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Development of formulated diets for snakehead (*Channa striata*): use of rice bran and feeding stimulants in fish meal/soybean meal diets

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Abstract- The development of the snakehead (*Channa striata*) aquaculture industry depends on the development of formulated feeds. The previously showed that soybean meal (SBM) could replace up to 40% of the fish meal (FM) in formulated feeds for snakehead as long as phytase and essential amino acids (EAA) were added. In the current study, we investigated the use of rice bran (RB) to replace FM and SBM in snakehead diets and a feeding attractant solution to increase the percentage of SBM that could be incorporated. In Experiment 1 substituted 0% (control), 10, 20, and 30% of RB and found no differences in survival or growth among any of the treatments, except that the 10% treatment had higher growth than the control. In Experiments 2 substituted 0% (control), 50, 60, or 70% of FM with SBM (and added EAA and phytase) plus a feeding attractant solution. The study found that either 70% substitution was feasible (based on growth data), 60% was feasible (based on food conversion ratio data), and 50% was feasible (based on economic benefit).

Keywords: *Channa striata*, rice bran, feeding attractant

I. INTRODUCTION

Developing formulated feed for snakehead (*Channa striata*) aquaculture industry in Vietnam in order to replace low-value fish, or small-size fish to reduce fishing pressure on the small fish. In a previous study (Hien et al., 2015) we demonstrated that soybean meal (SBM) can replace up to 30% of fish meal (FM) in formulated diets for *Channa striata* and *Channa micropeltes* if essential amino acids (EAA’s) are added to make up the EAA deficiencies in SBM and that this value can be increased to 40% if phytase is added to the diets to break down the phytin in SBM.

Rice bran (RB) also is a rich source of protein (8.34-16.3%), oil, dietary fiber, and micronutrients (Hien et al., 2006). RB has been used in formulated feed for terrestrial animals and aquaculture species (Hertrampf and Piedad-Pascual, 2000). Moreover, RB is an available and abundant crop by-product in the Mekong Delta of Vietnam. To reduce the cost of feed for snakehead, diminish trash fish use, and reduce the environmental impact, RB is thought to be the best ingredient. Research has been conducted on utilization of RB in diets for Nile tilapia *Oreochromis niloticus* (Perschbacher and Lochmann, 1999; Liti, et al., 2006), silver barb *Puntius gononotus* (Mohanta et al., 2006), and *Streptocephalus proboscideus* (Ali and Dumont, 2002). Hien et al. (2006) reported defatted RB could be used in diets for tilapia *Oreochromis niloticus* and striped catfish *Pangasius hypophthalmus* with increased growth rate and reduced feeding cost. The popular forms of RB and cassava meal (CM) are dried full-fat rice bran, wet full-fat rice bran, defatted rice bran, and dry chopped CM (Hien et al., 2006).

Soybean meal (SM) is considered as the most nutritive plant ingredients widely used in fish feed and is potentially considered as the most pertinent protein source as an alternative to fish meal (Brown et al., 2008). Among plant protein ingredients, soybean meal has a well-balanced amino acid profile. Furthermore, SM has the advantage of being resistant to oxidation and spoilage and is naturally clean from organisms such as fungi, viruses, and bacteria that are harmful to fish (Swick et al., 1995). It has been observed in many fish species that anti-nutritional components in SM, such as trypsin inhibitor, antigens, lectins, saponins, and oligosaccharides, can harm digestibility of nutrients and performance of fish. Especially, SM contains approximately 15% of oligosaccharides (sucrose, raffinose, stachyose) that can have negative effects on nutrients utilization in fish. Feeding attractants such as betaine, squid viscera meal, and L-amino acids (L-alanine, L-glutamic acid, L-arginine) have been used to increase the palatability of plant protein diets for fish. Mackie and Mitchell (1985) summarized the results of various studies using dietary feeding attractants and reported the positive effect of mixtures of dietary free amino acids as feeding stimulants in rainbow trout, *O. mykiss* (Adron and Mackie, 1978); European eel, *Anguilla anguilla* (Mackie and Mitchell, 1983); Japanese eel, *A. japonicus* (Takeda et al., 1984); and Dover sole, *Solea solea* (Mackie and
Mitchell, 1982). More recently, squid viscera meal has been used as a feeding stimulant for Japanese seabass, *Lateolabrax japonicus* (Mai et al., 2006), and yellow croaker, *Pseudosciaena crocea* (Li et al., 2009).

Building on our previous results, we next wanted to increase the level of locally available plant products in diets for snakehead and to see if replacement of FM by SBM could be increased if soluble fish attractant. The objectives of this study were to: a) determine the optimal of RB in a diet containing fixed amounts of FM and SBM for optimum growth and cost-effectiveness for *C. striata*, and b) investigate the effects of supplementing dietary a feeding attractant solution on growth performance in fingerling snakehead fed diets containing more than 40% SBM.

II. MATERIALS AND METHODS

Two experiments were conducted: Experiment 1 was a study of the replacement of an FM/SBM mixture with an RB in diets for *C. striata*; Experiment 2 was a study of the effects of adding a feeding attractant solution to *C. striata* diets containing at least 50% SBM.

**Experiment 1:** Diets for Experiment 1 were formulated from the main ingredients FM, defatted SBM, CM, and dried RB to be isonitrogenous and isoenergetic and to contain 45% crude protein (CP) and 4.7 Kcal gross energy/g diet. The ratio of FM: SBM was 6:4. The experiment consisted of four treatments identified by the amount of RB: 0% RB (control), 10%, 20%, or 30% RB, as indicated in the composition of the experimental diets shown in Table 1. Experimental ingredients were homogeneously mixed and pelleted at 80°C without steam to produce feed with a diameter of 2 mm. The experimental feed was then sterilized at 105°C for 10 min and dried at 45°C for 24 h to reach 11–12% moisture.

Each treatment had three replicates with 50 fish per replicate. Snakehead fingerlings (4.51–4.63g in initial weight) were assigned randomly to each 500-L composite tank. Water temperature, measured daily, ranged from 27.0–28.0°C, pH and dissolved oxygen, measured weekly, were 7.6–7.7 and 6.68–6.76 ppm, respectively. The experimental period was 8 wks. Fish were fed to satiation twice a day (8:00 and 14:00). Uneaten food was removed from the tank following feeding and the feed intake recorded based on the amount fed minus that recovered (on a dry weight basis following placement in a drying oven for at least 4 hours at 105°C). Dead fish were collected and weighed.

**Table 1.** Composition and proximate analyses of four experimental diets (% of dry matter basis) used in Experiment 1

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Diets</th>
<th>0% RB</th>
<th>10% RB</th>
<th>20% RB</th>
<th>30% RB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish meal^a</td>
<td>34.5</td>
<td>33.6</td>
<td>32.8</td>
<td>31.9</td>
<td></td>
</tr>
<tr>
<td>Soybean meal^b</td>
<td>33.6</td>
<td>32.7</td>
<td>31.9</td>
<td>31.0</td>
<td></td>
</tr>
<tr>
<td>Dried rice-bran^c</td>
<td>0.00</td>
<td>10.0</td>
<td>20.0</td>
<td>30.0</td>
<td></td>
</tr>
<tr>
<td>Cassava meal^d</td>
<td>21.4</td>
<td>14.2</td>
<td>7.12</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>Vitamin Premix^e</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Mineral Premix^f</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Fish oil^g</td>
<td>5.63</td>
<td>4.47</td>
<td>3.32</td>
<td>2.17</td>
<td></td>
</tr>
<tr>
<td>Binder^h</td>
<td>1.82</td>
<td>1.80</td>
<td>1.79</td>
<td>1.78</td>
<td></td>
</tr>
<tr>
<td>Lysine^i</td>
<td>0.40</td>
<td>0.42</td>
<td>0.44</td>
<td>0.46</td>
<td></td>
</tr>
<tr>
<td>Methionine</td>
<td>0.28</td>
<td>0.8</td>
<td>0.28</td>
<td>0.28</td>
<td></td>
</tr>
<tr>
<td>Threonine</td>
<td>0.41</td>
<td>0.41</td>
<td>0.40</td>
<td>0.39</td>
<td></td>
</tr>
<tr>
<td>Phytase</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

Proximate composition (%)

<table>
<thead>
<tr>
<th></th>
<th>Diets</th>
<th>90.3</th>
<th>90.2</th>
<th>90.6</th>
<th>89.9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry matter</td>
<td>90.3</td>
<td>90.2</td>
<td>90.6</td>
<td>89.9</td>
<td></td>
</tr>
<tr>
<td>Crude protein</td>
<td>44.4</td>
<td>44.5</td>
<td>44.7</td>
<td>44.8</td>
<td></td>
</tr>
<tr>
<td>Crude lipid</td>
<td>9.27</td>
<td>9.59</td>
<td>9.75</td>
<td>9.33</td>
<td></td>
</tr>
<tr>
<td>Crude ash</td>
<td>10.1</td>
<td>10.5</td>
<td>10.2</td>
<td>10.6</td>
<td></td>
</tr>
<tr>
<td>Fibre</td>
<td>2.30</td>
<td>2.60</td>
<td>3.52</td>
<td>4.31</td>
<td></td>
</tr>
<tr>
<td>Nitrogen free extract</td>
<td>34.0</td>
<td>32.8</td>
<td>31.8</td>
<td>30.9</td>
<td></td>
</tr>
<tr>
<td>Gross energy (kcal/g)</td>
<td>4.81</td>
<td>4.79</td>
<td>4.78</td>
<td>4.71</td>
<td></td>
</tr>
</tbody>
</table>

Note:

^aFM: Kien Giang fishmeal was supplied by Minh Tam Co., Ltd (Vietnam). Moisture: 11.7%, crude protein: 65.1%, crude lipid: 7.94%, crude fiber: 0.55% and Ash:13.7%.
SBM: Argentine Soybean meal was supplied by Quang Dung Co., Ltd (Vietnam). Moisture: 8.78%, crude protein: 46.1%, crude lipid: 1.98%, crude fiber: 6.36% and Ash: 6.20%.

Dried rice bran was supplied by Cai Lan Oils & Fats Industries Company Ltd, Can Tho Branch, Cantho City, Vietnam. Moisture: 11.5%, crude protein: 12.7%, crude lipid: 14.3%, crude fiber: 5.00% and Ash: 7.94%.

Cassava meal was supplied by Gentraco Fed, Cantho province, Vietnam. Moisture: 13.3%, crude protein: 2.73%, crude lipid: 2.54%, crude fiber: 2.69% and Ash: 3.12%.

Vitamin mix consisted of (IU kg$^{-1}$ or g kg$^{-1}$): vitamin A: 2,500,000 IU; D3: 1,500,000 IU; vitamin E: 80 g; vitamin B1: 800 mg; vitamin B2: 2,000 mg; vitamin B6: 800 mg; vitamin B12: 20 mg; vitamin C: 8 g; vitamin K3: 1,000 mg; Choline: 200 g; Niacin: 6.5 g; Folic acid: 250 mg; Biotin: 40 mg.

Mineral mix consisted of CuSO$_4$: 10 g; ZnSO$_4$: 20 g; MgSO$_4$: 10 g; CoSO$_4$: 1 g; FeSO$_4$: 5 g; MnSO$_4$: 5 g; CaHPO$_4$: 1 g.

Fish oil was supplied by Vemedim Company Ltd, Cantho City, Vietnam.

Binder (Carboxymethylcellulose) was a Chinese product) imported by Thanh My Company Ltd, Cantho city, Vietnam.

Binder (Carboxymethylcellulose) was a Chinese product) imported by Thanh My Company Ltd, Cantho city, Vietnam.

Experiment 2 consisted of four treatments with increasing levels of SBM: 0% (FM), which was the control diet, 50%, 60%, or 70% (referred to as 50% SBM, 60% SBM, and 70% SBM, respectively). All SBM diets contained supplemental lysine and methionine to correct the essential amino acid (EAA) deficiencies associated with lowered levels of FM, as well as 0.02% phytase and 1.5% of a feeding attractant solution (Table 2). Thus, the four diet treatments are again referred to as FM, 50% SBM, 60% SBM, and 70% SBM. Each treatment again had three replicates with 30 fish per replicate.

Table 2. Composition and proximate analyses of nine experimental diets with solution feeding attractant addition in Experiment 3 (% of dry matter basis). Diet details are as explained in footnotes to Table 1.

<table>
<thead>
<tr>
<th>Ingredients (%)</th>
<th>FM</th>
<th>50% SBM</th>
<th>60% SBM</th>
<th>70% SBM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish meal</td>
<td>56.2</td>
<td>27.7</td>
<td>22.2</td>
<td>16.7</td>
</tr>
<tr>
<td>Soybean meal</td>
<td>0.00</td>
<td>40.4</td>
<td>48.5</td>
<td>56.7</td>
</tr>
<tr>
<td>Rice bran</td>
<td>15.0</td>
<td>15.0</td>
<td>15.0</td>
<td>15.0</td>
</tr>
<tr>
<td>Cassava meal</td>
<td>24.2</td>
<td>7.86</td>
<td>4.64</td>
<td>1.40</td>
</tr>
<tr>
<td>Vitamin Premix</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Mineral Premix</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Fish oil</td>
<td>2.18</td>
<td>4.22</td>
<td>4.61</td>
<td>5.01</td>
</tr>
<tr>
<td>Binder</td>
<td>0.50</td>
<td>0.50</td>
<td>0.50</td>
<td>0.50</td>
</tr>
<tr>
<td>Lysine</td>
<td>0.00</td>
<td>0.52</td>
<td>0.60</td>
<td>0.69</td>
</tr>
<tr>
<td>Methionine</td>
<td>0.00</td>
<td>0.35</td>
<td>0.41</td>
<td>0.48</td>
</tr>
<tr>
<td>Phytase</td>
<td>0.00</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>Fish attractant solution</td>
<td>0.00</td>
<td>1.50</td>
<td>1.50</td>
<td>1.50</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

Proximate composition (%)

| Dry matter       | 91.0 | 91.2 | 91.5 | 91.6 |
| Crude protein    | 44.7 | 44.7 | 44.5 | 44.6 |
| Crude lipid      | 8.96 | 8.15 | 8.38 | 8.26 |
| Crude ash        | 10.0 | 9.13 | 8.74 | 8.27 |

Note: Fish attractant solution was supplied by Trai Viet Co., Ltd (Vietnam) (consisting of 30% Crude Protein; 2.1% Omega-3 and 22.63% amino acid)

In experiments 2, all of the experimental diets were formulated to be isonitrogenous and isoenergetic to contain 45% crude protein (CP) and 4.5 kcal gross energy/g of diet. *Channa striata* fingerlings (2.24–3.79 g in initial weight) were randomly assigned to each experimental tank (500-L composite tank) and were fed to satiety. Water temperature, measured daily, ranged from 26.5–27.5°C. pH and dissolved oxygen, measured weekly, varied from 7.2–7.5 and 5.0–7.6 ppm respectively.

At the end of each experiment, fish were weighed and counted to calculate survival rate (SR), daily weight gain (DWG), feed intake (FI = feed consumed per fish per day / (initial weight * final weight)), feed conversion ratio (FCR), protein efficiency ratio (PER), and economic conversion ratio (ECR), which is simply feed cost multiplied by FCR.

Feed was analyzed for the following composition: moisture, crude protein (CP), crude lipid (CL), crude fiber (CF), nitrogen-free extract (NFE), and gross energy, all according to AOAC (2000). Loss on drying was used to determine moisture content; protein (N x 6.25) was determined by Kjeldahl method; lipid was determined by Soxhlet method; crude fiber was determined by acid and base hydrolysis, and gross energy was determined by bomb calorimetry. Carbohydrate-NFE equals 100-(CP+CL+CF).
Data were checked for normal distribution by One-Sample Kolmogorov-Smirnov test and homogeneity of variances by Levene’s test. Data were analyzed using One-way analysis of variance (One-way ANOVA) test followed by a Duncan’s Multiple Range Test. Differences in growth and feed efficiency between diet treatments were considered to be statistically significant when p ≤ 0.05. The statistical tests were performed using the SPSS statistical package (ver. 16.0, SPSS Company, Chicago, IL, USA).

III. RESULTS AND DISCUSSION

In Experiment 1, daily weight gain of fish in treatment 10% RB (0.29±0.02 g.day⁻¹) was significantly higher than that of fish in the control treatment that had no rice bran in the diet; moreover, final weight and daily weight gain of fish in treatment 20% and 30% rice bran in diet were not significantly different from those of fish in the control treatment and there was no significant difference among 10%, 20%, and 30% RB treatments in daily weight gain (Table 3). Survival rates of fingerlings were high (60.0 - 69.3%) and no significant differences were observed (Table 3). Feed intake fluctuated between 2.55 - 3.14% BW per day among treatments and showed significant differences, with the lowest FI in treatment 0% RB and other treatments; however, no significant differences were seen in FCR or PER (Table 3).

**Table 3.** Initial (Wi) and final (Wf) body weights (g), daily weight gain (DWG) (g.day⁻¹), survival rate (SR) (%), feed intake (FI) (%), feed conversion ratio (FCR), and protein efficiency ratio (PER) of *Channa striata* fed experimental diets (% of moisture matter basis) with different ratios of the replacement of Rice bran (mean±SE, n=3) in Experiment 1. Values in a row followed by the same letter are not significantly different (p<0.05).

<table>
<thead>
<tr>
<th>Diets</th>
<th>RB 0%</th>
<th>RB 10%</th>
<th>RB 20%</th>
<th>RB 30%</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR</td>
<td>60.7±3.71</td>
<td>60.5±3.46</td>
<td>62.0±6.11</td>
<td>69.3±2.91</td>
</tr>
<tr>
<td>Wi</td>
<td>4.54±0.05</td>
<td>4.57±0.04</td>
<td>4.63±0.04</td>
<td>4.51±0.02</td>
</tr>
<tr>
<td>Wf</td>
<td>17.4±0.36ab</td>
<td>20.9±1.22ab</td>
<td>19.9±1.11ab</td>
<td>19.4±0.70ab</td>
</tr>
<tr>
<td>DWG</td>
<td>0.23±0.01ab</td>
<td>0.29±0.02ab</td>
<td>0.27±0.02ab</td>
<td>0.27±0.01ab</td>
</tr>
<tr>
<td>FI</td>
<td>2.55±0.03ab</td>
<td>3.04±0.09bc</td>
<td>2.90±0.08bc</td>
<td>3.14±0.06bc</td>
</tr>
<tr>
<td>FCR</td>
<td>1.29±0.05</td>
<td>1.26±0.07</td>
<td>1.27±0.07</td>
<td>1.28±0.06</td>
</tr>
<tr>
<td>PER</td>
<td>1.75±0.07</td>
<td>1.79±0.10</td>
<td>1.77±0.10</td>
<td>1.75±0.08</td>
</tr>
</tbody>
</table>

These results extend those of our previous study (Hien et al., 2015) and further indicate the possibility of using formulated diets for rearing snakehead in captive conditions. The improvement in the growth performance of snakehead fingerlings fed the 10% RB diet compared to the result from the 0% RB diet may have been caused by the presence of micronutrients in RB. The CM content decreased along with the increase of RB in diets (Table 1). RB is abundant in trace minerals and vitamin B, especially vitamin B1 (thiamine), that are necessary for growth (Guillaume et al., 2001). Vitamin B1 plays a major role in carbohydrate metabolism (Hertrampf and Piedad-Pascual, 2000). No significant difference in FI was observed between 10% RB and 30% RB treatments. However, the growth response of snakehead in 10% RB treatment was better, inducing the lowest FCR in this experiment. That result may be caused by the highest fiber content in 30% RB diet (4.31%) whereas the cassava meal (which plays a role as a good binder for the diet) was absent, reducing the stability of the pellet and raising waste feed, although no significant differences in FCR and PER were observed among treatments. Suhenda et al. (2005) found in Asian catfish (4.9 g/fish in initial weight) fed 55.6% RB in the diet that FCR was low (1.3), and SGR and PER were high (4 % per day and 2.6, respectively). According to Trieu et al. (2001), survival rates of snakehead fingerlings during 4 weeks in tank conditions ranged from 60.2 to 100%. The growth performance of fish in this experiment was better than that of snakehead fingerlings (initial weight 5.22g) fed with 50% crude protein (CP) (1.19%.day⁻¹) which were studied by Trieu et al. (2001). In summary, RB could be well utilized by snakehead fingerlings with levels from 10% to 30% without any differences in growth performance. Hence, RB could be used in formulated feed for snakehead fingerlings up to 30% to reduce feed cost.

In experiment 2, survival rate fluctuated between (47.8 – 58.9%) among treatments and showed significant differences, with the FM and the others. There were again no significant differences among the treatments in the final weight, daily weight gain, or FI (Table 4); however, there were significant differences in FCR between the SBM 70% treatment and all the other diets, as well as in PER between the SBM 60% and 70% diets and the FM and SBM 50% diets (Table 4).

**Table 4.** Initial (Wi) and final (Wf) body weights (g), daily weight gain (DWG) (g.day⁻¹), survival rate (SR) (%), feed intake (FI) (%), feed conversion ratio (FCR), protein efficiency ratio (PER) of *Channa striata* fed experimental diets (% of moisture matter basis)
with solution feeding attractant addition (mean±SE, n=3) in Experiment 3. Values in a row followed by the same letter are not significantly different (p<0.05).

<table>
<thead>
<tr>
<th>Diets</th>
<th>FM</th>
<th>50% SBM</th>
<th>60% SBM</th>
<th>70% SBM</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR</td>
<td>53.3±1.92&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>58.9±2.94&lt;sup&gt;b&lt;/sup&gt;</td>
<td>47.8±1.11&lt;sup&gt;a&lt;/sup&gt;</td>
<td>57.8±2.94&lt;sup&gt;ab&lt;/sup&gt;</td>
</tr>
<tr>
<td>Wi</td>
<td>2.28±0.03</td>
<td>2.27±0.03</td>
<td>2.24±0.01</td>
<td>2.24±0.02</td>
</tr>
<tr>
<td>WF</td>
<td>8.53±1.11</td>
<td>8.32±0.50</td>
<td>8.67±0.87</td>
<td>8.33±1.00</td>
</tr>
<tr>
<td>DWG</td>
<td>0.15±0.03</td>
<td>0.15±0.01</td>
<td>0.16±0.02</td>
<td>0.15±0.02</td>
</tr>
<tr>
<td>FI</td>
<td>3.69±0.47</td>
<td>3.79±0.11</td>
<td>4.48±0.25</td>
<td>4.65±0.32</td>
</tr>
<tr>
<td>FCR</td>
<td>1.06±0.02&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.06±0.05&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.23±0.06&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.37±0.09&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>PER</td>
<td>2.11±0.04&lt;sup&gt;b&lt;/sup&gt;</td>
<td>2.11±0.09&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1.83±0.09&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>1.65±0.12&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

From an economic point of view, replacing up to 30% of FM and SBM by RB yielded economic benefits (Table 5). The cost for one kg fish weight gain was reduced by 6.88% in treatment 30% RB compared to the control treatment. In Experiments 2, the cost for one kg fish weight gain decreased 9.91% and 10.5%, respectively, in the 50% SBM diet compared to the control diet; however, the replacements over 50% were not economically beneficial because of increasing FCR (Table 5).

**Table 5.** Feed costs for producing one kg weight gain by fish fed the experimental diets in the two experiments a) The different ratios of the replacement of Rice bran of the Experiment b) the replacement of Fish meal by Soybean meal with solution feeding attractant addition in the Experiment 2.

<table>
<thead>
<tr>
<th>Diets</th>
<th>Cost/ Kg fish weight gain (USD)</th>
<th>The reduction compared to control (%) in the experiment</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Experiment 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RB 0%</td>
<td>0.84</td>
<td>--</td>
</tr>
<tr>
<td>RB 10%</td>
<td>0.81</td>
<td>3.58</td>
</tr>
<tr>
<td>RB 20%</td>
<td>0.79</td>
<td>6.10</td>
</tr>
<tr>
<td>RB 30%</td>
<td>0.78</td>
<td>6.88</td>
</tr>
<tr>
<td>b) Experiment 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FM</td>
<td>0.70</td>
<td>--</td>
</tr>
<tr>
<td>50% SBM</td>
<td>0.62</td>
<td>10.5</td>
</tr>
<tr>
<td>60% SBM</td>
<td>0.70</td>
<td>-1.05</td>
</tr>
<tr>
<td>70% SBM</td>
<td>0.76</td>
<td>-9.41</td>
</tr>
</tbody>
</table>

We found in previous studies that SBM can replace up to 30% of FM in the snakehead diet without addition of phytase or 40% of FM with the addition of phytase (Hien et al., 2015). The results of the current study show that addition of feeding attractant solution to snakehead diets could allow the replacement of FM with SBM to be as high as 70% (based on growth results), 60% (based on FCR results), or 50% (based on PER and economic results). Experimental results showed that when adding odors, stimulating the feeding, the growth of fish in the 60-70% high protein replacement diet was still good, not different from the control treatment. Hydrolyzed fish protein is used as a protein supplement and food stimulant, leading to increased growth and feed efficiency of salmonids (Berge and Storebakken, 1996; Carvalho et al., 1997). This positive effect may be increased digestibility of the protein of hydrolyzed fish due to the enzyme processing of raw materials. Protein breakdown produces short-chain peptides and free amino acids. Free amino acids act as a food stimulant for some fish, increasing growth and feed utilization. Papatryphon and Soares (2000) reported the addition of 2% fish soluble to fish food, including the amount of striped bass fish *Morone saxatilis* has a similar effect very close to the effect of neutral, non-essential amino acids. However, the addition of 2% fish fluid to *Sciaenops ocellatus*, did not affect growth (Davis et al., 1995), but added 2% or 4% of fish fluid to soybean meal-based diets has increased the food intake and growth of the red drum. (McGoogan and Gatlin, 1997). Positive effects of feeding attractants were previously shown in *Epinephelus malabaricus* by adding 1% of squid viscera meal for using a blend of rendered animal protein ingredients to replace fish meal in practical diets (Wang et al., 2008).
IV. CONCLUSION

In the snakehead diet can use 30% RB. For the addition of feeding stimulants, 70% SBM protein for fish meal protein was feasible (based on growth data), 60% was feasible (based on food conversion ratio data), or 50% was feasible (based on protein efficiency ratio data and economic benefit).

ACKNOWLEDGMENT

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Development And Assessment Of Self-Paced Module For Grade 7 Science Cum Worksheets

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Abstract: Biology is one of the core subjects in the K to 12 Curriculum. This study endeavored to assess the use of Strategic Intervention Material as a tool in remediating Grade 7 Biology least learned competencies in San Felipe Integrated School. It also sought to find out the least learned competencies based from the second quarter test result in biology class and describe the extent of the mastery of 75 respondents after the use of SIM as an intervention.

As revealed in the study, based on the second quarter test result, respondents possess the minimum knowledge about identifying beneficial and harmful organisms such as fungi, protists and bacteria, relationship of animal to the surroundings, biotic and abiotic factor of the ecosystem, difference of asexual and sexual reproduction, and the components of plant and animal cells.

The result of mastery level per learning competencies using the verbal descriptions of each attained percentage and cumulative percent. In the first competency, most of the respondents fell within “moving towards mastery” but one of them was described as “low mastery” after remediation. In the second competency, most of the respondents were at the range of “moving towards mastery”, in the third competency, students were categorized as having “average mastery” after the remediation. While in the fourth and fifth competency, most of the students were described as having “average mastery” while there are three students with “absolutely no mastery”. There were noted factors of difficulties of respondents in learning the competencies.

It is recommended that teachers find time in making strategic intervention materials to help learners study the topics, lessons or difficulties during their vacant time, holidays, when typhoon occurs, suspension of classes and when they are at home, make a progress chart for each students as reference for their improvement, and the conduct of similar studies is recommended with consideration for localized materials, three domains of learning, and higher order thinking skills.

Keywords: curriculum, item analysis, module, self-assessment, mastery of learning

1. Introduction

In this globally competitive world, education plays a significant role in every individual’s life. Through education a person is equipped with the necessary knowledge, attitude and skills needed for life-long learning. According to Suba (2010), learning is a process wherein an idea is acquired in different ways. Learning requires concept formation and mental construction of knowledge into concept systems.

To make the learning always available in all learners, new strategies, techniques and methods are advised to teacher in order that the teacher cope up with the present trend of computer generated learners. The focus of K-12 Curriculum is to have a student centered approach in all schools at all times. They encourage teachers to use inquiry-based approach, constructivist approach, integrative and collaborative
method of teaching as a strategy to meet the desired goal of DepEd Curriculum (deped.resources, 2015).

However, school days these past few years were loaded with so many activities and concerns. There are also yearly holidays that teachers observed every month that they need to follow. Aside from this, teachers are required to attend different seminars to upgrade their knowledge and be updated in all new regulations and memoranda to follow. Learners were also trained in different subjects to be the contestants in quiz bee contests, sports meet, school camping, etc. Due to these reasons, the desired learning competencies cannot be mastered in a short period of time. There is not enough time to teach the other competencies in just few days.

Moreover, learners have poor performance in Science based from the mean percentage score of the last quarter. Learners in this generation are more addicted to gadgets, mobile games and social media. Learning difficulties may be attributed to different factors like the environment, technology, peers, parents and even the school. Structure of the school with limited resources and learning materials can affect the learning needs of the students. Distance of school from home of the learners may also a factor to cope learnings. This is the reason why the researcher was encouraged to make a Strategic Intervention Material in Grade 8 Biology subject. The purpose is not only to help the students to keep up with the lesson but also to help them to learn and remediate the learning competencies.

Biology subject is a major subject that focuses on the discussions and experimentation taught in sixty minutes (one hour). The teacher should be flexible to facilitate the learning to ensure that learners will understand the lesson in a few days. In addition, some of the learning competencies are pre-requisite knowledge to understand the learning competency in the next grade level. If the teacher fails to teach other competencies, students will lack the knowledge to answer formative, summative and quarterly test. Thus, the performance level of students will be low.

Based from the research of Kamamia et al., (2014), mastery of subject matter is an essential skill that a teacher requires to be endowed with for it has a direct impact in teaching and learning process in schools. The learner gets maximum benefit from teacher-learner relationship that is based on teacher’s competence in the delivery of subject content.

Therefore, in order that the Grade 8 students will have the mastery of the learning competencies, the researcher thought of ways to help them and one way is by providing SIMs. According to Suba (2010), it is an effective means of instruction because it is a self-paced, independent learning materials that provide learnings for immediate reinforcement of correct responses.

According to Vega et al., (2009) Strategic intervention material is an instructional material meant to reteach the concept and skills. It is a tool given to learners to help them master a competency-based skill which they were not able to develop during the regular classroom teaching with minimal intervention or guide of the teacher.

Through the use of SIMs, students will learn best especially when they discover answer for questions and problems themselves. They will learn to find their own goals and be given choices as to what and how to learn. Students learn most effectively when they feel to be a part of the intervention such as understanding on the concepts, interactive topics and discussions with summative test at the end. If the teacher provides SIM, it will serve as supplementary material to the current K to 12 resources where contextualization is a top priority (lrmds.portal, 2012).

Moreover, the study of Anderson (2012) revealed that using intervention material had assisted the learners of Biology to improve their performance in understanding the concepts of photosynthesis, respiration, mendelian, non-mendelian genetics etc. He uses of computer-based materials and exercises on concept mapping allowed these students to improve their performance significantly in answering and understanding genetic problems and concepts. Finally, Escoreal (2012) found that the use of SIM reduced the number of least mastered skills after the implementation of the intervention material in Grade 4 Science. He particularly emphasized that SIMs must be implemented to avoid pupils’ marginalization. Proving that students can cope with science lessons with the teacher utilization and integration of intervention materials.

Students learned much from the intervention material or self-learning material and can work with it. They had ease receiving the instruction, interested and motivated to learn the subject, and gained significant learning using the material.
According to Vega, Prieto, and Carreon (2009), “each individual must be equipped to seize learning opportunities throughout life, both to broaden knowledge, skills and attitudes, and adapt to a changing, complex and interdependent world.

The quality of student’s performance remains to be the top priority of every academic institution. Aside from the National Achievement Test administered by the government, private schools seek the help of privately operated organizations such as the Center for Educational Measurement (CEM). According to its official website, CEM achievement tests are designed to measure academic stability and achievement of students in English, Reading/Pagbasa, Mathematics, Science, Araling Panlipunan, and Filipino.

**Biology as a Subject**

According to Geleta et al., (2008), biology is one of the elective subjects in the Key Learning Area (KLA) of Science Education. The Biology Curriculum serves as a continuation of the Science (S1-3) curriculum and builds on the strength of current Biology curricula. It will provide a range of balanced learning experiences through which students develop the necessary scientific knowledge and understanding, skills and processes, values and attitudes embedded in the “Life and Living” strand and other strands of science education for personal development and for contributing towards a scientific and technological world. The curriculum will prepare students for entering tertiary courses, vocation-related courses or the workforce in various fields of life science.

In order that the teacher will help the learners to deepen their understanding in learning competencies or lessons to be taught, according to Renard et al., (2016), learning competencies should give focus because today, learning happens in a classroom, with a lots of other students. The teacher teaches a lesson and goes on the next one. If a student can’t master the lesson or learning material, there are many ways schools try to support those students to catch up. But since every student is more or less on the same time schedule, there are only few things you can do. At some point, you have to move on the next topic. Those that were not able to catch up, will struggle more and more, and eventually fall so far behind that it becomes impossible to catch up.

### Mastery of Learning

According to Renard et al., (2016), mastery of learning aims to change that, primarily by letting go of the concept that everyone is on the same time schedule. It requires more differentiated learning, giving students more time to go over the learning material, giving them extra explanation and support. And he would also eventually master the learning material, just like anybody else. He also added that mastery of learning focuses on mastering a topic before you move on to an more advanced one. The mastery approach suggests that every student is on his own track. Education would have to be personalized and learners would have private tutors and different worksheets for every learner. It sounds really new and impractical, but the truth is that, 100 years ago, there already experiments where they did mastery-based learning and saw great results. They also said it would never scale because it was logistically difficult and impractical.

When student needs to practice and get feedback, teachers can use adaptive exercises like book widgets, modules, and self-learning material. Because of providing learning materials, students can finally master the concepts while building a growth mindset, grit, and taking agency over their learning. Students do not have to focus anymore on the lecture. They can now interact with each other and get a deeper mastery over the material.

### K-12 Science Curriculum

According to the Department of Education, the K to 12 science curriculum will provide learners with a repertoire of competencies important in the world of work and in a knowledge-based society. It envisions the development of scientifically, technologically, and environmentally literate and productive members of society who are critical problem solvers, responsible stewards of nature, innovative and creative citizens, informed decision makers, and effective communicators. This curriculum is designed around the three domains of learning science: understanding and applying scientific knowledge in local setting as well as global context whenever possible, performing scientific processes and skills, and developing and demonstrating scientific attitudes and values. The acquisition of these domains is facilitated using the
following approaches: multi/interdisciplinary approach, science technology-society approach, contextual learning, problem/issue-based learning, and inquiry-based approach. The approaches are based on sound educational pedagogy namely, constructivism, social cognition learning model, learning style theory, and brain-based learning.

Science content and science processes are intertwined in the K to 12 Curriculum. Without the content, learners will have difficulty utilizing science process skills since these processes are best learned in context. Organizing the curriculum around situations and problems that challenge and arouse learners’ curiosity motivates them to learn and appreciate science as relevant and useful. Rather than relying solely on textbooks, varied hands-on, minds-on, and hearts-on activities will be used to develop learners’ interest and let them become active learners.

As a whole, the K to 12 science curriculum is learner-centered and inquiry-based, emphasizing the use of evidence in constructing explanations. Concepts and skills in Life Sciences, Physics, Chemistry, and Earth Sciences are presented with increasing levels of complexity from one grade level to another in spiral progression, thus paving the way to a deeper understanding of core concepts. The integration across science topics and other disciplines will lead to a meaningful understanding of concepts and its application to real-life situations.

Features of K-12 Curriculum in Preparing Learners’ Materials

According to DepEd Order No. 42 s. 2016, in preparing daily lesson plans, teacher’s learning materials are encouraged to emphasize the feature of K to 12 Curriculum which are spiral progression, constructivism, differentiated instruction, and contextualization.

The K to 12 curriculum follows a spiral progression of content. This means that students learn concept while they are young and learn the same concepts repeatedly at a high degree of complexity as they move from one grade level to another. According to Bruner (1966) this helps the learners to organize their knowledge, connect what they know and master it. Teachers should make sure that in preparing the SIM, learners are able to revisit previously encountered topics with an increasing level of complexity and that lessons build on previous learning.

The K to 12 curriculum views learners as active constructors of knowledge. This means that in planning lessons, and creating instructional materials and intervention materials teacher should provide learners with opportunities to organize or re-organize their thinking and construct knowledge that is meaningful to them. This can be done by ensuring that lessons engage and challenge learners and tap into the learners’ zone of proximal development (ZPD) or the distance between the learners’ actual development level and the level of potent development. Vygotsky (1978) suggests that to do this, teachers can employ strategies and provide self-learning materials that allows collaboration among learners so that learners are varying skills can benefit from interaction with one another.

All K to 12 teachers are encouraged to differentiate their teaching in order to help different kinds of learners meet the outcomes expected in each lesson. Differentiation or differentiated instructional materials provide multiple learning opt the classroom so that learners of varying interests, abilities, and needs are able to take in the same content appropriate to their needs.

Section 5 of RA 10533 or the Enhanced Basic Education Act of 2013 states that the K to 12 Curriculum shall be learner-centered, inclusive and developmentally appropriate, relevant, responsive, research-based, culture sensitive, contextually global, and flexible enough to allow schools to localize, indigenize, and enhance the same based on their respective educational and social contests. K to 12 teachers are allowed to use contextualized strategy and materials in their lessons for improving academic performance and mastering it.

Self- directed Learning

According to Skiff and Hetzel (2008), self-directed learning describes a process by which individuals take the initiative, with or without the assistance of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes. According to Knowles (1975) in self- directed learning, learner takes the initiative to pursue a learning experience, and the
responsibility for completing their learning. Once the initiative is taken, the learner assumes complete responsibility and accountability for defining the learning experience and following it through to its conclusion. This does not preclude input from others, but the final decision is the learner’s decision. Self-direction does not mean the learner learns alone or in isolation. While, that may be the case in any given learning situation, the critical factor here, again, is the fact the learner is driving the total learning experience, beginning with recognizing a need to learn.

**Strategic Intervention Material as a tool in Biology**

The Department of Education employs a solution for the deteriorating academic performance of students in the field of science and technology. As stipulated in the DepEd Order no. 39, s. 2012, interventions have to be made in order to address learning gaps. The use of Strategic Intervention Material (SIM), is identified as one of the suggested various intervention form that can bridge learning gaps. SIM is a remediation aid for the students at the level of their understanding and thereby increasing their academic achievement.

SIM was defined by Bunagan (2012) as meant to re-teach the concepts and least mastered skills, and in this study the science concepts and skills. It is a material given to students to aid in mastering the competency-based skills which they were not able to develop in regular classroom instructions. SIM is a multifaceted approach to aid the students, especially those who are non-performing to become independent and successful learners.

SIM increases and deepens students’ skills in manipulation, knowledge or thinking, understanding, and observing the microscopic into macroscopic representation of cell like atoms, molecules, and ions which students believe as a vague symbolism of what they know about biology and other related concepts in science. SIM is an instructional material that is prescribed by the Department of Education to increase the level of proficiency of students in science subjects.

According to Dacumos (2015), the crafting of these tools have been intensified through the conduct of division, regional, and national competitions for SIM making and part of the teacher’s innovation for ranking purposes. However, it is through this same activity that SIMs have been used for levelling up the achievement in Science of the learners, rather for personal pursuit. But regardless, in preparing this tool, science educators are encountered by another predicament, that is in the selection and development of assessment methods in crafting science SIMs, which are appropriate, suitable and strategically-designed for students’ learning. Assessments in SIMs include a variety of methods that allow students to demonstrate evidence of learning such as performance of tasks and applying to real-life situations. Gone are the days that assessments are confined to paper and pencil, thus, authentic assessments have to be encouraged in the making of SIMs.

An instructional intervention is a specific program or set of steps to help a child improve in an area of need. According to Enriquez (2007), the Filipino seems to be the most effective when he is exposed to a material as a meaningful whole. While he appreciates parts, he tackles them simultaneously or sequentially. He does this not according to an inflexible and pre-conceived plan but according to the most efficient combination of interaction between the exigencies of the situation and the changing demands of the active-self. The Filipino would rather control his schedule than allow himself to become compulsive victim of the imposed structure.

**Effectiveness of Self-directed Learning**

Another result from Manipal University research about “The effectiveness of self-directed learning (SDL) and the Traditional Lecture” by Pai, Rao, and Punja (2007), they found out that in the first topic, Batch A students, who were exposed to an independent SDL session, scored similar to Batch B, who were supplemented with a lecture to SDL. This suggests that the additional lecture delivered to one batch of students failed to make SDL session more effective for learning the topic. There was no significant difference in the number of students with high, medium, or low scores between the two groups. Hence, the different learning methods employed did not influence different levels of scores between the two groups.

Therefore, it was concluded that, SDL can be considered as an alternate form of learning in knowledge acquisition. As SDL was equally effective as lecture, it is not necessary to supplement one instructional approach with the other. However, in
this study, SDL sessions could cover only few topics area from the total content needs to be done to ascertain the impact of SDL on science curriculum and level of mastery of science class.

Some researchers have highlighted the motivational component of self-directed learning, arguing that this kind of learning is effective because it makes students more willing and more motivated to learn. But few researchers have examined how self-directed learning might influence cognitive processes, such as those involved in attention and memory.

In an article published in Perspectives on Psychological Science, a journal of the Association for Psychological Science, researcher Gureckis and Markant of New York University (2008) address this gap in understanding by examining the issue of SDL from a cognitive and a computational perspective. According to them, research from cognition offers several explanations that help to account for the advantages of self-directed learning. For example, SDL helps us optimize our educational experience, allowing us to focus effort on useful information that we do not already possess and exposing us to information that we do not have access to through passive observation. The active nature of SDL also helps us in encoding information and retaining it over time. But we are not always optimal self-directed learners.

Drawing together, research from cognitive and computational perspectives will provide researchers with a better understanding of the processes that underlie SDL and can help bridge the gap between basic cognitive research and applied educational research. Hope that this integration will help researchers to develop assistive training methods that can be used to tailor learning experiences that account for the specific demands of the situation and characteristics of the individual learner.

Learning difficulties against science curriculum

According to Geleta et al., (2008), in order students will develop their necessary scientific knowledge and understanding, skills and processes, values and attitudes in science curricula, strands in science education will be strengthen and developed to prepare students towards a scientific and technological world.

In addition, the teacher will help learners to deepen their understanding in learning competencies or lessons to be taught, according to Renard et al., (2017), learning competencies should give focus because today, learning happens in a classroom, with a lots of other students. The teacher teaches a lesson and goes on the next one. If a student can’t master the lesson or learning material, there are many ways schools try to support those students to catch up.

Isaacson et al., (2016) agrees that providing accessible science learning activities may help to increase both the number of individuals who have learning difficulties and the adoptability and diversity of science learning. Rosenkranzer et al., (2016) added that the understanding of complex, dynamic and animate systems has a special standing in education for the sustainable development and biology. Hudson (2016) concluded in their study that teacher must provide an overview of the strengths and weaknesses of the students, as well as practical suggestions for modifying teaching materials and methods to make learning enjoyable, effective and accessible for all learners.

Moreover, students have learning difficulties each topic in every quarter. Maybe of the reason that, in Self-Regulation Theory of Bandura cited by McClendon (2002), self-learning influences the level of goal challenge people set for themselves, the amount of effort they mobilize, and their persistence in the face of difficulties. It means that self-learning influences the performance accomplishments over self-set goals.

Westwood (2016), learning difficulties provides guidance on teaching students that encounter difficulties in number of learning areas including science. He used a cross-curricular perspective, he suggested this as the best strategies for reducing learning failure and enhancing student’s progress. Fried (2012) added a practice of experiential pedagogy like using of strategic intervention material address student’s learning. She believed that experiential pedagogy engages students’ knowledge construction and helps students to learn holistically.

Bahar et al., (2007) suggest that students perceived science subject as difficult, there are level of abstractness in science concepts, teacher’s assessment in the curriculum or the type of exam administered by the teacher.

Classroom and learning disabilities through instruction of science may contribute the difficulty in learning. Bulat et al., (2017) concluded that having
learning disability can be one of the most marginalizing factors in child’s life and education. Disabilities can be challenging especially in school moreover when there are severely limited resources.

According to the study conducted by Escoreal (2012), he concluded that the use of SIM reduced the number of least learned skills. He emphasized that SIM avoids student’s marginalization and utilized students to cope science lessons. Renard et al., (2017) added the SIM provides students to master the concepts with deeper mastery over the material.

However, there are some instances that learners are confined in what they know, Enriquez (2007) opposed this in which he suggested that intervention material is the most efficient of combination of interaction between exigencies of the situation and which learners changing demands of the active self.

Emotional factor may one of the reasons where nine respondents fell in average and low mastery. Meyer et al., (2008), found that the students who adopted a deep approach in learning were very likely to pass the course, while students who adopted a surface approach were very likely to fail. The students who adopted a deep approach also generally expressed greater satisfaction with their instruction. According to Kendra (2014), this happens when a student fails to focus on what is being taught. Maybe they had other things in their mind that day or the material simply was not engaging enough to capture their attention. Another reason for not paying attention is that the student didn’t see a reason for learning this information; it didn’t seem to have a purpose related to the subject at hand. There is an encoding failure which may also occur when too much information all at once, causing them to have to pick and choose what the brain will retain.

However, the study of Ibe cited by Martin (2009) shows that majority of students are poor in sentence analysis. Another reason in which a respondent may fail and not mastered the competency well is supported by Sigamony (2014), he reveals that if the students do not analyze a lesson he or she fails to grasp a concept to pre-knowledge and their existing knowledge structures which militate against any kind of understanding.

2. Goals and aims of the present study

This study aimed to assess the use of Strategic Intervention Materials (SIMs) as a tool in remediating Grade 7 Biology least learned competencies in San Felipe Integrated School. Specifically, it sought to answer the following questions:

1. What are the least learned competencies based from the Second Quarter test result in Grade 7 Biology class?
2. How may the extent of the mastery of five least learned competencies be described after the use of SIM as an intervention?

3. Methods

Through the use of SIMs learners can master their least learned competencies and teachers will help students to learn by their own. Through SIMs utilization learners are assisted in achieving success in concept mastery. Thus, using learning or intervention materials performance level on the competencies will be improved, developed and mastered.

Among the various systems of individualized instruction proposals, modular instruction is one of the newest and it combines many advantages of a number of separate instructional innovations, such as performance objectives, self-pacing, and frequent feedback.

Bruner’s Cognitive Learning Theory (1966) concluded that learning is an active process in which learners construct new ideas or concepts upon their current or past knowledge. He also added that the learner selects and transforms information, construct hypotheses, and make decisions, relying on a cognitive structure to do so. Cognitive structure provides meaning and organization to experiences and allows the individual to “go beyond the information given”.

This research entails how SIMs described mastery level of students after the utilization of SIMs. After the second quarter test, students are described with their least learned competencies. Bruner emphasized that learners will construct new ideas when they are given information and meaningful experiences. Thus, after researcher selected five least learned competencies he designed a SIMs to remediate students’ least learned competencies. This gives a clue to support minimal knowledge of students in Biology subject. Relying on a cognitive structure and information given, students developed their
mastery level. This will become meaningful because the intervention materials are self-pacing, performance objective and self-directed.

Corollary, the current study could be best presented and analyzed using the Context, Input, Process and Product (CIPP) Model which was developed by Daniel Stufflebeam in 1960’s. Figure 1 depicts the flow of the study using the CIPP Model.

From the context of testing from second quarter lessons in Grade 7 Biology there are inputs of five least learned competencies. In the CIPP Model, these five least learned competencies are containing of the Strategic Intervention Material which is part of the process and the resulting outcome is an improved level of five least learned competencies in Grade 7 Biology subject.

In order to gather the desired results, the descriptive research method is employed. It includes studies presenting the facts concerning the nature and status of anything. This means that it gives meaning to the quality and standing of facts that are going on.

Three main purposes of research are: to identify the least learned competencies based from the Second Quarter test result in Grade 7 Biology class, to describe the mastery level of Grade 8 least learned competencies after the use of SIMs as an intervention.

Descriptive research generally precedes explanatory research. According to Jackson (2009) it aims at casting light on current issues or problems through a process of data collection that enables them to describe the situation more completely.

The researcher used and designed intervention materials which are the SIMs as a tool in describing the Grade 7 students in remediating their learning competencies in Biology.

Research Instruments

The instrument used in this study are the Second Quarter Test in Grade 7 Biology as the basis for identifying five least learned competencies. The researcher did an item analysis using the table of specification. After identifying the ten least learned competencies, the researcher identified the five topics of the least learned competencies which is the basis in construction of the strategic intervention material. The number of test items was derived after the item analysis and the type of test to assess the learning of respondents are presented below which is derived from the topics of every learning competency.

<table>
<thead>
<tr>
<th>Competencies</th>
<th>Number of Test Items</th>
<th>Type of Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rank 1</td>
<td>15</td>
<td>Multiple Choice</td>
</tr>
<tr>
<td>Rank 2</td>
<td>10</td>
<td>Multiple Choice</td>
</tr>
<tr>
<td>Rank 3</td>
<td>10</td>
<td>Multiple Choice</td>
</tr>
<tr>
<td>Rank 4</td>
<td>10</td>
<td>Multiple Choice</td>
</tr>
<tr>
<td>Rank 5</td>
<td>5</td>
<td>Multiple Choice</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>50</td>
<td></td>
</tr>
</tbody>
</table>

To assess the learning competencies each topics has corresponding computations of number of items. Rank 1 in the least learned competencies has more items and is definitely the difficulty of the learners on the subject, and a decreasing computations until Rank 5.

To identify the level of mastery of students after the SIM administration from the assessment in each learning competencies the researcher adopted the Policy Guidelines on Classroom Assessment for the K to 12 Basic Education Program on DepEd Order no. 8 s. 2015 standard grading system for quarterly assessment illustrated below:

According to DepEd Memorandum no. 160 series of 2012, to determine the quality learning outcomes from the assessment results or any descriptive equivalent after data utilization including the use of intervention and remedial instruction, such mastery or achievement level are specified. Thus, the researcher followed the rating scale for determining mastery level of Grade 7 after the utilization of SIMs, remediation and assessment.

To describe each learning competency, descriptions below and each calculated percentage used:
Strategic intervention material is the main tool in this study. This material was validated by the English teacher, school principal, and Chairman of School Evaluation Team. It is composed of five parts which include; Title card, Guide card, Activity card, Assessment card, and Reference card. SIMs was aligned with the Second Quarter least learned competencies identified after the Second Periodical Examination. Afterwards, SIMs was given to the identified respondents and they are tasked to answer the activities within five days. The researcher checked the activities on the activity card and assessment card before giving the assessment or least learned test.

Statistical tool

Descriptive statistics was used in the study. The process of the study was illustrated using the CIPP Model. After the examination of second quarter, frequency of the correct answer per item number are counted for the formulation of the item analysis. Through ranking, data were analyzed. The item number that has least frequency ranked as the least learned competency. Through the use of SIMs, least learned competencies were improved. After the retrieval of the intervention material, respondents answered the least learned test to assess their mastery level. Percentage or rating scale categorized the class into different classifications. The score per learning competency were analyzed, and computed using the Microsoft Excel Spreadsheet and then presented in table form. Frequency, percentage, and cumulative percentage were computed to analyze the tests result (second quarter and least learned assessment) of the respondents in remediating their least learned competencies in Biology subject.

4. Results

After the conduct of second quarter test in Grade 7 Biology, a table of specification was used to identify the item number in which students had the most and least learned competencies. The researcher did an item analysis, and ten least learned competencies (see Appendix 7) were drawn and identified by using ranking from the frequency of the correct answer. The five identified competencies were the substance of the intervention material. It was validated by the School Evaluation Team including the principal, English teacher and consultant. Each learner was given a SIM. They enjoyed answering the activity card and assessment card in the SIM. They did answering at home and during their vacant hours with their parents, guardians, and peers. To validate the effectiveness and learnings of the respondents from the SIM given, the researcher administered least learned assessment test on the fifth day after the retrieval of the material. The researcher checked the test papers, then computed the percentage by using the standard grading system based from DepEd Order no. 8 s. 2015. The rating scales were used to categorize the mastery level of respondents in each least learned competencies. The researcher also used cumulative percentage to determine the respondents fell within above average level to mastered level, and from average to low mastery level.

The five least learned competencies based from the second quarter test result were revealed in Table 2. As indicated in the table, “identify beneficial and harmful organisms” is the first least learned competency, “describe the different ecological relationship found in an ecosystem” is the least learned competency 2, “differentiate biotic from abiotic components of ecosystem” is the third least learned competency, “differentiate asexual from sexual reproduction in terms of number of individuals involved and similarities of offspring to parents” is the fourth least learned competency, and “differentiate plant and animal cells according to presence and absence of certain organelles” is the fifth least learned competency.
At this level, respondents possess the minimum knowledge about identifying beneficial and harmful organisms such as fungi, protists and bacteria, relationship of animal to the surroundings, biotic and abiotic factor of the ecosystem, difference of asexual and sexual reproduction and the components of plant and animal cells.

According to Geleta et al., (2008), in order students will develop their necessary scientific knowledge and understanding, skills and processes, values and attitudes in science curricula, strands in science education will be strengthen and developed to prepare students towards a scientific and technological world.

In addition, the teacher will help learners to deepen their understanding in learning competencies or lessons to be taught. According to Renard et al., (2017), learning competencies should give focus because today, learning happens in a classroom, with lots of other students. The teacher teaches a lesson and goes on the next one. If a student cannot master the lesson or learning material, there are many ways schools try to support those students to catch up.

Isaacson et al., (2016) agrees that providing accessible science learning activities may help to increase both the number of individuals who have learning difficulties and the adoptability and diversity of science learning. Rosenkranzer et al., (2016) added that the understanding of complex, dynamic and animate systems has a special standing in education for the sustainable development and biology. Hudson (2016) concluded in their study that teacher must provide an overview of the strengths and weaknesses of the students, as well as practical suggestions for modifying teaching materials and methods to make learning enjoyable, effective and accessible for all learners.

Moreover, students have learning difficulties of each topic in every quarter. This may be due to the Self-Regulation Theory of Bandura cited by McClelland (2002) that states “self-learning influences the level of goal challenge people set for themselves, the amount of effort they mobilize, and their persistence in the face of difficulties.” It means that self-learning influences the performance accomplishments over self-set goals.

**Extent Level of Mastery for Learning Competency 1**

Table 3 shows the level of mastery of Grade 7 Biology class after the use of Strategic Intervention Material and an assessment on the knowledge retained and remediated competencies.

As reflected in Table 3, five out of 36 students fell within “mastered” rating scale, six students were within “nearly mastered”, 16 learners were within “moving towards mastery”, eight students among the class were within “average mastery” and one student fell in “low mastery”.

<table>
<thead>
<tr>
<th>Level of Mastery</th>
<th>Percentage</th>
<th>Frequency</th>
<th>Cumulative Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mastered</td>
<td>96-100</td>
<td>5</td>
<td>100.0</td>
</tr>
<tr>
<td>Nearly Mastered</td>
<td>86-95</td>
<td>6</td>
<td>96.1</td>
</tr>
<tr>
<td>Moving Towards Mastery</td>
<td>66-85</td>
<td>16</td>
<td>69.4</td>
</tr>
<tr>
<td>Average Mastery</td>
<td>55-65</td>
<td>8</td>
<td>25.0</td>
</tr>
<tr>
<td>Low Mastery</td>
<td>16-34</td>
<td>1</td>
<td>2.8</td>
</tr>
<tr>
<td>Very Low Mastery</td>
<td>5-15</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Absolutely No Mastery</td>
<td>0-4</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>36</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Based on this result, it implies that most of the students performed moving towards mastery level approximately 69.4% cumulative percentage after the use of intervention. There are few students who mastered the competency while there is one or 2.8% of the class who fell in low mastery level or having difficulty in learning the first competency.

These findings were consistent with the study conducted by Westwood (2016), learning difficulties provides guidance on teaching students that encounter difficulties in number of learning areas including science. He used a cross-curricular perspective, he suggested this as the best strategies for reducing learning failure and enhancing student’s progress. Fried (2012) added a practice of experiential pedagogy like using of strategic intervention material address student’s learning. She believed that experiential pedagogy engages students’ knowledge construction and helps students to learn holistically.

As revealed in Table 3, there were few students who fell in average mastery and low mastery.
This may be due to the reasons illustrated by Bahar et al., (2007) such as, students perceived science subject as difficult, there are level of abstractness in science concepts, teacher’s assessment in the curriculum or the type of exam administered by the teacher.

Classroom and learning disabilities through instruction of science may contribute to the difficulty in learning. Bulat et al., (2017) concluded that having a learning disability can be one of the most marginalizing factors in child’s life and education. Disabilities can be challenging especially in school where there are severely limited resources.

**Extent Level of Mastery for Learning Competency 2**

Table 4. Respondents’ Level of Mastery for Learning Competency 2 after using the SIM

<table>
<thead>
<tr>
<th>Level of Mastery</th>
<th>Percentage</th>
<th>Frequency</th>
<th>Cumulative Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mastered</td>
<td>96-100</td>
<td>5</td>
<td>100.0</td>
</tr>
<tr>
<td>Nearly Mastered</td>
<td>86-95</td>
<td>6</td>
<td>96.1</td>
</tr>
<tr>
<td>Moving Towards Mastery</td>
<td>66-85</td>
<td>16</td>
<td>69.4</td>
</tr>
<tr>
<td>Average Mastery</td>
<td>55-65</td>
<td>8</td>
<td>25.0</td>
</tr>
<tr>
<td>Low Mastery</td>
<td>16-34</td>
<td>1</td>
<td>2.8</td>
</tr>
<tr>
<td>Very Low Mastery</td>
<td>5-15</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Absolutely No Mastery</td>
<td>0-4</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Table 4 shown the mastery level of Grade 7 students in Biology class after the used of the intervention. To assess the mastery level learner’s cumulative percentage was used.

As revealed in Table 4, five of the respondents fell within “mastered” level, six respondents performed within “nearly mastered”, or 27 respondents fell within “moving towards mastery”, eight respondents out of 36 fell in “average mastery” and one respondent was within “low mastery”.

This implies that most of the respondents were on “moving towards mastery” level with 69.4% cumulative percentage. There were few students who mastered and nearly mastered the second learning competency. There were nine respondents who fell in average and low mastery level with 25.0% cumulative percentage.

According to the study conducted by Escoreal (2012), the use of SIM reduced the number of least learned skills. He emphasized that SIM avoids student’s marginalization and utilized students to cope science lessons. Renard et al., (2017) added the SIM provides students to master the concepts with deeper mastery over the material.

However, Enriquez (2007) suggested that intervention material is the most efficient of combination of interaction between exigencies of the situation and which learners changing demands of the active self.

Emotional factor may also one of the reasons where nine respondents fell in average and low mastery. Meyer et al., (2008), found that the students who adopted a deep approach in learning were very likely to pass the course, while students who adopted a surface approach were very likely to fail. The students who adopted a deep approach also generally expressed greater satisfaction with their instruction.

**Extent Level of Mastery for Learning Competency 3**

Table 5 reveals the extent level of mastery among Grade 7 Biology class for Learning Competency 3 “Differentiate biotic from biotic components of ecosystem”.

As shown in Table 5, four respondents were described as having “mastered” the learning competency 3, one student performed “nearly mastered”, five respondents out of 36 fell within “moving towards mastery”, 11 respondents were described as having “average mastery”, 11 respondents got “low mastery”, three learners fell within “very low mastery” and one respondent was described as having “absolutely no mastery”.

Table 5. Respondents’ Level of Mastery for Learning Competency 3 after using the SIM

<table>
<thead>
<tr>
<th>Level of Mastery</th>
<th>Percentage</th>
<th>Frequency</th>
<th>Cumulative Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mastered</td>
<td>96-100</td>
<td>4</td>
<td>100.0</td>
</tr>
<tr>
<td>Nearly Mastered</td>
<td>86-95</td>
<td>1</td>
<td>88.9</td>
</tr>
<tr>
<td>Moving Towards Mastery</td>
<td>66-85</td>
<td>5</td>
<td>86.1</td>
</tr>
<tr>
<td>Average Mastery</td>
<td>55-65</td>
<td>11</td>
<td>72.2</td>
</tr>
<tr>
<td>Low Mastery</td>
<td>16-34</td>
<td>11</td>
<td>41.7</td>
</tr>
<tr>
<td>Very Low Mastery</td>
<td>5-15</td>
<td>3</td>
<td>11.1</td>
</tr>
<tr>
<td>Absolutely No Mastery</td>
<td>0-4</td>
<td>1</td>
<td>2.8</td>
</tr>
</tbody>
</table>

Table 5 implies that there are 72.2% respondents categorized “average mastery towards mastered” the learning competency 3, while there are
41.7% cumulative percentage lied within “low mastery to absolutely no mastery”.

Findings in this study was consistent and parallel to the study of Isaacson et al., (2016), who examined the potential relationship of accessible hands-on science learning experiences to the development of positive beliefs concerning one’s capacity to function in the sciences and motivation. There were respondents on the survey who had low vision that most were failed.

On the other hand, there are suggestions that Fried (2012) had given in order that students may master and transform learning through engagement. One is the student who has minimum knowledge must have affairs and cooperate to honor classmates, to have broader context and understanding driven to more knowledge construction.

Vygotsky (1978) states that the challenge cannot be too great, however. If students are confronted with tasks that call for thinking too far above their current developmental level, they may not be able to understand what is being required of them. Moreover, challenge alone even at an appropriate level may not be sufficient to move students to higher levels of development. Students confronted with challenges to their fundamental beliefs may feel threatened and either persist at their current developmental levels or retreat to even lower levels. To avoid these outcomes, instructors should provide appropriate support to help their students meet the challenges.

**Extent Level of Mastery for Learning Competency 4**

Table 6 shows the level of mastery of the respondents for learning competency 4 after the SIM was used. Number of respondents was distributed according to the rating scale on how they were performed accordingly. Cumulative percentage was used to analyzed each mastery level.

Foregoing result reveals that there were four respondents who fell within “mastered” level, one out of 36 respondents got “nearly mastered”, six were described as “moving towards mastery”, eight fell within “average mastery”, 15 respondents got “low mastery”, two of them were described as having “very low mastery”.

Table 6 implies that there are 69.4% categorized as “average towards mastered” on learning the fourth competency, while there are 47.2% based on the cumulative percent falls within “low mastery to very low mastery”. According to Mendezabal (2013), students who do not have adequate study habits can affect their achievements. Therefore, 47.2 percent of the class in the research maybe claimed that they are lacking on self-study habits.

Mike (2014) added that if the whole class is struggling with the lesson, it may be due to the syllabus that has been badly designed and the lesson’s inappropriate content or failing students come to class late and/or do not show up at all. When they do show up, they send text or play videos during class or otherwise do not pay attention. They do not read the material before class and do not complete their assignments. Some students do not care if they fail.

Based on the different studies, it shows that students are marginally poor in answering the task and coping with the competencies. However, an improvement in their level of mastery was noted after the use of interventions or self-directed materials.

**Extent Level of Mastery for Learning Competency 5**

Table 7 indicates the respondents’ level of mastery after the used of SIM as an intervention to remediate the fifth least learned competency. Rating scale was used to describe the competency based from the least learned test administered to each respondent.

As shown in Table 7, it reveals that six respondents were within “mastered” level, five respondents fell within “moving towards mastery”, 12 of them described themselves as having “average mastery”, ten performed with “low mastery” level, and three respondents had “absolutely no mastery”.

---

**Table 6. Respondents’ Level of Mastery for Learning Competency 4 after using the SIM**

<table>
<thead>
<tr>
<th>Level of Mastery</th>
<th>Percentage</th>
<th>Frequency</th>
<th>Cumulative Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mastered</td>
<td>96-100</td>
<td>4</td>
<td>100.0</td>
</tr>
<tr>
<td>Nearly Mastered</td>
<td>86-85</td>
<td>1</td>
<td>88.9</td>
</tr>
</tbody>
</table>

www.ijsrp.org
At this level, there were students possessing minimum knowledge in differentiating plant and animal cell according to its absence and presence organelles. Learning tools were not sufficient and students did not pay attention to content.

Based from the observation, the students only read the content of the test but they did not analyze the questions.

According to Kendra (2014), this happens when a student fails to focus on what is being taught. Maybe they had other things in their mind that day or the material simply was not engaging enough to capture their attention. Another reason for not paying attention is that the student did not see a reason for learning this information; it did not seem to have a purpose related to the subject at hand. There is an encoding failure which may also occur when too much information all at once, causing them to have to pick and choose what the brain will retain.

Parallel study of Ibe cited by Martin (2009) shows that majority of students are poor in sentence analysis. Another reason in which a respondent may fail and not master the competency well is supported by Sigamony (2014) who reveals that if the students do not analyze a lesson he or she fails to grasp a concept to pre-knowledge and their existing knowledge structures which militate against any kind of understanding.

Chaitin (2017) states in his essay “The Limits of Reason”, he argued that understanding something means being able to figure out a simple sets of rules that explain the situation.

5. Conclusions

Based on the findings, the following conclusions are drawn:

1. There were five least learned competencies identified after the second quarter test in Grade 7 Biology class.
2. After the use of strategic intervention and assessment, respondents fell within moving towards mastery level and average mastery level in coping with the five least learned competencies in Biology subject.

Acknowledgements

The researcher would like to extend his sincerest gratitude to the following persons who rendered their valuable time, patience

Dolores Salvacion F. Tolentino, RGC, statistician for giving suggestions and assistance to make this study clearer and successful;
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Compliance with the “4 right” principle in pesticide using of decorative tree planters in Nam Phong village, Nam Dinh province, Viet Nam

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** Department of Basic Sciences, Nam Dinh University of Nursing, Nam Dinh, Vietnam

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**Abstract**- The objective of the study is to describe the real situation of appliance with the “4 right” principle of planters and to study the impact of this compliance on safety and effectiveness. A cross-sectional study was designed in order to satisfy the aims of the study. Subjects are planters who have committed to use pesticides at least 5 times in the past 3 months. By choosing 1 person in each household, the total of 220 respondents participated in the questionnaire survey designed on the Likert scale. Results of the study reveal that the level of compliance with the principle “4 right” of the subjects is in the average level with a score from 3.68-3.91/5. The criterion of using the right pesticide in the principle of “Correct pesticide” was most violated (36.8% of respondents rarely declared and occasionally complied). There is a positive relationship between compliance with “principle 4 right” and safety and effectiveness in pesticide using through people’s self-assessment. In conclusion, there was a widespread violation of the “4 right” principle of pesticide using. Communication and consultation programs on the use of pesticide for people should be maintained.

**Index Terms**- Pesticides, compliance, decorative plants, planters, Nam Dinh province

I. INTRODUCTION

The term “pesticide” is considered to embrace active ingredients in any form, irrespective of whether, or to what extent, they have been formulated for application. Pesticides that kill or control pests, they also include some substances used to modify the behavior or physiology of pests or plants during production or archive 1.

Pesticides play an important role in ensuring food security through pest control, reducing the risk of crop failure, improving productivity and quality of agricultural products (Seyed & Mohamad, 2011 and WHO, 2019). However, pesticides have also been shown to be related to health problems (Seyed & Mohamad, 2011; Carolyn et al., 2015; Kim et al., 2017; Hu et al., 2015, and Mahmood et al., 2016). They can enter the body through the gastrointestinal tract, respiratory tract, skin and mucous membranes. The characteristics of the drug, its exposure time, exposure level and individual health status are the key determinants of post-exposure health problems (WHO, 1990). After penetration, pesticides can be metabolized, excreted, stored or bio-accumulated in the body and thereby cause human health problems (WHO, 1990; Pirsahel et al., 2015, and Cui et al., 2015). Health problems caused by exposure to pesticides are very diverse, such as the neurological, cardiovascular, respiratory, Gastrointestinal - hepatobiliary syndromes, blood (Carolyn et al., 2015; Kim, Kabir & Jahan 2017). In order to limit the negative impact of pesticides on the environment and health, WHO has recommended that the use of pesticides for food production should adhere to good agricultural practices regardless of the economic status of the country (WHO, 2019).

Vietnam is a developing country in which agriculture plays an important role in ensuring national food security and National Gross Domestic Product. To ensure the safe usage of pesticides, Vietnamese Government has also issued guidelines and legalized regulations on good agricultural very soon. In 2015, the “4 right” principle in the use of pesticides was officially legalized. This is one of the important principles in plant protection and quarantine activities in Vietnam. However, the literature review found that there were very few studies evaluating people's compliance with the “4 right” principle. Besides, the current research has focused mainly on rice and vegetable planters (Cuong & Thuan, 2017, and Giang et al., 2016), the test gap on this issue on decorative tree planters still exists. The objective of the study is to describe the real situation of compliance with the principle “4 right” in the use of pesticides by decorative tree planters, and at the same time explore the relationship between compliance with the principle “4 right” with safety and effectiveness in the usage through their self-assessment.
II. METHODS
The study was conducted in 2019 at decorative tree planting village of Nam Phong commune, Nam Dinh province. This is the coastal area in the southeast of the Red River Delta region of Vietnam. The surveyed subjects were kumquat and peach planters who have committed to the acts of spraying pesticide at least 5 times in the past 3 months, they did not participate in testing tools, but they were be able to answer and agree to participate in answering the interview. Each household chose 1 person who regularly sprayed or was present at home when the enumerator came. A total of 220 people from 220 households planting kumquats and peaches in the village agreed to participate in the interview (reaching 97.8%).

The research toolkit consists of 2 parts: Part I “4 right principles” is based on the “Principles of plant protection and quarantine activities” in the 2013 Plant Protection and Quarantine Law of Vietnam. The “4 right” principles include: right pesticide (RP1-RP5), right time (RT1-RT4), right concentration and dose (RC1-RC5), right way (RW1-RW5). The evaluation scale consists of 5 steps built according to the Likert-scale. This is specifically listed as follows: (1) = Never comply; (2) = Very little comply; (3) = Occasional comply; (4) = Regular comply; (5) = Always comply. Part II self-assesses the safety and effectiveness of people’s pesticide use (GS1-GS3). The 5-level Likert scale evaluates the levels including: (1) = Strongly disagree; (2) = Disagree; (3) = Confused; (4) = Agree; (5) = Totally agree. The result of testing the tool showed that the content validity index was suitable (6 experts: S-CVI/Ave=0.96; S-CVI/UA=0.86) and Cronbach’s Alpha coefficient = 0.884.

The used statistical methods included descriptive statistics, assessment of reliability of scales, Exploratory Factor Analysis (EFA), and multivariate linear regression analysis. Regression model with 4 independent variables including: X1 was the average value of the factors measuring the right pesticide factor (RP1-RP5); X2 was the average value of the factor measurement variables at the right time (RT1-RT4); X3 was the average value of the variables measuring the factor of correct concentration and dose (RC1-RC5); X4 is the average value of the proper factor variables (RW1-RW5). The Y-dependent variable was the average value of the variables measuring the level of safety and effectiveness when using the drug (GS1-GS3). The regression equation showed the relationship between the status of compliance to the principle of “4 right” and the level of safety and effectiveness when using pesticides with the form: \[ Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + u_i \]

III. RESULTS
A total of 220 people participated in the interview, of which men accounted for 63.2% with the average age was 46.02; The majority of newcomers completed lower secondary school (66.8%). About 77.3% of subjects had an experience of spraying ≥10 years. The average number of sprays in the past three months was 26.37 times (the lowest was 10 and the highest was 37 times). The rate of subjects spraying from 20-30 times/past three months accounts for about 49.5%; more 30 times is 32.3%

The level of compliance to the “4 right” principle of people was at a moderate level. The rate of compliance always reached a mean level. The right time was the best compliance principle, while the right medication was the most violated principle as shown in Table 1 below.

Table 1. Real situation of complying the “4 right” principle of research subjects (n=220)

<table>
<thead>
<tr>
<th>Principles</th>
<th>Notation</th>
<th>Compliance level (rate %)</th>
<th>Mean±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Very little compliance</td>
<td>27.7</td>
</tr>
<tr>
<td>The criteria of the “right drugs” principle</td>
<td></td>
<td>Occasional compliance</td>
<td>27.7</td>
</tr>
<tr>
<td>Right pest</td>
<td>RP1</td>
<td>Constant compliance</td>
<td>61.8</td>
</tr>
<tr>
<td>Right crop plants</td>
<td>RP2</td>
<td>Always compliance</td>
<td>65.0</td>
</tr>
<tr>
<td>Right list of prescribed drugs</td>
<td>RP3</td>
<td></td>
<td>29.1</td>
</tr>
<tr>
<td>Right farming condition</td>
<td>RP4</td>
<td></td>
<td>35.9</td>
</tr>
<tr>
<td>Right type (Name of drugs and active ingredient)</td>
<td>RP5</td>
<td></td>
<td>35.9</td>
</tr>
<tr>
<td>The criteria of the “right time” principle</td>
<td></td>
<td></td>
<td>27.7</td>
</tr>
<tr>
<td>At the right time of the pest (age, stage of disease)</td>
<td>RT1</td>
<td></td>
<td>27.7</td>
</tr>
<tr>
<td>Right time on a day (Morning, noon, after noon)</td>
<td>RT2</td>
<td></td>
<td>25.5</td>
</tr>
<tr>
<td>Right weather condition (rainy, sunny)</td>
<td>RT4</td>
<td></td>
<td>27.7</td>
</tr>
<tr>
<td>The criteria of the “right concentration and dosage” principle</td>
<td>RC1</td>
<td></td>
<td>34.1</td>
</tr>
<tr>
<td>Right amount of dosage recommended on the label</td>
<td>RC1</td>
<td></td>
<td>34.1</td>
</tr>
</tbody>
</table>
The results of the reliability test of the scale show that the coefficient Cronbach’s Alpha = 0.87. All correlation coefficients between component variables and total variables (Corrected Item-Total Correlation)> 0.3 and Cronbach’s Alpha if Item Deleted values were also <0.87. Therefore, all observed variables of the factors were preserved and continued to run EFA analysis. Results of running EFA by Principal components method with Varimax rotation showed KMO value = 0.827, Barlett’s test = 1945.741 with significance level <0.001. There are 4 groups of factors formed from 19 initial observed variables. Total Variance Explained value = 63,715, Eigenvalues value of 4 factors from 1,445 - 5,789 to ensure requirements. Factor loading > 0.5 and there was no case that the variable uploaded both factors at the same time with the load factor close together. So factors ensured the convergence and differentiation when analyzing EFA.

In addition, there was no disturbance of factors, only the disturbance of the position of the items in each factor (see Table 2 below).

Table 2. Rotated Component Matrix between the variables of compliance “4 right” principle in using plant protection drugs of decorative tree planters

<table>
<thead>
<tr>
<th>Rotated Component Matrix</th>
<th>Item</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RC2</td>
<td>1.232</td>
</tr>
<tr>
<td></td>
<td>RC1</td>
<td>0.850</td>
</tr>
<tr>
<td></td>
<td>RC3</td>
<td>0.795</td>
</tr>
<tr>
<td></td>
<td>RC5</td>
<td>0.732</td>
</tr>
<tr>
<td></td>
<td>RC4</td>
<td>0.713</td>
</tr>
<tr>
<td></td>
<td>RW3</td>
<td>0.843</td>
</tr>
<tr>
<td></td>
<td>RW2</td>
<td>0.823</td>
</tr>
<tr>
<td></td>
<td>RW4</td>
<td>0.790</td>
</tr>
<tr>
<td></td>
<td>RW1</td>
<td>0.749</td>
</tr>
<tr>
<td></td>
<td>RW5</td>
<td>0.647</td>
</tr>
<tr>
<td></td>
<td>RT4</td>
<td>0.796</td>
</tr>
<tr>
<td></td>
<td>RT1</td>
<td>0.794</td>
</tr>
<tr>
<td></td>
<td>RT2</td>
<td>0.771</td>
</tr>
<tr>
<td></td>
<td>RT3</td>
<td>0.768</td>
</tr>
<tr>
<td></td>
<td>RP5</td>
<td>0.767</td>
</tr>
<tr>
<td></td>
<td>RP1</td>
<td>0.734</td>
</tr>
<tr>
<td></td>
<td>RP4</td>
<td>0.699</td>
</tr>
<tr>
<td></td>
<td>RP3</td>
<td>0.681</td>
</tr>
<tr>
<td></td>
<td>RP2</td>
<td>0.511</td>
</tr>
</tbody>
</table>

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 5 iterations.

After running EFA, the independent variables were kept for regression analysis. The results of the regression analysis showed that the Adjusted R Square was 0.446. Testing the hypothesis of the overall fit of the model results in a value of F = 45.146 with p <0.001, showing that R^2 of the population was non-zero, this means that the linear regression model built was consistent with it the overall. The analysis results also showed that there was no multi-collinear phenomenon in the model (Table 3). Other assumptions of the model such
as the normal distribution of residuals, linear relation, constant variance and independence of error were all guaranteed (Attachment file). The regression equation had the form: \[ Y = 0.648 + 0.36X1 + 0.085X2 + 0.195X3 + 0.17X4. \]

Table 3. Analyzing of linear current to describe the relation between real situation of complying “4 right” principle and self-evaluation of safety and effectiveness in using plant protection drugs of the planters.

<table>
<thead>
<tr>
<th>Factors</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
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IV. DISCUSSION

Complying the principles of pesticide using is a necessary condition in agricultural production in general because this activity is related to the level of safety for users as well as the impact on the living environment. The research results showed that the level of compliance with the “4 right” principle in the pesticide using of kumquats and peach planters was quite average. The average score of the criteria was only from 3.68/5 (DT5) to 3.91/5 (DL21 and DC3). Compared with studies in Vietnam, it was better to comply with the “4 right” principle of the subjects in this study. The survey on vegetable planters in Thanh Hoa showed that the average score of the criteria in the principle of “4 right principle” was only from 2.06-3.63/5 points (Cuong & Thuan, 2017). A similar result was also reported on rice farmers in Thai Binh when this went up to 80% of households violated “4 right principle” correctly (Lan, Le & Phong, 2014). A violation of the “4 right” principles could also be partly attributed to previous research results on pesticide use (Giang et al., 2016; Hoa et al., 2019; Lanh, 2016; Luu et al., 2014, and Toan 2013). As a result, this research result was correlated with the results of the studies that had been consistent with the view that violation of the principles of pesticide using was quite common in rural areas of Vietnam.

The right pesticide is considered the first rule in the “4 right” principle because if you do not choose the right pesticide, the compliance with the remaining principles will not work. The results of this research were similar to previous studies when it was considered the most violated principle. A recent study in Mazandaran - Iran showed that selecting the right pesticide list allowed only 22 out of 25 proposed criteria for planters’ choice of drug usage. A survey report at Ekiti State - Nigeria found that up to 86.7% of the drugs were classified as highly dangerous by WHO but still selected to be used by people. The use of pesticide outside the list of regulations/recommendations had also been reported in many studies in Vietnam (Cuong et al., 2017; Lan et al., 2014, and Nhan et al., 2015). The overuse of unknown active ingredients and their toxicity could lead to increased pest resistance, negative impacts on the ecosystem and user health.

The right time is the principle that is best complied in 4 principles, but only at a moderate level (3.83/5-3.91/5). Previous reports on this issue in Vietnam also showed similar results. Only about 63% of rice farmers in Phong Dien-Can Tho and tea planters in Pong Drang commune, Dak Lak province implemented the right time to start spraying. Even this rate among vegetable planters in Da Lat, Lam Dong province was only 14.4% (K’Vay & Dung, 2013). The survey in Le Xu, Hung Yen province also showed that only 50% of farmers implemented the time of starting spraying according to experience, neighbors and when the presence of pests/diseases was present (Lanh, 2016). This situation had also been described in studies in Tanzania (Jakaya, Mizengo & Yoweri, 2015), in Malaysia (Halimatusadiah et al., 2016), in Ghana (Mattah, Mattah & Futagbi, 2016) and in Nepal (Khanal & Sigh, 2016).

The research results also showed that the violation of the principle of right concentration and dosage is taking place quite popularly. Specifically, 30-38.7% of people rarely and occasionally comply with the criteria of this principle. This situation has also been confirmed in many previous studies. Planters can measure the pesticide dosage with a spoon or bottle or whatever is available and even measure the amount of pesticides to be made by hand, mixing pesticides higher than recommended, according to the economic experience. Experiments and often increase the dose higher than recommended (Lan & Le, 2014; Truong & Vi, 2016; Rakosanam et al., 2012). The main reason for using a higher dose than directed is to make sure it is effective after spraying, saving time and labor (Toan, 2013).

This finding repeated the results of studies which suggested that “the right way” is also a frequently violated principle, although the level seems to be lower than other principles (Cuong & Thuan, 2017; Lan et al., 2014, and Mattah, Mattah & Futagbi, 2015). The least compliant criterion in this principle is “making the right pesticide (the form of powder or solution, the order of mixing the drugs)”. The situation of mixing two or more pesticides with irregular rules, arbitrarily mixing drugs was also recorded in many previous reports (Lan et al., 2014; Linh, Binh & Lam, 2014, and Thang et al., 2011). Some causes of incorrect mixing of pesticides were proposed: Planters often used a mixture of pesticides with the hope that they could create a new drug that had a wide impact, could be deducted simultaneously to eliminating pests and improving the effectiveness of drugs. Many planter households hire sprayers, because they want to save time, the sprayer has mixed a variety of drugs at once. Due to the lack of knowledge about the pesticide mixture, the mixtures are often unreasonable (Lan et al., 2014). To save time and labor, to prevent and repel many pests after spraying, and simply do follow their neighbors when they realize the effect of this approach (Toan, 2013).
According to FAO, there are many factors affecting crop productivity and quality such as Agronomic factors, Management, Land development and land improvements, Conservation and the environment, Socio-economic factors (FAO, 1985). Being able to assess all of these factors at the same time requires a lot of resources. With limited resources, the scope of this study only focused on understanding the effectiveness of the “4 right” principle on the safety and effectiveness of pesticide usage through users’ self-assessment. The results from the regression model showed that all factors in the “4 right” principle had a positive effect on the safety and efficiency of the usage. This means that improving any of these factors will improve people’s safety and effectiveness of using plant protection drugs. Basing on the Standardized Coefficients of the regression model, the influence of the independent variables on the dependent variable can be determined as follows: the “right pesticide” factor group has the strongest impact; the second one is “Right time” factor group, the “Right way” factor group stands in the third position and the final one is the “Right dose” factor group. However, these four factors only explained 44.6% of the variation in the level of safety and effectiveness when it is used. This is entirely consistent with the recommendations of FAO because pesticides contribute only a part in the success of a crop. A similar report was also found on vegetable planters in Thanh Hoa-Viet Nam, where the five principles of plant protection drug usage also explained 51.7% of the variation in safety and efficacy (Cuong & Thuan, 2017).

V. CONCLUSION

The principle of “4 right” plays an important role in agricultural production because it is related to the level of safety for users, impacts on living environment and economic efficiency. Current research shows that the level of compliance to the “4 right” principles of decorative tree planters is only fairly average. The most violated principle is "right pesticide" with typical criteria as "Correct pesticide category". All 4 criteria in the “4 right” principle are positively related to safety and effectiveness when used through selection of the people. This study has provided a very useful data from a decorative tree village in Vietnam. However, the research results may be affected by the data collection through interviews only.

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Substance Abuse: “An escape from reality” Alcohol Dependence and it’s relation with Sensation Seeking among adolescents.

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Abstract: The goal of the present study was to examine a relation between Alcohol Dependence and Sensation Seeking. To test the hypothesis as to whether Alcohol Dependence is significantly correlated with Sensation Seeking or not, self-reported questionnaires measuring severity of Alcohol Dependence and Sensation Seeking, were administered on a sample of 94 college students (between 18 and 24 years). It was found from the study that Alcohol Dependence was not significantly correlated with Sensation Seeking, however, sub-factors of Sensation Seeking like Boredom Susceptibility among male adolescents and Experience Seeking among female adolescents were significantly correlated with Alcohol Dependence, showing to some extent that these factors of Sensation Seeking play a role in giving rise to Alcohol Dependence.

Keywords: Adolescents, Alcohol Dependence, Sensation Seeking, Boredom Susceptibility, Experience Seeking.

Introduction

The world today is moving at a very fast pace in almost every aspect of life. New trends are increasing day by day and they particularly show how much we have developed overtime. However, with the developing trends we are also adapting and getting addicted to things (trends) that are making us more vulnerable. One of the major trends in today’s era is substance abuse, (consumption of psychoactive substances including alcohol and illicit drugs in a hazardous way are labeled as substance abuse, WHO). Overtime, there has been a tremendous increase in the past few years in utilization of various substances. Consumption of alcohol has not only become just a habit but also a status symbol in today’s world. People may consume alcohol in order to gain prestige in the society. Our paper seeks to clarify the important reasons behind the increased consumption of alcohol not only among the male population but also covering the female population as they too are getting addicted towards such things. The amount of dependence people have developed towards alcohol has led them to become addicted to various alcoholic substances. Apparently, it is harming people’s life not just physically but also psychologically in almost every region.

In many countries, consumption of various alcoholic drinks has become a diathesis for adverse illnesses. In 2015 around 79000 preventable deaths in England were attributed to smoking. Thus, the data differed for each country, though Eastern European countries seem to dominate when it comes down to the highest alcohol consuming country.

The countries that are the major alcohol dependent countries over the world include Lithuania, Russia, Czech Republic, Ireland, and France with Belarus as the highest alcohol dependent country with 17.50litres of alcohol consumed per capita. Such countries might
show increased rates of alcohol consumption, these countries experience extreme cold weather conditions and alcohol helps in warming up the body.

In India, liquors such as spirits are preferred more over beers. According to past two decades consumption of alcohol has increased to a great extent from 1 in 300 to 1 in 20. Statistics reported on alcohol and health reveal that 30 per cent of people consume alcohol regularly in India.12 The largest consumer of whiskey in the world is India and it constitutes about 60% of the IMFL (Indian made foreign liquor) market.7 Andhra Pradesh, Telangana, Kerala, Karnataka, Sikkim Haryana and Himachal Pradesh stand for the largest alcohol consuming states in India.7

The addiction of alcohol consumption and smoking has affected almost every age group but the most affected one is the present day’s youth. According to the United Nations, Youth can be defined as a period of transition from childhood to adolescence ranging from 15-24 years of age. A recent survey, the ESPAD conducted on the young European adults aged between 15-16 showed that around 90 per cent of young people had consumed alcohol at least once in their lifetime with the average age of initiation of 12 and a half years; Hibell et al (2009)16. The most popular drinks among adolescents in Europe are beer and spirits with beer accounting for 40 per cent of total alcohol consumption, (30%), wine (13%) and alcopops (11%). Portugal was a notable exception, with a rising lifetime prevalence for both boys and girls from 2003 to 200718. In general, beer was the most popular drink among boys, while spirits were more popular among girls.

The youth of India does not stay far behind in terms of using substances like alcohol or smoking cigarettes. Young males in Chennai along with areas of Meerut, Indore, Mumbai, Nagpur are high alcohol dependent states in India. An increased and repeated use or consumption of alcohol can lead to having a dependence on it, also marked by symptoms of withdrawal when relatively decreased (from previous consumption) amount of alcohol is being consumed.2. Alcohol prevalence is high among college students in Punjab and Ludhiana with a usage of 31.1 per cent11. In Mumbai, the alcohol consumption sums up to 18.8 per cent among young and older adults consuming alcoholic beverages. Organization for Economic Cooperation and Development (OECD) report in May 2015, there was an increase in alcohol use by about 55 percent between 1992 and 2012.1

Dehradun is the capital of the Indian state of Uttarakhand. It is a small city, however, during the past few years there has been an incredible change in people’s behavior and the trends. One of the trends that is highly being adopted by the adolescents of Dehradun is consumption of alcohol. Our paper majorly focuses on finding the underlying reasons responsible for this changing and hazardous trend in the city of Dehradun. Saxena and colleagues conducted a study (2010)20 in Doiwala block, district Dehradun to assess the rate of alcohol consumption and other substances. The study included 511 male adolescents from class 10th and 12th. It was observed in the study that with increasing age there was also an increase in the prevalence of alcohol. Also, it was seen that the initiation of substance abuse had started at the age of 14-15 years. In 8.7 per cent cases adolescents were found to be consuming alcohol, peer pressure being one of the major reason for this. 80.2 per cent of users wanted to quit the habit of substance abuse.

Juyal et al14 observed substance abuse patterns among students in Dehradun district of Uttarakhand. 1094 students from class 9th to 12th were chosen from two educational institutions. It was revealed from the study that 55.3 per cent children used arecanut/panmasala followed by tobacco. There were 26.2 per cent alcohol users. Also it was seen that 22.2 per cent of alcohol users and other substances users had consumed these substances for more than 20 days during the last month before the survey.

Zuckerman et al (1990)25 defined sensation seeking as the tendency to seek varied, novel, and stimulating experiences or taking risks in order to undergo such experiences. Individuals obtaining high scores on this trait often fulfill tasks that give pleasure and also have
difficulty to delay their gratification for the particular stimuli that give novelty experiences and lower down self-control, Gottfredson and Hirschi (1992). Various studies conducted in US found sensation seeking to be a significant predictor of substance abuse, Stacy, Newcomb, and Bentler (1993).

Sensation seeking is considered to be one of the major causes behind alcohol use problems. Sensation seekers are thought to use alcohol to attain stimulation. A study was conducted by Legrand and colleagues (2007) investigated the relation between sensation seeking and consumption of alcohol in French college going students. The sample consisted of 205 students. Open bar parties happening in the Reims and Paris metropolitan area were investigated. A 40 item version of the sensation seeking scale in French (form- IV) was used. Alcohol concentration was estimated by means of an AlcoSensor IVTM hand-held breath alcohol tester which were later transformed into blood-alcohol concentration. It was made clear from the study that overall trait of sensation seeking especially the subscales disinhibition and experience seeking were related to binge drinking in the college students chosen as the sample. Also, higher levels of the trait sensation seeking were observed in those attending the open bar parties. Along with sensation seeking, socio-demographic and other factors played a role in determination of alcohol use by the students.

Having a lack of interest in one’s environment characterized by a state of being idle is called boredom. When people lack interest in things present in the surrounding or they feel they have nothing productive to do (creating a state of restlessness) they try to get engaged in activities that are novel, or might seem to reduce the feeling of being unproductive. This is why many youngsters switch to alcohol or smoking in order to get pass their leisure time and also try out things that they are not allowed to, so that they develop some interest. Boredom susceptibility is dislike of repetition, routine and other people who are not stimulating. Wiesback et al (1996) studied sensation seeking, alcoholism and dopamine activity. Scales measuring sensation seeking were administered on 45 men having a dependence on alcohol. Among these 15 men had a favorable family history while the other 15 had an unfavorable family history and 15 men in a controlled group. The activity of the neurotransmitter dopamine was analyzed by assessing the amount of hormone responsible for growth, secreted after arousal. It was seen through results from a one-way ANOVA that both groups of men who were dependent on alcohol (with favorable and unfavorable family histories) showed high levels of boredom and the factor of boredom susceptibility had highest correlations in comparison to other factors.

Disinhibition can be defined as the tendency to express impulses. In many cases disinhibition has been observed to be related with consumption of alcohol in many people. McCarthy et al (2001) studied anticipated (expectancy) risk for alcohol consumption and disinhibition. For the study 279 white and 200 black college students were assessed on alcohol expectancy, disinhibition and drinking behavior. The association between disinhibition and usage of alcohol were analyzed using the acquired preparedness model. The study revealed that black participants significantly scored lower on disinhibition, expectancy and drinking. Also, it was seen that alcohol expectancy mediated between disinhibition and drinking relationship.

Experience seeking is concerned with facing or experiencing complex or novel stimulus. The novel or complex stimulus may vary from visiting different places or meeting people who are different from them. As adolescence is the prime age where young people explore a lot of new things. While exploring, they often come across many things like substance abuse which might seem novel. Thus, the continuous use of alcohol or any other substance leads the teenagers to get addicted vehemently to such things. A study conducted by Jordan and Anderson (2017) focuses on early adolescent drinking and the risk involved with it. The study suggests that early use of alcohol or any other substance increases high risk for substance dependence.

Thrill and adventure seeking involves engaging in activities that are highly stimulating and are characterized by fearlessness. Wilkinson et al (2010) studied the various factors related to use of alcohol. The study involved 1053 Mexican origin participants. It
was seen from the study that as sensation seeking tendencies along with behaviors involving potential risks, use of alcohol also increased.

**Review of literature**

Plant and Miller (1999)\(^1\)\(^7\) carried out a survey on 90,000 teenage school students based on drinking, smoking and drug abuse behaviors. It was found in the study that the survey based on the particular behaviors differed for each country. Young people from northern countries showed highest rates of substance intake. On the contrary, teenage students in southern Europe showed lower rates of substance intake.

Martin et al (2002)\(^1\)\(^3\) studied association between various factors like nicotine, alcohol usage and marijuana, sensation seeking and pubertal development. The sample included both male and female adolescents from a psychiatric clinic and two general pediatric clinic. Level of sensation seeking was measured using sensation seeking questionnaire, pubertal development was measured using pubertal development scale and to assess the usage of nicotine, alcohol and marijuana self-report questionnaires were used. Results indicated a high level of sensation seeking in both the genders who consumed nicotine and alcohol consumption and in males who consumed marijuana. Sensation seeking intervened between pubertal development and consumption of drugs in males and females.

Crawford et al (2003)\(^4\) conducted a longitudinal survey data on two different sample groups. One group consisted of 1002 adolescents and the other of 1206 adolescents. The aim was to understand whether initiation of sensation seeking during middle school years led to consumption of substances during the same period and in later years of schooling. It was observed that sensation seeking acted as a strong predictor for substance use in the two samples. Also it was found that sensation seeking acted as a strong indicator of cigarette use in adolescents (in one group only), due to different ethnicities.

Fein et al (2010)\(^5\) studied sensation seeking in middle-aged individuals who had not been consuming alcohol for a long time and in young individuals who were treatment naïve active alcoholics. A modified version of the sensation seeking scale was administered to 52 middle aged persons (who were not consuming alcohol in a long-time) and 86 young persons (who were treatment naïve active alcoholics). Associations between sensation seeking scale, consumption of alcohol and deviance proneness was investigated. It was found from the study that treatment naïve active alcoholics had higher levels of sensation seeking scores as compared to non-alcoholic controls on all subscales except for boredom susceptibility. Also, sensation seeking either leads to adaptation to long-term abstinence from alcohol or normalizes itself to long-term abstinence.

Kong and colleagues (2013)\(^1\)\(^3\) investigated factors like pubertal status, sensation seeking and impulsivity in relation to substance use. 3068 adolescents from grades 9 to 12 in Connecticut were chosen for the study. It was found from the study that sensation seeking was independently associated with use of various substances in both the genders.

Biolcati, Passini, and Mancini (2016)\(^3\) conducted a study to find out about binge drinking in adolescents. The study focused at finding out reasons behind adolescents’ vulnerability to excessive drinking while focusing on boredom susceptibility. A questionnaire designed to assess expectancies of binge drinking and boredom susceptibility was administered on a sample of 721 young Italian students. It was observed from the study that drinking expectancies were due to boredom. An important mediating role was played by disinhibition and pain relief between boredom and alcohol outcome in the study.

**Method:**

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www.ijsrp.org
The following study is a quantitative research to find whether alcohol dependence and sensation seeking are related to each other or not.

Sample

For the study, a small sample of 94 randomly selected adolescents from the city of Dehradun of different universities and colleges were chosen. The sample consists of 47 male adolescents and 47 female adolescents who were contacted personally and were explained the purpose of the study.

The participants responded to the questionnaires on their free will and they were requested to provide correct and complete information that would be kept confidential.

Hypotheses:

1. It is expected that Alcohol Dependence will be significantly correlated with Sensation Seeking in males and females.
2. Boredom susceptibility (BS) is significantly correlated to alcohol dependence in males.
3. Boredom susceptibility (BS) is significantly correlated to alcohol dependence in females.
4. Disinhibition (DIS) is significantly correlated to alcohol dependence in males.
5. Disinhibition (DIS) is significantly correlated to alcohol dependence in females.
6. Experience seeking (ES) is significantly correlated to alcohol dependence in males.
7. Experience seeking (ES) is significantly correlated to alcohol dependence in females.
8. Thrill/Adventure Seeking (TAS) is significantly correlated to alcohol dependence in males.
9. Thrill/Adventure Seeking (TAS) is significantly correlated to alcohol dependence in females.

Statistical tools:

For the collection of data the following tools were used: 1) alcohol dependence was measured using the Severity of Alcohol Dependence Questionnaire (SADQ). The questionnaire is a self-report test that containing 20-items that assesses severity of dependence on alcohol. The scoring for the test is based on a 4-point scale ranging from “Almost Never” (score 0) to “Nearly Always” (score 3). The overall score ranges from 0 to 60, test-retest reliability is 0.85. Factor analysis yields single main factor accounting for 53 per cent of variance.

2) For measuring the psychological variable of sensation seeking, the Sensation Seeking Scale by Marvin Zuckerman (1964) was used. It is a 40- item self-report test that measures the four subscales: a) Boredom Susceptibility (BS), b) Disinhibition (DIS), c) Experience Seeking (ES), d) Thrill and Adventure Seeking (TAS). The total score helps in understanding an individual’s inclination towards unique, different, experiences and engaging in behaviors with a potential for risk in order to achieve stimulation.

The collected data was compiled and analyzed using Microsoft Excel (MS Excel- 2013). The Pearson correlation coefficient was used to find out the relation between alcohol dependence and sensation seeking.

Results

As represented in Table (1), Pearson’s r correlation coefficient method yielded a score of 0.069 between the variables of Alcohol Dependence and Sensation Seeking for male sample (n=47), and in Table (2) a correlation of 0.026 for female sample (n=47).

Table 1: Correlation Scores (males)

Table 2: Correlation Scores (females)
Boredom Susceptibility is significantly correlated with alcohol dependence in males (Table 1). Experience seeking is significantly correlated with alcohol dependence in females (Table 2).

**Discussion**

Overt consumption and dependence on alcohol has risen to a great extent. The trend of consuming alcohol has increased to a great level and the highest consumers are today’s youth. Our study observed that certain factors from sensation seeking like boredom susceptibility amongst males and experience seeking among females may act as important factors contributing to the reason as to why people may be dependent on alcohol.

Having a lack of interest in one’s environment characterized by a state of idleness is called boredom. As observed from the study, high rates of boredom are related with consumption of alcohol in males. Male adolescents are usually engaged in many physical activities like sports however due to development and the new trends today males are now shifting their leisure motivation activities from just playing sports to engaging in consumption of alcohol making them more dependent towards it. One reason for this could be peer influence or befriending other people who are themselves involved in behaviors that is similar to one’s own behavior. Ivaniushina and colleagues (2019) have highlighted in their study, the influence of peers on drinking behavior in adolescents. According to the study factors such as boredom contribute to the reason for consuming alcohol.

Disinhibition is the ability to express impulses or seeking release via alcohol, partying etc. Disinhibition was not correlated with alcohol dependence amongst both the genders. One possible reason regarding why disinhibition was not correlated with alcohol dependence could be that the paper majorly was concerned about alcohol, factors such as smoking and drug abuse were not taken into account.
consideration. Flory and Manuck (2009) conducted a study to assess associations between impulsiveness and smoking on a sample of 1284 adults. It was found from the study that factors like disinhibition were associated with use of tobacco and behaviors associated with attainment of rewards were related with smoking. So for the present study it could be a notion that the sample chosen was more inclined towards use of cigarettes, tobacco or other substances to express impulses rather than just being dependent on alcohol.

Experience seeking is concerned with experiencing or facing novel or complex stimulus, young people are often looking out for novel experiences and during that age they are exploring new and complex things, this could be one of the major reasons as to why there is a significant correlation between alcohol dependence and experience seeking. According to the present study experience seeking was significantly correlated with alcohol dependence in females. One possible notion to this could be that the Indian society is still developing in terms of giving females the same amount of respect, status and autonomy that males are given. Most females today are frowned upon for leaving their homes for work or any other purpose. These restrictions not only become a physical barrier stopping them to go out of their houses for any work but also a psychological one where they feel dictated on how to act morally, repress their impulses and without questioning conform to the norms that have been precisely dictated by the society. Thus, the factor of being always restricted might increase more curiosity amongst females to enjoy new experiences, for the matter of fact even consuming alcohol.

The subscale of Thrill and Adventure seeking showed a negative correlation in both the samples. With thrill and adventure also comes in the factor of risk. One of the reasons underlying this could be that we as people living in India are bounded by a collectivistic culture, implying that all our beliefs, behaviors and our personalities too are determined by people whom we live with, that is our family. There are various rules of conduct as to how families want their children to behave, this also means that sometimes the parental supervision is such that young people are told strictly to be around a good peer group, not perform activities that are risky. Visser et al conducted a study to find out how different types of parenting led to increased use of alcohol. Sometimes, the parenting style may also become extremely overindulgent or overprotective where the child seems to lose on to their personal lives, there may be extreme supervision from the side of parents and thus the children may fear engaging in any adventurous activities like mountaineering, skiing or for that matter even trying any kind of substance simply due to authority figures who vehemently tell their children to be disciplined and not engaging in any risk related behavior.

Conclusion

The alcohol dependence rates of adolescents in Dehradun was measured and it was seen that alcohol dependence is not significantly correlated with overall sensation seeking. Factors like boredom susceptibility among males and experience seeking among females were however found to be significantly correlated with alcohol dependence.

Strengths

The present study highlights not just the relation between alcohol consumption, dependence and sensation seeking but it also lays importance on the current trends that are being adopted by the youth of today. It also emphasizes the countries that are highest on the rate of alcohol consumption and the lowest alcohol consuming countries. The study focuses on the rate of alcohol consumption in the city of Dehradun. Also, it takes into consideration both the genders who consume alcohol.

Limitations

The study has majorly focused on just sensation seeking as a potential cause underlying alcohol addiction. The rest of the causes are not given so much weightage. The study has not focused on qualitative, demographic factors of alcohol consumption.
Suggestions as a psychologist

A psychologist has an integral role to play in helping people suffering from alcohol addiction or any other alcohol use disorder. A psychologist can provide counselling along with therapies. Since, substance abuse addicts often have bad interpersonal relations with their family members, a psychologist can provide counselling to the family members of an addict and make them understand that as family members they have an integral role to play in helping the person get rid of the addiction problem and provide them support. They can help these people to manage their vocational skills and all other important skills required to maintain a healthy living in a society.

References


**Appendix:**

**SEVERITY OF ALCOHOL DEPENDENCE QUESTIONNAIRE (SADQ-C) 1**

NAME__________________________________________AGE__________No.______

DATE:

Please recall a typical period of heavy drinking in the last 6 months.
When was this? Month: __________________ Year: ________________

Please answer all the following questions about your drinking by circling your most appropriate response.

During that period of heavy drinking

1. The day after drinking alcohol, I woke up feeling sweaty.
   ALMOST NEVER  SOMETIMES  OFTEN  NEARLY ALWAYS

2. The day after drinking alcohol, my hands shook first thing in the morning.
   ALMOST NEVER  SOMETIMES  OFTEN  NEARLY ALWAYS

3. The day after drinking alcohol, my whole body shook violently first thing in the morning if I didn't have a drink.
   ALMOST NEVER  SOMETIMES  OFTEN  NEARLY ALWAYS

4. The day after drinking alcohol, I woke up absolutely drenched in sweat.
   ALMOST NEVER  SOMETIMES  OFTEN  NEARLY ALWAYS

5. The day after drinking alcohol, I dread waking up in the morning.
   ALMOST NEVER  SOMETIMES  OFTEN  NEARLY ALWAYS

6. The day after drinking alcohol, I was frightened of meeting people first thing in the morning.
   ALMOST NEVER  SOMETIMES  OFTEN  NEARLY ALWAYS

7. The day after drinking alcohol, I felt at the edge of despair when I awoke.
   ALMOST NEVER  SOMETIMES  OFTEN  NEARLY ALWAYS

8. The day after drinking alcohol, I felt very frightened when I awoke.
   ALMOST NEVER  SOMETIMES  OFTEN  NEARLY ALWAYS

9. The day after drinking alcohol, I liked to have an alcoholic drink in the morning.
   ALMOST NEVER  SOMETIMES  OFTEN  NEARLY ALWAYS

10. The day after drinking alcohol, I always gulped my first few alcoholic drinks down as quickly as possible.
    ALMOST NEVER  SOMETIMES  OFTEN  NEARLY ALWAYS

11. The day after drinking alcohol, I drank more alcohol to get rid of the shakes.
    ALMOST NEVER  SOMETIMES  OFTEN  NEARLY ALWAYS

12. The day after drinking alcohol, I had a very strong craving for a drink when I awoke.
    ALMOST NEVER  SOMETIMES  OFTEN  ALMOST ALWAYS
13. I drank more than a quarter of a bottle of spirits in a day (OR 1 bottle of wine OR 7 beers).

ALMOST NEVER  SOMETIMES  OFTEN  ALMOST ALWAYS

14. I drank more than half a bottle of spirits per day (OR 2 bottles of wine OR 15 beers).

ALMOST NEVER  SOMETIMES  OFTEN  ALMOST ALWAYS

15. I drank more than one bottle of spirits per day (OR 4 bottles of wine OR 30 beers).

ALMOST NEVER  SOMETIMES  OFTEN  ALMOST ALWAYS

16. I drank more than two bottles of spirits per day (OR 8 bottles of wine OR 60 beers)

ALMOST NEVER  SOMETIMES  OFTEN  ALMOST ALWAYS

Imagine the following situation:

1. You have been completely off drink for a few weeks

2. You then drink very heavily for two days

How would you feel the morning after those two days of drinking?

17. I would start to sweat.

NOT AT ALL  SLIGHTLY  MODERATELY  QUITE A LOT

18. My hands would shake.

NOT AT ALL  SLIGHTLY  MODERATELY  QUITE A LOT

19. My body would shake.

NOT AT ALL  SLIGHTLY  MODERATELY  QUITE A LOT

20. I would be craving for a drink.

NOT AT ALL  SLIGHTLY  MODERATELY  QUITE A LOT

SCORE

Sensation Seeking Scale

1.  A. I like “wild” uninhibited parties

   B. I prefer quiet parties with good conversation

2.  A. There are some movies I enjoy seeing a second or even a third time
3. A. I often wish I could be a mountain climber
   B. I can’t understand people who risk their necks climbing mountains

4. A. I dislike all body odors
   B. I like some for the earthly body smells

5. A. I get bored seeing the same old faces
   B. I like to comfortable familiarity of everyday friends

6. A. I like to explore a strange city or section of town by myself, even if it means getting lost
   B. I prefer a guide when I am in a place I don’t know well

7. A. I dislike people who do or say things just to shock or upset others
   B. When you can predict almost everything a person will do and say he or she must be a bore

8. A. I usually don’t enjoy a movie or play where I can predict what will happen in advance
   B. I don’t mind watching a movie or a play where I can predict what will happen in advance

9. A. I have tried marijuana or would like to
   B. I would never smoke marijuana

10. A. I would not like to try any drug which might produce strange and dangerous effects on me
    B. I would like to try some of the new drugs that produce hallucinations

11. A. A sensible person avoids activities that are dangerous
    B. I sometimes like to do things that are a little frightening
12. A. I dislike “swingers” (people who are uninhibited and free about sex)
   
   B. I enjoy the company of real “swingers”

13. A. I find that stimulants make me uncomfortable
   
   B. I often like to get high (drinking liquor or smoking marijuana)

14. A. I like to try new foods that I have never tasted before
   
   B. I order the dishes with which I am familiar, so as to avoid disappointment and unpleasantness

15. A. I enjoy looking at home movies or travel slides
   
   B. Looking at someone’s home movies or travel slides bores me tremendously

16. A. I would like to take up the sport of water skiing
   
   B. I would not like to take up water skiing

17. A. I would like to try surf boarding
   
   B. I would not like to try surf boarding

18. A. I would like to take off on a trip with no preplanned or definite routes, or timetable
   
   B. When I go on a trip I like to plan my route and timetable fairly carefully

19. A. I prefer the “down to earth” kinds of people as friends
   
   B. I would like to make friends in some of the “far out” groups like artists or “ punks”

20. A. I would not like to learn to fly an airplane
21. A. I prefer the surface of the water to the depths
   B. I would like to go scuba diving
22. A. I would like to meet some persons who are homosexual (men or women)
   B. I stay away from anyone I suspect of being “gay or lesbian”
23. A. I would like to try parachute jumping
   B. I would never want to try jumping out of a plane with or without a parachute
24. A. I prefer friends who are excitingly unpredictable
   B. I prefer friends who are reliable and predictable
25. A. I am not interested in experience for its own sake
   B. I like to have new and exciting experiences and sensations even if they are a little frightening, unconventional, or illegal
26. A. The essence of good art is in its clarity, symmetry of form and harmony of colors
   B. I often find beauty in the “clashing” colors and irregular forms of modern paintings
27. A. I enjoy spending time in the familiar surroundings of home
   B. I get very restless if I have to stay around home for any length of time
28. A. I like to dive off the high board
   B. I don’t like the feeling I get standing on the high board (or I don’t go near it at all)
29. A. I like to date members of the opposite sex who are physically exciting
   B. I like to date members of the opposite sex who share my values

30. A. Heavy drinking usually ruins a party because some people get loud and boisterous
   B. Keeping the drinks full is the key to a good party

31. A. The worst social sin is to be rude
   B. The worst social sin is to be a bore

32. A. A person should have considerable sexual experience before marriage
   B. It’s better if two married persons begin their sexual experience with each other

33. A. Even if I had the money I would not care to associate with flight rich persons like those in the “jet set”
   B. I could conceive of myself seeking pleasures around the world with the “jet set”

34. A. I like people who are sharp and witty even if they do sometimes insult others
   B. I dislike people who have their fun at the expense of hurting the feelings of others

35. A. There is altogether too much portrayal of sex in movies
   B. I enjoy watching many of the “sexy” scenes in movies

36. A. I feel best after taking a couple of drinks
   B. Something is wrong with people who need liquor to feel good

37. A. People should dress according to some standard of taste, neatness, and style
   B. People should dress in individual ways even if the effects are sometimes strange
38.   A. Sailing long distances in small sailing crafts is foolhardy
       
          B. I would like to sail a long distance in a small but seaworthy sailing craft

39.   A. I have no patience with dull or boring persons
       
          B. I find something interesting in almost every person I talk to

40.   A. Skiing down a high mountain slope is a good way to end up on crutches
       
          B. I think I would enjoy the sensations of skiing very fast down a high mountain slope
Bandung City Features Characteristics based on Cultural Geography

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Abstract- City features become an important component in the identification of city characters. The character of a city is formed by a long process and involves many forming factors. The character of the city is a differentiator between one city and another. It is leaving a distinct impression for the residents and visitors of the city. Culture is an important aspect that plays a role in forming the image of a city. Urbanization and globalization can fade the identity of the city and eliminate the boundaries of distinguishing characteristics of cities. Bandung is the third major city in Indonesia with a long history and known as a heritage city. In this context, the character and feature of Bandung city in the cultural sphere is identified by applying the principles of cultural geography. The character features of the city analyze with multi-level analysis, describe the forming factors and the challenges faced in the preservation of the city's character features.

Keywords- cultural geography, city characteristic, heritage city.

I. INTRODUCTION

The identity and characters of a city are the results of the representation of natural, cultural, and other human-made components in the city. The phenomenon of globalization and urbanization are things that significantly affect the environment and character of a city. Increasing urbanization directly makes the need for land and resources in the city also increase, resulting in the possibility of changes in land and building functions that have historical value and identity of the city. Ease of access to information and technology makes the boundaries between cities and even countries begin to fade. This condition also allows for many similarities in the development of cities. These conditions can lead to the crisis of identity and character of the city.

The character of the city is flexible and develops following the changes that occurred. In a multicultural and ethnic condition need efforts to manage the identity and character of the city to make it sustainable [1]. City character is determined by some elements, such as the natural, geographical, and artificial environment. Buildings or architectural works are part of the city's identity that can provide continuity, transfer the identity and memory of the city to future generations [2]. The formation of city character is also influenced by physical, cultural, socio-economic, historical, and other forming factors, including the people and their lifestyle.

Culture is something that is owned, shared, accepted, and endowed in society. The features included in culture are those that are spiritual, material, intellectual and emotional that characterize a social group or community, such as lifestyle, art, traditions and beliefs, and value systems [3]. Culture involves meaning (human attribute to objects and concepts) and practice (the way people perform actions) [4]. The components of culture are values, beliefs, and material cultures, such as creative expressions, clothing, foods, buildings, and occupations [3].

Culture is divided into two main components, namely the material component and non-material culture. Non-material culture is what defines society, which consists of values, beliefs, symbols, and language. Material culture is a culture in the form of physical objects in society. Material and non-material cultures are interrelated with each other in the development of a civilization at various regional scales and become a cultural carrier for the next generation.

Geography is a field of knowledge that studies the distribution of features and objects that exist on the surface of the earth, while cultures that vary geographically due to diverse interactions between people in their geographical areas in various ways [6]. Cultural geography is related to how the distribution of different cultures in the form of material and non-material in various areas of the world or region can be characteristic of the site and make it different from other regions. The concept of cultural geography was focused on landscape, and now also developed to social science [7]. In mapping cultural geography, several things are the focus of attention, among others: the concept of regional culture, cultural diffusion, cultural landscape, cultural ecology, and cultural interaction [8].

Indonesia is an archipelago country that stretches from west to east, consists of more than 17,000 islands with diverse geographical and cultural conditions [9]. Before the Dutch came, Indonesian cities had no cultural concept; that's mean the basis of culture was weak and confusing [10]. It happened because Indonesia has a very long history, starting from the Hindu-Buddhist kingdom, the Islamic empire, until colonialism. These conditions become the forming factors of the identity of civilization in Indonesia. So, the issue of the character of urban features is essential in Indonesia.

This paper aims to understand the forming factors of Bandung city characteristics. By applying the principles of cultural geography and multi-level analysis (macro, meso, and micro) to identify the characteristics of Bandung city, which makes it different from other cities in Indonesia. Also, the purpose is to know the challenges faced in the preservation of the city's characteristics.
II. MATERIAL AND METHOD

The identification of characteristics and features involves the history of the city, culture, physical condition, and spatial character of the city. The scope of this research is the city center of Bandung. Using study literature to obtain data about Bandung city history and development. Collect some previous-related researches in the scope of Bandung city to support the data obtained. The detailed and in-depth literature study conducted to get the characteristics of the features, forming factors, and identity of Bandung city.

Besides the literature study, the data needed are the map of Bandung city and some documents from the city government and related agencies, for example, the list of material and non-material cultures that exist in Bandung city. The map of heritage buildings distribution also obtained from the Department of Culture and Tourism in Bandung City Government. Field surveys conducted to observe the factual condition of building units that showed on the map. Photographs obtained from field observations are used as materials for research. The short interview also conducted with the local government to get the general and specific introduction about Bandung city’s cultural aspect and the efforts to maintain it that has done by the government and communities in Bandung city.

The data obtained analyzed in three scales (macro-meso-micro) to understand Bandung city characteristics comprehensively from a broader scope to detail (unit). Combination of these material and method are capable of providing the comprehensive result of character identification in a city, especially in the cultural aspect.

III. RESULT AND DISCUSSION

3.1 Bandung City

Bandung is the third-largest city in Indonesia, which is located at an altitude of 700 m above sea level in West Java Province. Bandung is surrounded by volcanic mountains that make this city has lower temperature compared to other cities in the tropics [11]. 52% of Bandung city is used as a settlement [12]. Bandung is one of the activities centers during the Dutch colonialism era. In the formation of Bandung city morphology, the colonialism era played an important role [13]. At that time, the northern Bandung area was more developed with much luxurious housing owned by the Dutch colonizers, while in the southern part, the condition was inversely [14].

In brief, important events and developments in the history of the formation of Bandung City can be seen in the following table 1 [15];

<table>
<thead>
<tr>
<th>Period</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>9th century to 16th century</td>
<td>Bandung area and its surroundings are under the authority of the Hindu Kingdoms (Tarumanegara, Kuningan, Galuh, and Sunda Pajajaran Kingdoms).</td>
</tr>
<tr>
<td>1615 - 1677</td>
<td>The influence of Islam and Islamic culture began to spread in the mountains area of Bandung by the Cirebon Sultanate and then the Kingdom of Mataram.</td>
</tr>
<tr>
<td>1677 - 1799</td>
<td>The area of Bandung and its surroundings is controlled by Vereenigde Oostindische Compagnie (VOC) or the Dutch East Indies Company.</td>
</tr>
<tr>
<td>19th century</td>
<td>The VOC went bankrupt, and the Bandung area was taken over directly by the Dutch Government.</td>
</tr>
<tr>
<td>1905</td>
<td>Bandung’s population is 47,500, with details: 2,200 Europeans; 3,800 Chinese, Arabs, and non-Asians.</td>
</tr>
<tr>
<td>1906 - 1940</td>
<td>At this time, Bandung became the independent Municipality by implementing a decentralized government structure.</td>
</tr>
</tbody>
</table>

In terms of population, Bandung city is inhabited by several kinds of religions and tribes. Data from the Central Statistics Agency shows that the community of Bandung city is 91.798% Muslim, 5.398% Protestant Christian, 2.228% Catholic, 0.071% Hindu, 0.493% Buddhist, 0.007% Confucian, and the rest are other faiths [16]. The majority of tribes who inhabit Bandung city are Sundanese, followed by migrants, namely Javanese, Chinese, Arabic, Indian, and other ethnic groups from outside the region. The diversity of tribes and religions makes Bandung City heterogeneous. Related to spatial aspect in Bandung, the need for space has a significant influence on the transformation of buildings and land-use, when compared with historical, cultural, and religious factors [17]. Besides, changes in land ownership also affect changes in the function of the building and land [18].

3.2 Cultural Identification of Bandung City

The culture of Bandung City can be identified by classifying various types of culture that exist into two big groups, namely culture that is material and non-material.

The non-material culture that exists and develops in Bandung city [19], among others:

- Oral traditions: hereditary stories, fairy tales, rhymes, folklore, myths, legends, and other forms of oral traditions that are transmitted from generation to generation orally;
- Customs: certain values in the community, such as cooperation, ngaronda, jamsan pusaka, marak lauk, babarit tradition and hajat sasih;
Rite: procedures for carrying out a ceremony or activity which is passed down from generation to generation and containing specific values, such as procedures for the commemoration of death, birth, marriage, and other religious rituals;

Traditional knowledge: knowledge of methods or procedures for the development of material culture, for example, knowledge of craft making, traditional clothing, traditional medicine methods, special foods and drinks, and traditional fabrics;

Art: the results of human creativity and activities that have a beauty value and are closely related to certain ceremonies or rituals. The types of arts that developed in Bandung city, among others: karawita art (sound art that is produced from vocals and instrumental), dance, theater, visual arts, and so on;

Languages: Sundanese, Sundanese youth language, Indonesian, and English;

Folk games: usually played in spare time, can be played with or without equipment; and

Traditional sports: pencak silat, hadang, stilt, sack races, debus, Sundanese jati fitness, and so on.

The material culture that exists and develops in Bandung city, among others:

Manuscript: cultural heritage in the form of ancient texts that record the history of Bandung city and neatly stored in museums in Bandung.

Traditional techniques: efforts to solve the problem of the lack of equipment in agriculture, so traditional technologies are made to support the sector. The results of conventional technology used in the city of Bandung are hoe, ax, baliung, patik, rake, and so on.

Cultural heritage: cultural heritage in the form of physical objects in Bandung city is divided into several categories, namely: cultural heritage buildings, cultural heritage sites, cultural heritage structures, and cultural heritage areas.

3.3 Spatial Distribution of Bandung Culture

The non-material culture of Bandung City is spread evenly throughout the Bandung City area and is still being preserved by the local government and its people. One of the efforts made by the local government is to provide one working day in one week to use traditional clothing and interact with each other using local languages, and this is applied in all government agencies in the working area of Bandung city.

The spatial distribution of culture in Bandung City that is included in material cultures can be analyzed based on three levels, namely macro, meso, and micro levels.

3.3.1 Macro-level Analysis:

At the macro level, Bandung city is thoroughly analyzed to see how the overall cultural distribution is. In Bandung Mayor Regulation No.921 in 2010, Bandung City is divided into six major regions, namely region I (Historic City Center Area), Region II (Chinatown/Trade Area), Region III (Defense Area and Security/Military), Region IV (Sunda Ethnic Area), Region V (Villa and Non-Villa Residential Area), and Region VI (Industrial Estate). Each region that divides the city of Bandung into six parts has its characteristics, which can be seen from the type of building, environmental conditions, and community activities in each region. The division six areas cannot be separated from the history of the past when the new city of Bandung was established.

Region I cover the Alun-Alun area, Asia-Africa street, Bandung City Government Office, Braga street, Pakuan Building, and Railway Bureau Company. In this region, many historical heritage buildings, the center of community activities, and tourist attractions. In Region II, which includes the Temple area and Pasar Baru (New Market), is a trading center in Bandung city, where the site is dominated by shophouses, the majority of which are ethnically Chinese, with strong buying and selling activities and Confucian religious activities at the Temple. There is no limit between Chinese and native residents in this region because they are used to living together [20]. Region III is a defense and security/military zone, which during the Dutch occupation period, was also a vital area with the same function. Many historical heritage buildings seem sturdy and strong with sharp building angles. Around this area, there is also a broad field that is used as a place for military training and other social activities. Region IV is often referred to as the Sundanese ethnic area with a densely populated area. Tegallega Square is included in this area, which is the center of Bandung's community activities. Area V (Villa and Non-Villa Housing) is a residential area which is dominated by typical buildings of valuable cultural heritage, some of them were works of famous architects during the Dutch occupation. This area is located in the northern part of Bandung city that is highland making it very comfortable as a residential area. This region was the most preferred area for Europeans because of the lower temperature than other places. The last site is Region VI, which is an industrial area that is dominated by buildings that function as support in the production process as well as the location for production goods sales.

3.3.2 Meso-level Analysis:

At the intermediate level (meso), the cultural heritage of Bandung city is analyzed in a more specific scope that is quite representative of some of the Regions mentioned at the macro level. The meso level analysis was chosen in the Bandung downtown area, which became the concentration of community activities. Several cultural heritage buildings have been recorded by the local government, which is then mapped on the map of the distribution of cultural heritage buildings in Bandung city in Figure 2.
Based on the map of the distribution of Bandung’s cultural heritage buildings in 2016, described 17 units of cultural heritage buildings had been recorded that are scattered in several areas of the cultural heritage of the city of Bandung. From the analysis, it was found that the cultural heritage buildings that were successfully mapped were in Regions I, III, and V.

3.3.3 Micro-level Analysis:

The micro-level analysis chosen in this study was 17 units of cultural heritage buildings scattered in Bandung city center according to the map of the distribution of cultural heritage buildings in 2016 from the Department of Culture and Tourism of Bandung City. Analysis at the unit level of this cultural heritage building aims to see how cultural products made by humans are influenced by the colonial architectural style or even combination with the traditional style that developed in a certain period. The analysis explains each building's name, built year, and architectural style. Besides, the explanation also describes building appearance, location, and features.

Table 2. Building Unit Analysis

<table>
<thead>
<tr>
<th>No</th>
<th>Picture</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Region I</td>
</tr>
</tbody>
</table>
| 1  | ![Image](image1.png) | Name: Cicendo SLB Building (built-in 1930)  
Function: School for disability (deaf)  
Style: Art Deco |
| 2  | ![Image](image2.png) | Name: Hotel Preanger (built-in 1929)  
Function: Hotel  
Style: Art Deco  
Description: Concrete as a building material, flat roof, streamlines domination on the exterior, with unique ornaments on the outer pillars. |
| 3  | ![Image](image3.png) | Name: Pikiran Rakyat Daily Building (built-in 1920)  
Function: Daily Newspaper Office  
Style: Neo Classic  
Description: Shield roof (helmet roof), flat and symmetrical facade with neat, elegant lines, and the color of the building is predominantly white with beige and black accents. |
| 4  | ![Image](image4.png) | Name: Savoy Homann Hotel (built-in 1880)  
Function: Hotel  
Style: Art Deco  
Description: Facing the main street. The streamlined exterior with a curved section on one side of the building, a flat roof, and a single tower with a color that matches the color of the main building. |
| 5  | ![Image](image5.png) | Name: Merdeka Building Bandung (built-in 1926)  
Function: Museum  
Style: Art Deco  
Description: Flat roofed, precise geometric shapes building facades. Square and rectangular windows, smooth building surface combined with gold-colored ornaments on the front (central pillar). |
<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Function</th>
<th>Style</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Bank Mandiri Building (ex. State Trading Bank) (built-in 1915)</td>
<td>Bank Building</td>
<td>Neo-Classical (Art Deco Ornamental)</td>
<td>Located at the crossroads of the main, has a single big clock tower in the corner with an entrance, triangle roof and frame ornament on the outside of the window, and white as the dominant color of the building.</td>
</tr>
<tr>
<td>8</td>
<td>Bank Mandiri Building (ex. Bandung Import-Export Bank) (built-in 1912)</td>
<td>Bank Building</td>
<td>Indische Empire Architecture / Neo-Classical / Romanticism</td>
<td>This building is a typical Greco-Roman royal building style that equipped with a pair of giant pillars that united into the walls of the building. It has thick walls with high ceilings, equipped with large iron-lined windows and vents, and the color of the building is white with gray accents.</td>
</tr>
<tr>
<td>9</td>
<td>Bandung Great Post Office (built-in 1928)</td>
<td>Post Office</td>
<td>Modern Functional (Art Deco Geometric)</td>
<td>It has an expansive front yard, rectangular roof with two small towers on the corner, equipped with ornament lines on the exterior. The building is predominantly white with the combinations of orange as post office typical color.</td>
</tr>
<tr>
<td>10</td>
<td>Jiwasraya Insurance Building (built-in 1914)</td>
<td>Insurance Office Building</td>
<td>Neo-Classical (Art Deco Ornamental)</td>
<td>A multi-story building with a symmetrical façade appearance. Concrete as a building material, equipped with several pillars that united into the walls of the building, many windows, and vents on the walls, high roof, distinctive ornaments on the edges of windows and doors. Beige is the dominant color in this building.</td>
</tr>
<tr>
<td>11</td>
<td>Paguyuhban Pasundan Building (built-in 1913)</td>
<td>Sundanese Cultural Organization Building</td>
<td>Western Traditional</td>
<td>Classic-style building, equipped with a pair of lamp decorations on the left and right side of the entrance, dominated by white with a combination of green at the top of the curve vents. This building seems luxurious, equipped with stairs leading to the door, making the building's position higher than its surroundings.</td>
</tr>
<tr>
<td>Name: SMUN 3 and 5 Bandung Building (built-in 1953)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Function: Senior High School</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Style: Modern Tropic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Description: Kind of tropical building with high walls, a pyramid roof, with tall rectangular windows on the wall, has a large yard in the front, and building color is beige.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Name: SMPN 5 Bandung Building (built-in 1920) |
| Function: Junior High School |
| Style: Indisch Style |
| Description: Has a pair of towers on the entrance sides, piled roof, and multiple facades aiming to create a cool building. Beige is the dominant color of the building. |

| Name: SMPN 2 Bandung Building (built-in 1948) |
| Function: Junior High School |
| Style: Indisch Style |
| Description: The color of the building is dominated by light green. The building walls and supporting poles are separated by long hallways, have many windows, and plenty of air ventilation, with high and piled up-roof. |

| Name: Geology Museum (built-in 1928) |
| Function: Geological Museum |
| Style: Art Deco |
| Description: Flat wall surfaces and sharp edges, showing precise geometric shapes with rectangular windows. The building is predominantly white, with window tints typical of wood. |

| Name: Gedung Sate (built-in 1920) |
| Function: Office of the Governor of West Java Province |
| Style: Modern Dutch Indies, New Indies Style |
| Description: This building is a harmonious blend of European, India, Chinese, Islamic, and Sundanese style traditional buildings. The walls of the building are dominated by white, with typical Hindu ornaments, with Meru roof (multi-level roof) like Pagoda. The building has pillars connected by arches at the top as characteristic of Roman style. |

| Name: Dwi Warna Building (built-in 1940) |
| Function: Regional Office of the Directorate General of Treasury, West Java Province |
| Style: Modern Colonial |
| Description: Has a pyramid roof, the position of the building is more backward than other buildings (large front yard, has high walls and a terraced roof, equipped with round pillars on the facade. Dwi Warna Building is dominated by a soft beige color. |

From the microanalysis, it can be seen that the architecture works in Bandung adheres to the style of colonial architecture because most of it is the work of architects from the Netherlands. Architectural buildings in Bandung are the result of the acculturation of western and local cultures that pay attention to the aesthetics and comfort of its users. As one of the cities in the tropics, various adaptation efforts have been carried out in the design of architectural buildings in Bandung, for example, by making walls and roofs higher and make many windows/air ventilation to facilitate air circulation and increase comfort in buildings. Besides, make layered facades (shading façade) as solar heat buffer and beautifying buildings.
These 17 buildings that analyzed in the micro-scale can be representative of Bandung city characteristic in the form of material culture, because of its strategic location, unique features, and long history behind them. But as a heritage city with various kinds of buildings, consideration of extended sample units in micro-scale analysis can be used in further research, which can cover different types of constructions, locations, and functions.

It is essential to highlight that non-material cultures in Bandung city mostly influence by the traditional or local tribes that were living in the area of Bandung city. The existence and maintenance of non-material cultures are supported by local government and communities in their daily activities. Interestingly, in the aspect of material culture, especially heritage buildings, the influence of traditional and local tribes precisely not as strong as in non-material cultures. It proves in the colonial-style that implemented in observed heritage buildings. Another interesting finding is the colonial-style buildings also take the local condition in consideration of building construction. It can provide a style that can not be said as traditional or colonial. The combination style becomes the fundamental characteristic of Bandung city.

Efforts that have been made by the government and the people of Bandung city to maintain and preserve their culture is to make regulations relating to culture and cultural preservation. Besides, carefully inventorying all forms of culture in Bandung city, support the community to carry out activities that help cultural conservation. Re-function historical buildings that are scattered in the area of Bandung city to maintain, restore, and revitalize historic buildings without removing or changing their original shape. But on the other side, functional changing of buildings and land without regard to the initial conditions that still often occur in Bandung city can also eliminate the historical and cultural values contained. Also, the number of cultural heritage buildings that are not entirely recorded and mapped results in an inventory effort, not going well enough.

IV. CONCLUSION

The city and its identity can leave an impression on residents and city visitors. In this paper, we presented Bandung city characteristics by applying cultural geography principles. Bandung as heritage city is the result of acculturation of diverse cultures and backgrounds harmoniously integrated that shape all forms of cultural products, from customs to architectural buildings. The long history of kingdoms, colonialization era, location, natural and social condition become the forming factors of Bandung city characteristics.

The results of this investigation show that Bandung city characteristic in cultural aspect is divided to non-material and material culture. Non-material culture spread in the city evenly. Non-material cultures are used and maintained by residents in their daily life. On the other hand, material culture as the physical objects analyzed in macro-meso-micro scales. In this context, material culture focuses more on heritage buildings in Bandung city. In macroscale, Bandung city is divided into six regions. In mesoscale, the scope is narrowed by three areas; then, in microscale, each building unit described. The significant finding shows the character that becomes a feature of Bandung city is the combination of colonial style that adapts to the surrounding environment and location. It shows the strong influence of the colonialization era in Bandung city identity.

Various types of culture can develop well in urban areas supported by the local government and society. It is expected in the future; all the cultural heritage in Bandung city is not only recorded but also can be mapped in detail to facilitate the promotion of tourism. Besides, the application of non-material culture in residents daily has to be more encouraged to face the modernization challenge. The rapid development of the city need considers the existence of cultural potentials. Also, the preservation of heritage buildings must maintain originality and historical value. This research has the potential for applications in city identity identification and assessment. In future work, the extensive and various samples can be used; it also can be applied in another study area.

ACKNOWLEDGEMENT

I would like to thank Bandung City Development Planning, Research and Development Agency, and Bandung City Culture and Tourism Office for their support in terms of supporting documents and directions related to the condition of Bandung City. This research also has been supported by CSC Funds in China (No. 2017SLJ025923).

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Taking the Lead in the Time of COVID-19 Pandemic: A Perspective from the Philippine Financial Industry

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Abstract - This paper attempts to explore the traits that leaders should possess in the time of COVID-19 pandemic. The study utilized a qualitative research design and solicited 58 responses from employees in the financial industry to capture the prevailing traits of business leaders. The reflexive thematic analysis showed that leaders, among others, should be empathetic, responsible, transparent, resilient and supportive. The participant-employees perceived these traits as necessary not just for their leaders’ effective governance but for the organization’s survival as a whole.

Index Terms - Leadership, Trait Theory, COVID-19, Pandemic, Financial Industry, Philippines

I. INTRODUCTION

The first case of the deadly Coronavirus disease 2019, also known as COVID-19, was recorded in November 2019 in Wuhan, China (South China Morning Post, 2020). The government leaders were confident to contain the virus within the Chinese territory until January 2020 when the first case was confirmed in Thailand (World Health Organization, 2020). On March 11, 2020, with over 118,000 cases in around 110 countries, the World Health Organization declared the virus as a pandemic (Time, 2020). The announcement triggered a dreadful challenge among leaders across financial markets with looming distress worse than the global financial crisis in 2008. Giant economies like the US, China and Japan succumbed to economic instability, and with economies under lockdown, business leaders began to realize financial and manpower losses.

In the Philippines with its struggling economy, the government leaders placed initiatives to mitigate the impact of the pandemic through monetary and fiscal policy stimulus for the business sectors, distribution of financial aids for the underprivileged, and health care assistance for the infected Filipinos. Likewise, financial industry leaders shifted gears from business-centric to people-centric as they implemented alternative business models, work-from-home arrangements, advance salary payments and waiver of interests on employee loans. In this time of pandemic,
people in an organization is like a sheep waiting for the shepherd’s guidance. As organizations embrace the new normal of doing things, employees look up to their leaders in terms of direction and motivation to get things done while staying safe. Nevertheless, true leaders emerge with noticeable traits in achieving organizational commitments and goals while ensuring the welfare of their people.

The study is anchored to the Trait Theory of Leadership which can be traced from the works of Thomas Carlyle (Spector, 2016). The theory suggests the correlation of inborn personality traits to successful leadership. In particular, the theory was based on the rationale that traits produce behavioral patterns that are consistent across various situations (Yuki, 2006; Zaccaro, Kemp, & Bader, 2004). The proponents of this theory believe that successful leaders have a definite set of skills, abilities and personality traits that are different from less effective leaders. Galton (1869) added that some of the immutable traits cannot be developed over time while Derue, Nahrgang, Wellman and Humphrey (2011) pronounced that understanding these personality traits may help organizations plan for leadership succession. On the other hand, psychologists Ralph Stogdill believed that leadership is a product of the interaction between the individual and the social situation (Oakleaf, 2016). Other scholars commented that the theory is unidimensional and focuses only on the follower’s perception (Conger & Kanugo, 1998; Lord, De Vader, & Alliger, 1986). Also, Kouzes and Posner (2019) argued that credibility is a key indicator of leadership skills while Kumar, Adhish and Deoki (2014) posited that leadership is somehow predestined but not in all cases.

Though various studies were already undertaken regarding the vast aspects of leadership in the Philippines, none of the literature was done during the pandemic. Knowing that there is still no available vaccine for the virus at the time of publication of this paper, materials for both quantitative and qualitative types of research are still very scarce. Thus, this paper contributes to the early literature about the prevailing traits that leaders should possess in the time of COVID-19 pandemic.

II. LITERATURE REVIEW

A. The Big Five Personality Traits

To reduce the innumerable traits produced in a decade of studies, Tupes and Raymond (1961), Digman (1990), and Goldberg (1993) introduced a model also known as the Big Five Model which captures broadly defined traits into five domains. The domains included are extraversion, conscientiousness, agreeableness, emotional stability and openness (Hough, 1992; Judge, Bono, Ilies & Gerhardt, 2002). Salgado (1997) found that all domains except for openness were significant predictors of job performance in the European community while Stevens and Ash (2001) posited that only conscientiousness and extroversion were positively correlated with a preference for managerial work and job performance. However, Crant and Bateman (2000) argued that only extroversion was related to perceptions of charismatic leadership. Judge et al. (2002) also pronounced that extroversion had the strongest correlation to leadership.
B. Resilient Leaders

According to Southwick, Martini, Charney and Southwick (2017), resilience can be defined as the ability to regain balance after an adverse event. It is a process instead of a result (Southwick, Litz, Charney & Friedman, 2011) and those resilient leaders can adapt to stress and maintain a healthy mindset amidst management crisis (Krystal, 2008; Reich, Zautra & Hall, 2010). Added by Joy (2017), the real test of leaders is when they manifest strength, audacity and professionalism in difficult situations. Yehuda, Flory, Southwick, and Charney (2006) pronounced that the resiliency of a leader depends on numerous genetic, neurobiological, developmental and psychological factors. Furthermore, resilient leaders are realistically optimistic and that they understand the implications of over and underestimation of potential risks that may result in organizational failure (Kruger & Dunning, 1999; Reivich & Shatte, 2003).

C. Supportive Leaders

Supportive behavior is among the significant factors that contribute to effective leadership (Brearley, 2020). Simmons (2010) hypothesized that supportive leadership may enhance work performance. According to Yukl (2010), there are 9 behaviors that supportive leaders should work on: show acceptance and positive regard for others, be polite, treat the employee as an individual, remember important details, be patient, provide sympathy, express confidence, provide assistance, and be willing to help with personal problems. Lane (2019), in her article, mentioned that supportive leaders should build on the strengths of others, and empower and inspire. Leaders should recognize the expertise and acknowledge the value of team members while at the same time listen to every opinion and offer equal opportunity for assignments, training and promotions. Likewise, supportive leaders should encourage teamwork, show commitment and focus on relationships (CFI, 2020).

D. Empathetic Leaders

Empathy is defined as a skill of understanding the feelings, emotions, interests and concerns of other people (Decety, Philip & Jackson, 2006; Goleman, 2000; Marques, 2010; Mencl & May, 2009). Likewise, Gentry, Weber and Sadri (2016) defined empathy as the ability to experience the thoughts and emotions of others. It is essential to transformational leadership to show that leaders care for his/her team members (Bass, 1985). Likewise, empathy is crucial to effective leadership (Bar-On & Parker, 2000; George, 2000; Marques, 2010; Salovey & Mayer, 1990). Empathy, as a skill, allows leaders to understand the perspective of others by placing themselves in the same situation (Gardner & Stough, 2002; Voss, Gruber and Reppel, 2010). Empathic leaders are more open about diversity (Atwater & Waldman, 2008), likely to develop trust in the leader-follower relationship (Martinovski, Traum & Marsella, 2007), and sensitive to changes in the work environment (Tager, 2004).
E. Transparent Leaders

Transparent leaders listen and communicate questions to encourage discussions and promote innovative thinking among team members (Leonard, 1999). According to Llopis (2012), transparent leaders solve problems faster, build teams easier, grow a genuine relationship, promote trust, and develop high work performance. Open communication is essential to effective organizations (Gross, 2002; Myers, Knox, Palowski & Ropog, 1999), better leader-employee relationship (Kay & Christophel, 1995), job satisfaction (Weiss, 2002), role clarity (Klaus & Bass, 1982) and positive peer relationship (Myers et al., 1999). Transparency is vital to authentic leadership (Gardner, Avolio, Luthans, May & Walumbwa, 2005) which develops greater trust between the leader and followers (Hughes, 2005; Walumbwa, Avolio, Gardner, Wernsing & Peterson, 2008). Furthermore, Han (2017) determined that leaders’ transparent behavior influences creativity among employees.

F. Responsible Leaders

According to Maak and Pless (2006), responsible leadership is a social process wherein leaders sort things based on ethical considerations to create a more sustainable and trustful relationship with the stakeholders. Further, they emphasize the relationship is vital to responsible leadership. Leaders with empathy can easily understand the needs of the stakeholders and act promptly, thus they are more likely to become responsible leaders (Dietz & Kleinlogel, 2014; Muller, Pfarrer & Little, 2014; Stahl & de Luque, 2014). Likewise, moral intensity and cultural value orientations greatly influence leaders’ responsible behaviors (Stahl & de Luque, 2014). Moreover, responsible leadership reduces employee turnover ratio (Doh, Stumpf & Tymon Jr., 2011), improves job satisfaction among employees (Voegtlin, 2011), and promotes organizational commitment (Doh, Quigley, 2014).

III. METHODOLOGY

The qualitative research design using a reflexive approach of thematic analysis was designed to capture the emerging traits of leaders across financial industries during the time of COVID-19 pandemic in the Philippines. Qualitative research is appropriate for the study since it allows a full and in-depth review of the phenomenon being studied (Corbin & Strauss, 2008; Hill, Thompson & Williams, 1997). The inductive style was adopted in the survey since it captures raw ideas from the participants. It works from specific observation and relates to broader themes and generalizations (Burney & Saleem, 2008).

The survey was administered from May 5 to 25, 2020, using two online channels such as LinkedIn and Viber. The total valid responses were 58 out of the 59 collected. One response was scrapped due to an invalid character submitted by a participant. The single open-ended question used in the survey was: “In your own opinion as an employee, what are the most significant traits that leaders in your organization should possess in this time of COVID-19 pandemic?”.
After reviewing the validity of the responses, the researcher proceeded with the thematic analysis using the six-phase approach recommended by Braun and Clarke (2006). The procedures with corresponding examples are enumerated in Figure 1.

**Phase 1 - Read and re-read data.**
- All data were extracted from the online channels and placed into a single repository. The responses of the participants were read by the researcher in multiple times under different occasions. The repetition process allows the development of perception and full view of the concept being relayed by the participants.

**Phase 2 - Generate initial codes.**
- The reading process was accompanied with marking of excerpts in different descriptions or codes. For example, the responses “[…] adapts to the new normal way of doing things.” and “[…] be agile enough to respond to changes and chart a new course if there are mistakes and previous measures are not effective.” were coded under “Flexible in handling circumstances”.

**Phase 3 - Combine codes into themes.**
- The codes with similar concepts were merged to form a meaningful theme thus the codes from Phase 2 were tagged under the theme “Resilient”.

**Phase 4 - Check themes in line with study objective.**
- All the generated themes were reviewed several times against the coded data to identify redundancy and consistency towards satisfying the goal of the study.

**Phase 5 - Define each theme.**
- The themes were defined based on the story of each code and beyond the surface meaning of each response. This method captures a more profound and coherent way of telling the rationale behind the response without dwelling too much on the specific words or phrase used by the participants.

**Phase 6 - Decide which theme is meaningful.**
- The themes were reviewed for final reporting. The themes with meanings drifting apart from the objective of the study were refined. The qualified themes with clear and logical account in relation to the survey question were used for further analysis.

Figure 1. Thematic Analysis Procedures

### IV. EMPIRICAL RESULTS

**A. Descriptive Statistics**

The descriptive statistics of the study is presented in Table 1. The majority of the participants were female with ages 25 to 30 years old and more than half of the total responses came from Davao City. All participants were working in the financial industry which included banks, insurance companies, and lending firms.

![Table 1. Descriptive Statistics](image-url)
Table 2. Thematic Analysis – Resilient

<table>
<thead>
<tr>
<th>Response</th>
<th>Excerpt</th>
<th>Code</th>
<th>Theme</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>“[…] keep things moving forward and adapts to the new normal way of doing things.”</td>
<td>Flexible in handling circumstances</td>
<td>Flexible in handling circumstancs</td>
</tr>
<tr>
<td>R7</td>
<td>“[…] being ready in times like this pandemic we are going through.”</td>
<td>Reliable in managing situations</td>
<td>Reliable in managing situations</td>
</tr>
<tr>
<td>R17</td>
<td>“While driving people towards a common goal, he/she will be needing patience as stress and tension is high and people are coping with the pandemic differently.”</td>
<td>Patient and determined</td>
<td>Patient and determined</td>
</tr>
<tr>
<td>R12</td>
<td>“Lenient. Compassionate. Quick decision maker.”</td>
<td>Act prudently</td>
<td>Act prudently</td>
</tr>
<tr>
<td>R14</td>
<td>“One should have initiative without anyone asking them to do things. Should act first and be a good example for the team.”</td>
<td>Show initiative</td>
<td>Show initiative</td>
</tr>
<tr>
<td>R34</td>
<td>“[…] also be agile enough to respond to changes and chart a new course if there are mistakes and previous measures are not effective.”</td>
<td>Sensibly resourceful</td>
<td>Sensibly resourceful</td>
</tr>
<tr>
<td>R24</td>
<td>“[…] leader should be adaptive to changes specially in this time of Covid-19 pandemic.”</td>
<td>Adaptive to changes</td>
<td>Adaptive to changes</td>
</tr>
<tr>
<td>R26</td>
<td>“Resilient to face a crisis.”</td>
<td>Able to handle challenges</td>
<td>Able to handle challenges</td>
</tr>
<tr>
<td>R37</td>
<td>“Critical thinker, flexible or adaptive to a drastic change but with compassionate heart”</td>
<td>Flexible to drastic change</td>
<td>Flexible to drastic change</td>
</tr>
</tbody>
</table>

B. Thematic Analysis

The thematic analysis of leaders being resilient is presented in Table 2 with a total of 10 responses. During the time of difficulties, leaders are expected to be flexible and reliable in handling situations, patient in dealing with drastic changes, and determined to keep things moving forward.
The thematic analysis of leaders being supportive is exhibited in Table 3 with a total of 6 responses. As organizations shift from in-office to work-from-home setup, leaders are assumed to show trust and confidence to their team members in executing assigned tasks and appreciate the team’s effort through online collaboration and recognition.

<table>
<thead>
<tr>
<th>Response</th>
<th>Excerpt</th>
<th>Code</th>
<th>Theme</th>
</tr>
</thead>
<tbody>
<tr>
<td>R2</td>
<td>“[…] he/she doesn’t have to remind his/her team their tasks frequently because his/her teammates already know their tasks by heart […]”</td>
<td>Trust his/her team members</td>
<td>Supportive</td>
</tr>
<tr>
<td>R8</td>
<td>“Trust is also very important. Show your team that you trust them that they know how to handle their own areas. […]”</td>
<td>Show trust to his people</td>
<td></td>
</tr>
<tr>
<td>R11</td>
<td>“Have a Leader you can look up to who knows how to motivate his people to do more than what is required. He should know how to trust that his colleagues are working more even from work-from-home.”</td>
<td>Express confidence to his team members</td>
<td>Supportive</td>
</tr>
<tr>
<td>R43</td>
<td>“The leader must build consensus among the various stakeholders to ensure people have buy-in and are able to work together smoothly.”</td>
<td>Work with collaboration</td>
<td></td>
</tr>
<tr>
<td>R22</td>
<td>“A little recognition and appreciation of each and everyone's hard work and sacrifice for the benefit of the company/organization goes a really long way.”</td>
<td>Appreciate the team’s effort</td>
<td></td>
</tr>
<tr>
<td>R38</td>
<td>“Also listens to co-employees concerns and opinions.”</td>
<td>Open-minded</td>
<td></td>
</tr>
</tbody>
</table>

The thematic analysis of leaders being supportive is described in Table 4 with a total of 18 responses. As the country’s health care system struggles to combat the pandemic and organizations across industries tackle business survival, employees rethink their leaders as being sincere to know their health and safety, and considerate to extend emotional and financial support.

<table>
<thead>
<tr>
<th>Response</th>
<th>Excerpt</th>
<th>Code</th>
<th>Theme</th>
</tr>
</thead>
<tbody>
<tr>
<td>R3</td>
<td>“[…] they make sure we have food to eat and some money to spend during this pandemic. Since we need to go out to the branch and serve the needs of our clients, they provide us allowance in addition to our salary.”</td>
<td>Recognize the need of others</td>
<td></td>
</tr>
<tr>
<td>R5</td>
<td>“Must be able to understand each team member’s situation and always be sincere with showing care and thoughtfulness to the members […]”</td>
<td>Sincere in showing care</td>
<td></td>
</tr>
<tr>
<td>R4</td>
<td>“Aside from leading by example, taking into consideration not only the loss of income but also the health of the employees during this pandemic […]”</td>
<td>Consider health and safety of team members</td>
<td></td>
</tr>
<tr>
<td>R6</td>
<td>“Taking care of employees in the midst of pandemic. Making them feel special and supported […]”</td>
<td>Make sure their employees are okay</td>
<td></td>
</tr>
<tr>
<td>R51</td>
<td>“[…] letting us know that they understand what we are going through has a big impact to each one of us.”</td>
<td>Understand the current difficulties</td>
<td></td>
</tr>
<tr>
<td>R45</td>
<td>“[…] a little bit of ‘Kumusta Ka?’ would definitely brighten up someone’s rough day.”</td>
<td>Kind and considerate</td>
<td></td>
</tr>
<tr>
<td>R13</td>
<td>“At this time of pandemic, it is important that leaders in organizations must have a compassion for their employees […]”</td>
<td>Care for others</td>
<td></td>
</tr>
<tr>
<td>R18</td>
<td>“In this trying time, employees need a leader who knows how to empathize.”</td>
<td>Know how to empathize</td>
<td></td>
</tr>
</tbody>
</table>
to feel for them.”

R21 “[…] it is important for the team to know that their leaders know and understand what they are going through. It is important for them to feel valued and heard.”

Empathetic Understand difficulties of the situation

R23 “A leader should put the welfare of his constituents first and make sure their safety, security, and basic needs are met before they make them do their jobs.”

Prioritize welfare of members

R28 “Understanding and listening to the team concerns and needs especially in terms of safety and wellbeing of the members put as top priority.”

Listen to the team’s concerns

R31 “More than ever, employees need their companies to support them financially and emotionally. Because I believe that people is the bread and butter of any organization.”

Show genuine support

R32 “I think that a leader in an organization should be people oriented in this time of pandemic.”

Attend to member’s need

R39 “He must prioritize the welfare of his employees. To protect the company, he must protect the employees that made the company running.”

Prioritize employees

R41 “Leaders should be patient in times troubles. Since we all know that this pandemic affects not only the profits of our business but leaders should take notice of the workforce (humans).”

Considerate

R46 “[…] ensure that the employees’ mental health is stable since the situation triggers anxiety and other negative thoughts.”

Ensure sound working environment

R48 “Empathy over capitalism.”

Promote common good

R52 “[…] the leader should understand the situation of their employees instead of terrorizing them.”

Kind and compassionate

The thematic analysis of leaders being transparent is shown in Table 5 with a total of nine responses. Communication plays a crucial part in the survival of any organization, thus effective leaders are considered as honest, objective and confident in communicating significant issues across various levels of the organization.

<table>
<thead>
<tr>
<th>Response</th>
<th>Excerpt</th>
<th>Code</th>
<th>Theme</th>
</tr>
</thead>
<tbody>
<tr>
<td>R9</td>
<td>“[…] communicate the facts to us and at the same time, let us know the steps they are taking in this time of crisis. We will feel that we have our boss and the company that we can rely into […]”</td>
<td>Honest in communicating</td>
<td></td>
</tr>
<tr>
<td>R10</td>
<td>“A good leader during a pandemic is someone who is honest &amp; has integrity, good decision maker, and confident.” “[…] as a leader, you have to communicate your intent every chance you get.”</td>
<td>Truthful and confident Good communicator</td>
<td></td>
</tr>
<tr>
<td>R15</td>
<td>“The leader also must be firm and just, to apply decisions with fairness and resolve […]”</td>
<td>Objective and strong-minded</td>
<td></td>
</tr>
<tr>
<td>R35</td>
<td>“In the midst of the COVID-19 pandemic, a leader must keep her/his people updated with the recent condition of the country and of the company as a whole.”</td>
<td>Communicate truthfully Transparent</td>
<td></td>
</tr>
<tr>
<td>R54</td>
<td>“Clear goal on vision and mission, good example, clear communication, high integrity, good recognition.”</td>
<td>Role model</td>
<td></td>
</tr>
<tr>
<td>R42</td>
<td>“[…] communicating &amp; listening effectively are few of the many attributes of being a leader that must put into action […]”</td>
<td>Communicate effectively</td>
<td></td>
</tr>
<tr>
<td>R44</td>
<td>“A Good Communicator and transparent leader. Someone who can clearly communicate the goal and strategies for the team.”</td>
<td>Communicate directions</td>
<td></td>
</tr>
<tr>
<td>R49</td>
<td>“[…] not adverse to suggestions and comments from subordinates, takes the “big picture” into consideration, weighs what is important for the business while keeping</td>
<td>Keep an open communication</td>
<td></td>
</tr>
</tbody>
</table>
The thematic analysis of leaders being responsible is indicated in Table 6 with a total of 15 responses. Amidst the health crisis, leaders are thought to overlook the situations, guide the team members, and see opportunities for responsible headship.

<table>
<thead>
<tr>
<th>Response</th>
<th>Excerpt</th>
<th>Code</th>
<th>Theme</th>
</tr>
</thead>
<tbody>
<tr>
<td>R55</td>
<td>“[…] a leader you should be responsible for the company’s survival.”</td>
<td>Take responsibility</td>
<td></td>
</tr>
<tr>
<td>R16</td>
<td>He should be a good listener and well decided in everything.</td>
<td>Lead and decide</td>
<td></td>
</tr>
<tr>
<td>R56</td>
<td>There must be a sense of mission for the greater good. He/she will be looking after welfare of the people […]’</td>
<td>Overlook situations</td>
<td></td>
</tr>
<tr>
<td>R19</td>
<td>“Grit and commitment.”</td>
<td>Dedicated to work</td>
<td></td>
</tr>
<tr>
<td>R20</td>
<td>“Someone who doesn’t waste people’s time by having a concrete objective, plans solutions and implementation.”</td>
<td>Sincerity to serve</td>
<td></td>
</tr>
<tr>
<td>R25</td>
<td>“In my opinion, leaders in our organization must be accountable, possess positive attitude and committed in this time of pandemic.”</td>
<td>Committed</td>
<td></td>
</tr>
<tr>
<td>R27</td>
<td>“A leader should still have the mindset of being goal oriented without thinking of the impossible - the challenges in attaining positive results for the company despite the pandemic situation.”</td>
<td>Guide the team</td>
<td>Responsible</td>
</tr>
<tr>
<td>R29</td>
<td>“I think a good leader during this pandemic is someone who is organize, someone who is calm. A clear mind is the best asset in solving problems.”</td>
<td>Composed in dealing</td>
<td></td>
</tr>
<tr>
<td>R30</td>
<td>“At this time, a good leader should be decisive, giving clear and solid directions in the midst of great uncertainty.”</td>
<td>Focused to manage</td>
<td></td>
</tr>
<tr>
<td>R33</td>
<td>“A Leader with Concrete Plan. A Leader with Effective Actions.”</td>
<td>Visionary</td>
<td></td>
</tr>
<tr>
<td>R36</td>
<td>“He/she must create a positive attitude in implementing the new norm in the branch and supports employer’s new policies.”</td>
<td>Positive thinker</td>
<td></td>
</tr>
</tbody>
</table>
Table 6. Thematic Analysis – Responsible (continuation)

<table>
<thead>
<tr>
<th>Response</th>
<th>Excerpt</th>
<th>Code</th>
<th>Theme</th>
</tr>
</thead>
<tbody>
<tr>
<td>R40</td>
<td>“At times like this you need to think of solutions / opportunities and always to have positive outlook.”</td>
<td>Able to see opportunities</td>
<td></td>
</tr>
<tr>
<td>R47</td>
<td>“Goal driven, rational thinker […]”</td>
<td>Wise decision maker</td>
<td></td>
</tr>
<tr>
<td>R57</td>
<td>“Has the power to unite his/her team with same goal / objective; has strong decision-making attitude […]”</td>
<td>Lead decision maker</td>
<td>Responsible</td>
</tr>
<tr>
<td>R58</td>
<td>“In this chaotic and unprecedented situation, having a leader that is quick to decide and act on the matters is very essential like in our type of work as loan account officers.”</td>
<td>Act responsibly</td>
<td></td>
</tr>
</tbody>
</table>

C. Prevailing Traits

The generated themes were ranked based on the weight distribution of responses to determine the most prevailing traits of leaders. The result in Figure 2 revealed that most employees highly perceived that their leaders, above all, should be empathetic, responsible and resilient.

![Figure 2. Leader’s Prevailing Traits](image)

V. CONCLUSION AND RECOMMENDATION

The study revealed that leaders become even more effective principals of organizations during the health crisis if they are empathetic, responsible, resilient, transparent and supportive to their employees.

Empathetic leaders understand the concerns of their people, recognize their needs and sincere in showing care. They prioritize the welfare of their employees and create a sound working environment. They are more likely to become responsible leaders as well. Responsible leaders take the lead, overlook situations and discover opportunities. They build relationships that improve job satisfaction and promote organizational commitment. Resilient leaders can adapt to work pressures and process these to become prospects for growth. They are reliable,
patience and determined to see light at the end of the tunnel. Transparent leaders are good listeners and better communicators. They are truthful, strong-minded, objective and confident in conversing clear directions for effective organizations. Lastly, supportive leaders are motivators who acknowledge the contribution of each member. They show trust and confidence in the works and decisions of their people. They collaborate to encourage creativity, train to develop expertise, and they reward performers for motivation.

Moreover, the study is recommended to all organization leaders across industries. With the results, leaders may proactively improve their strategies in dealing with financial, emotional and social implications caused by the COVID-19 pandemic. The identified prevailing traits are necessary for leaders to possess so that employees may see confidence, hope and relief. Nonetheless, the study is endorsed to the community of scholars for further review and exploration of the subject using various scientific approaches.

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Volumetric Analysis and Characterization of D_7 Reservoir using Well log and Seismic Data

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Abstract- Suites of wire-line logs from seven (7) wells were integrated with 3D seismic data in order to characterize reservoir D_7 and estimate its hydrocarbon volumes. Detailed seismic interpretation was carried out to determine geologic structures. Seismic-to-well tie was done using previously generated synthetic seismogram, and this was used to pick the reservoir horizons; time and depth structural maps were subsequently generated. Geostatistical models were built using the Sequential Indicator Simulation and Sequential Gaussian Simulation which resulted in improved distribution of reservoir properties within the geologic cells. Statistical analysis of Porosity, Water saturation and Net-to-gross models for the reservoir revealed porosity values ranging from 18% to 27%, average water saturation of 45% and mean Net-to-gross value of 70%. Furthermore, the structural model showed a fault assisted closure. Finally, volumetric estimation revealed a STOIIP of 84Mstb. The results of this study have shown good hydrocarbon potential of reservoir D_7.

Index Terms- Geostatistical, Hydrocarbon, Reservoir, Seismic.

I. INTRODUCTION

Reservoir modeling is an important tool which aids in planning and development of depletion strategies for hydrocarbon reservoirs. However, it is often associated with uncertainties that may lead to inadequate description of the reservoir and prediction of field performance. Integrating seismic and well data sets will help in providing subsurface images that will aid geological interpretation and ultimately reduce uncertainties (Oluwadare et.al, 2017). Moreover, successful integration of relevant data depends on its quality. Optimizing reservoir management and field development requires a model capable of realistically predicting the dynamic behaviour in terms of fluid recovery and production rate for different operating conditions. Reservoir modeling and characterization focuses on integrating all available geologic data and subsequent interpretation that would aid in unraveling the nature of subsurface environments. Geostatic models are very useful in estimating reservoir properties and are also required as input to reservoir simulation programs which predict the movement of fluids within the reservoir under various hydrocarbon scenarios. It is essential to model the reservoir as accurately as possible in order to calculate the reserves and to determine the most effective way of recovering the hydrocarbon as economically as possible (Lucia and Fogg, 1990; Worthington, 1991; Haldersen and Dasleth, 1993).

This study focuses on integrating well log and seismic data to effectively characterize the D_7 reservoir and estimate its hydrocarbon volumes.

Geology of Study Area

The study area falls within the Niger Delta Basin. The Niger Delta Basin is a prograding depositional complex located in Southern Nigeria. It is bounded in the West by the Benin flank; the subsurface continuation of the West Africa shield, in the East by Calabar flank; the subsurface continuation of the Oban massif, to the North by Abakaliki and the post-Abakaliki (Anambra basin); and to the South by the Atlantic Ocean (Murat, 1972). Due to subsidence and deposition, a succession of transgressive and regressive sequence advanced south-west of the Niger Delta Basin (Oomkens, 1974) which resulted in the deposition of
between 9,000m to 12,000m thick transgressive/regressive sequences similar to the Gulf Coast Tertiary section in the United States of America (Curtis, 1970). Detailed information about the origin, geomorphology, tectonic setting, structural pattern, stratigraphy and depositional environment of the Niger Delta Basin has been provided by various authors (Reijers, 2011; Lehner and De-Ruiter, 1977; Kulke, 1995; Doust and Omatsola, 1990; Stacher, 1995; Michelle et al., 1999; Damuth, 1994; Mascle et al., 1973; Short and Stauble, 1967).

II. METHODOLOGY
Seismic (3D cube) and well (headers, deviation, logs, and checkshot) data sets from seven (7) wells was used for this research study. They were interpreted and analyzed using the Petrel software. A detailed research methodology workflow is shown in Fig. 1.

Data Quality check and Importation
The data sets were quality checked to ensure they were in the right format and then imported into the Petrel software platform (Table 1).

Well Log Interpretation and Correlation
The lithology was delineated using the gamma ray log which ranges from 0 API to 150 API. The shale formations have high radioactive contents, thus deflecting to the right of the baseline. While the sand formations deflect to the left of the baseline. The reservoir was also correlated across seven (7) wells.

Seismic Interpretation
Prominent geologic structures such as faults were identified across the seismic section. Geological fault interpretation was done on both inline and cross lines. The check shot data was used to generate a synthetic seismogram for well-to-seismic-tie (Fig. 3). The synthetic seismogram further aided in picking the top horizon of D_7 reservoir on both inline and cross lines. The mapped horizon was then used to generate a structural time map. Two-Way Time (TWT) was plotted against True Vertical Depth (TVD) using a polynomial function of second order (Fig. 2). The equation generated was subsequently used to build a velocity model for converting the time structural map to depth structural map.

Petrophysical Evaluation

Volume of Shale: The volume of shale within the reservoir was determined from the gamma ray log by first calculating the gamma ray index using the equation below:

\[ \text{IGR} = \frac{GR_{\text{log}} - GR_{\text{min}}}{GR_{\text{max}} - GR_{\text{min}}} \]  

Equation 1

Where: \( IGR \) = gamma ray index, \( GR_{\text{log}} \) = gamma ray reading of the formation, \( GR_{\text{min}} \) = minimum gamma ray (clean sand), \( GR_{\text{max}} \) = maximum gamma ray (shale). The gamma ray index was then used to calculate the volume of shale using the Larinov tertiary rock equation

\[ V_{\text{shale}} = 0.083 \times (\text{pow}(2,(3.7 \times IGR)) - 1) \]  

Equation 2

Porosity: The total porosity gives the ratio of pore volume to the total volume of the reservoir. It was evaluated using Wyllie’s equation.

\[ \phi = \frac{(\rho_m - \rho_h)}{(\rho_m - \rho_f)} \]  

Equation 3

Where \( \rho_m \) is the matrix density, \( \rho_h \) is formation bulk density and \( \rho_f \) is fluid density.

Effective Porosity: This was obtained using the equation below;

\[ \phi_{\text{eff}} = (\phi \times (1 - V_{\text{sh}})) \]  

Equation 4

Where \( \phi_{\text{eff}} \) is effective porosity, \( \phi \) is total porosity and \( V_{\text{sh}} \) is volume of shale.

Water Saturation: This was estimated using the Archie’s equation;

\[ S_w = \sqrt{\left(\frac{R_w}{(\text{ILD} \times \phi^{1.74})}\right)} \]  

Equation 5

Where, \( S_w \) = water saturation, \( R_w \) = water resistivity and ILD = true resistivity.

Permeability: This refers to the movement of fluid within the interconnected pore spaces and was obtained using the equation;

\[ K = \left[250 \left(\frac{\phi^2}{S_{\text{w}_{\text{tr}}}}\right)\right]^2 \]  

Equation 6

Where, \( K \) = permeability, \( \phi \) = porosity and \( S_{\text{w}_{\text{tr}}} \) = irreducible water saturation.

Geostatic Reservoir Modeling
Reservoir modeling workflow proceeds in stages which consist of structural modeling, facies modeling and petrophysical modeling.
Table 1: Data file type and their formats

<table>
<thead>
<tr>
<th>No.</th>
<th>DATA</th>
<th>DATA CATEGORY</th>
<th>DATA FORMAT (FILE TYPE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Well</td>
<td>Well headers</td>
<td>Well heads (**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Well paths/deviations</td>
<td>Well path/deviation (ASCII) (**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Well logs</td>
<td>Well log (ASCII) (**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Checkshot</td>
<td>Checkshot (ASCII) (**</td>
</tr>
<tr>
<td>2</td>
<td>Well tops</td>
<td></td>
<td>Well tops (ASCII) (**</td>
</tr>
<tr>
<td>3</td>
<td>3D Seismic</td>
<td>Horizon</td>
<td>Seismic data in (SEGY)</td>
</tr>
</tbody>
</table>

Fig. 1: Research Methodology Workflow
**Fig. 2:** Plot showing relationship between TWT and Z using the polynomial method

**Fig. 3:** Well-to-seismic-tie of reservoir D_7
Structural Modeling
This is the first step in building a geostatic model. Structural modeling comprises of fault modeling, pillar gridding, and layering.

- **Fault Modeling:** This involves the definition of faults in the geological model that form the basis for generation of the 3D grid.
- **Pillar Gridding:** Gridding involves creation of gridded surfaces from seismic interpretation, structural maps and faults.
- **Layering:** This involves building stratigraphic horizons, zones, and layers into the 3D grid. For this study, horizons were defined using seismic surfaces as input data. Zonation is the process of creating the different zones from the surfaces.

Up scaling of Well Logs
This is the process of grid coarsening enabled by calculation of effective flow properties using analytical (arithmetic, geometric, harmonic averages) and numerical simulation. The properties included in the scale-up process for this study were porosity, water saturation, net-to-gross, and facies type. These properties were scaled up using arithmetic averaging. Sequential indicator simulation and sequential Gaussian simulation were employed to estimate values for cells between wells.

Property Modeling
This is the process of assigning petrophysical properties to grid cells. The layer geometry given to the grid during layering follows the stratigraphy of the model area. These processes are therefore dependent on the geometry of the existing grid. When interpolating between data points, Petrel software propagates property values along the grid layers. Property modeling is divided into two separate processes; Facies and Petrophysical Modeling.

- **Facies Modeling:** This is a means of distributing discrete facies throughout the model grid. In this study, facie modeling was done using the sequential indicator simulation algorithm. Two major facies type (shale and sand) were defined on the basis of reservoir property relationships and this was used to populate the geocellular model of the D_7 reservoir.

- **Petrophysical Modelling:** The purpose of petrophysical modeling is to distribute properties between the wells so that it realistically preserves the reservoir heterogeneity and matches the well data. This comprises of porosity, net-to-gross, volume of shale and water saturation models.

Reservoir Volumetric Estimation
This was done using the equation below:

\[ STOIIP = \frac{7758 \times A \times h \times (1 - S_w) \times N/G}{B_o} \]

Where;
- 7758 = Area constant in acres/ft.
- A = Area of pay zone,
- h = Pay thickness,
- S_w = water saturation,
- N/G = Net-to-gross
- B_o = Oil formation volume factor
- Ø = porosity

III. RESULTS AND DISCUSSIONS

Reservoir Geology
D_7 reservoir was correlated across the seven (7) wells (25, 3, 60, 65, 2, 58 and 35 respectively) along the dip direction (SE) (Fig. 4). This was done using both gamma ray and resistivity logs. Hydrocarbon bearing intervals and fluid type (oil, gas or water) were identified using resistivity, neutron and density logs. The correlation panel showed the sands thinning out with presence of shale intercalations towards the S-E direction. This is probably an indication of shoreface sands prograding into marine; a characteristic of deltaic environments (Fig. 5 and 6). Reservoir tops and bases were delineated using GR, neutron and density logs (Table 2).

Structural Interpretation
From the study it was revealed that the reservoir has a rollover anticline structure with dip closure to the East and West bounded by growth faults to the North and North-west located on the footwall of the major growth fault. The regional growth fault is an elongate East-west trending fault that assisted the reservoir in trapping hydrocarbon.
### Table 2: Tops, Bases, Contacts and Petrophysical Information of Reservoir D\_7

<table>
<thead>
<tr>
<th>Wells</th>
<th>Top (ft.)</th>
<th>Bottom (ft.)</th>
<th>OWC (ft)</th>
<th>Thickness (ft)</th>
<th>Pay Thickness (ft)</th>
<th>NTG</th>
<th>Ø</th>
<th>Sw</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well 25</td>
<td>7579</td>
<td>7746</td>
<td>167</td>
<td></td>
<td>0.82</td>
<td>0.21</td>
<td>0.99</td>
<td></td>
</tr>
<tr>
<td>Well 03</td>
<td>7570</td>
<td>7700</td>
<td>130</td>
<td></td>
<td>0.47</td>
<td>0.15</td>
<td>0.79</td>
<td></td>
</tr>
<tr>
<td>Well 60</td>
<td>7628</td>
<td>7724</td>
<td>96</td>
<td></td>
<td>0.64</td>
<td>0.21</td>
<td>0.99</td>
<td></td>
</tr>
<tr>
<td>Well 65</td>
<td>7313</td>
<td>7365</td>
<td>7326</td>
<td>52</td>
<td>13</td>
<td>0.65</td>
<td>0.21</td>
<td>0.66</td>
</tr>
<tr>
<td>Well 02</td>
<td>7382</td>
<td>7460</td>
<td>7406</td>
<td>78</td>
<td>24</td>
<td>0.38</td>
<td>0.13</td>
<td>0.54</td>
</tr>
<tr>
<td>Well 58</td>
<td>7270</td>
<td>7331</td>
<td>7329</td>
<td>61</td>
<td>59</td>
<td>0.53</td>
<td>0.18</td>
<td>0.38</td>
</tr>
<tr>
<td>Well 35</td>
<td>7308</td>
<td>7373</td>
<td>7378</td>
<td>65</td>
<td>70</td>
<td>0.39</td>
<td>0.16</td>
<td>0.42</td>
</tr>
</tbody>
</table>

**Fig. 4:** Base map showing cross-section of the correlated wells.
Fig. 5: Correlated well section (wells 25, 3 and 60) showing top and base of reservoir

Fig. 6: Correlated well section (wells 65, 2, 58 and 35) showing top and base of reservoir
A major fault trending NW-SE was identified with several synthetic faults (Fig. 7). The closure within this reservoir was observed to be fault assisted and serves as a seal preventing further migration of the hydrocarbon (Fig. 8 and 9).

**Stratigraphic Interpretation and Depositional Environment**

The well logs and facies model showed a predominantly deltaic (paralic facies) comprising of shoreface/barrier bar and channel sands depicted by a coarsening upward gamma ray log signature. This was further corroborated by lateral continuity of the sand package; typical of shoreface deposits. The facies model indicates abundance of shoreface sand deposits in the south-eastern part of the reservoir (Fig. 10). The gamma ray log also shows that the sand packages are thicker in the west and thins out eastward which is suggestive of a shelf to slope depositional environment. The shale distribution on the model suggests that a large scale flooding occurred during transgression.

**Reservoir Thickness**

Reservoir D_7 was delineated in well 25 at a depth interval of (7579-7746ft), well 03 at (7570-7700), well 60 at (7628-7724ft), well 65 at (7313-7365ft), well 02 at (7382-7460ft), well 58 at (7270-7331ft), and well 35 at (7308-7373ft). This information was used to generate the thickness (isochore map). The isochore map shows that the reservoir is thicker in the West and thins out towards the East (Fig. 11).

**Petrophysical Interpretation**

This was done to generate the water saturation model, porosity model and the net-to-gross model.

**Water Saturation Model**

This shows water saturation distribution within the reservoir to range from 38% to 99%. Wells 25 and 60 showed the highest water saturation, while well 58 had the lowest water saturation of 38% (Fig. 12).

**Porosity Model of Reservoir**

Porosity distribution ranges from 13% to 27%. This indicates that reservoir D_7 has good porosity for accumulation of hydrocarbon (Fig. 13).

**The Net-to-Gross Model**

The net pay was deduced from the net to gross distribution. The net-to-gross model depicts highest net to gross ratio of 72%-80%, and lowest net to gross value of 25% - 45%. Due to the poor net-to-gross ratio of the reservoir in wells 25 and 60, production may not be economical enough. However, wells 35, 2, 58 may be good producing wells due to high net-to-gross ratios (Fig. 14). This only gives an idea about the producing capabilities of the wells penetrating the reservoirs. Final decisions should not be based on this alone.

**Fluid Contact and Volumetric Estimation**

The hydrocarbon contact was delineated from the well logs (gamma, resistivity and density-neutron). The density-neutron log revealed Oil-water contact (OWC), no Gas-oil contact was observed since the logs showed that the reservoir is an oil reservoir with no gas. Wells 65, 02, 58, and 35 had fluid contacts at 7326ft, 7406ft, 7329ft, and 7378ft respectively. However, fluid contacts in wells 25, 03, and 60 could not be effectively determined because their resistivity logs were not available and the density-neutron logs had poor signals. Hydrocarbon volume was calculated and stock tank oil initially in place (STOIIP) value of 84Mstb was obtained as shown in Table 3.

**IV CONCLUSION**

The integration of all available data (geophysical, geological, petrophysical) has led to the building of a consistent geostatic model of the reservoir which can used in field development planning and may also serve as input into a 3D dynamic reservoir simulation model. The reservoir characterization has led to detailed description and understanding of the reservoir which is very important in developing an efficient reservoir management strategy. Well logs used for this study includes Gamma ray, Resistivity, Neutron and Density logs. The seismic interpretation showed a highly faulted closure for hydrocarbon entrapment and accumulation. Petrophysical analysis revealed good reservoir properties. Volumetric estimation showed good and economically viable hydrocarbon yield. The depositional environment suggests a deltaic environment due to the presence of prograding shore sands and channel sands intercalated with shales.
Fig. 7a: Seismic section showing the faults and reservoir horizon

Fig. 7b: Seismic section showing reservoir D_7 horizon
Fig. 8: Structural depth map for reservoir Top

Fig. 9: Structural depth map for reservoir Base

Fig. 10: Facies distribution map

Fig. 11: Thickness map
Fig. 12: Water saturation model

Fig. 13: Porosity model

Fig. 14: Net-to-gross model

Fig. 15: Oil-water contact map
Table 3: Volumetric Estimation

<table>
<thead>
<tr>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>D_7</td>
<td>218,321</td>
<td>123,406</td>
<td>22,440</td>
<td>12,216</td>
<td>84,096,057</td>
</tr>
<tr>
<td>ZONES</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zone 2</td>
<td>158,606</td>
<td>101,998</td>
<td>18,566</td>
<td>10,936</td>
<td>75,287,570</td>
</tr>
<tr>
<td>Zone 1</td>
<td>59,715</td>
<td>21,408</td>
<td>3,875</td>
<td>1,280</td>
<td>8,808,487</td>
</tr>
</tbody>
</table>

V. RECOMMENDATIONS

Conventional cores should be taken within the reservoir interval to further reduce uncertainties and validate the results obtained from the well logs. Detailed biostratigraphic analysis could be done to reliably interpret the depositional environment.

VI. REFERENCES


Challenges Faced While Conducting Research on Higher Education Students in Iran

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Abstract- This study aims to present the challenges that the author as a PhD student experienced in planning and collection of data for her dissertation. The thesis utilized a quantitative research method to assess Iranian Students’ readiness for using mobile technology in English language learning at an Open Learning University in Iran. The instruments consisted of web surveys (27 questions). The challenges that the author encountered during data collection are organized into three categories: the researcher, participants and supervisory team. Researcher related challenges were financial, lack of basic computer knowledge, and distance. The participants’ challenges were associated with low response rates, and low quality of answers. Supervisory team-related challenges included the lack of support and experience. Moreover, the study puts forward some solutions to address the challenges in order to facilitate doctoral students’ journey towards collecting data.

Index Terms- Data Collection, challenges, Open Learning University, Solutions, web surveys

I. INTRODUCTION

Data collection is considered as a critical step in conducting dissertation research for PhD students because it can significantly influence the results and quality of the research. However, during data collection, doctoral students and early career researchers may face some unexpected challenges that affect the research process. Therefore, the causes of these challenges should be identified and addressed to equip future doctoral students with some skills and experiences in order to minimize the issues during data collection and improve the quality of research products.

Based on the methods used for the data collection, researchers might encounter several unanticipated challenges to obtain information from participants of the study (Rimando et al., 2015). While many research studies attempted to explore different types of data collection (Kothari, 2004; Walliman, 2017), there is limited research to address the experiences and challenges the researchers encounter during data collection and the strategies they use to deal with these obstacles.

The present study used quantitative method and data was collected through online questionnaires to assess undergraduate students’ readiness for integrating mobile technology in instruction in an Open Learning University in Iran. While engaging in data collection, the author faced some challenging obstacles in administrating the questionnaires. The study aims to share the researcher experience during collecting data and provide new insights for future PhD students to be cautious in conducting their research, identify and solve existing problems while collecting data through online questionnaires in the field of their study.

II. METHODS

A phenomenological approach was used in this study to describe the challenges the doctoral student of the university of Malaya, Malaysia, encountered during conducting her dissertation research in 2018. A phenomenology is an approach to qualitative research that explores an individual's experiences in an effort to gain a deeper understanding of the phenomena in a given context (Cigdemoglu, Arslan, & Akay, 2011). In this respect, phenomenological research is suitable for this study to describe the researcher’s own experiences gained during conducting research in order to understand and deal with the issues encountered while collecting data.

Firstly, the author summarized the study, giving some information related to the methods used for data collection. Secondly, she summarized the challenges faced during her data collection process. Furthermore, the study addressed the solutions implemented to resolve the data collection challenges for doctoral students and early career scholars.

III. STUDY CONTEXT

This study was conducted at an open university which is the only specialized distance education or online learning university in Iran. The distance education system of the university offers students a chance to study most or all of a course without needing to attend class.
In other words, the main purpose of this system is to provide education for all anywhere anytime (AbuSaidi, 2016). The study conducted an online questionnaire to determine Iranian English as a foreign Language (EFL) undergraduate students’ readiness for integrating Mobile Learning as a support into an existing English course. The aim of the questionnaire was 1) to gain a better understanding of Iranian undergraduate students’ mobile technology skills and usage, 2) to find the common mobile applications, and 3) to identify their attitude towards the Mobile Learning in learning English. The questionnaire was modified from the MReadiness Questionnaire (Baharam, 2013) to fit for the context of the present study.

The survey questionnaire administered in this study was divided into three parts: 1) learners’ background information and their perceived level of English, 2) learners’ mobile technology usage, and 3) learners’ acceptance and use of mobile learning. In the questionnaire, the first section was required to investigate the background information of the participants, including age, gender, field of study, and English level. The second was about the kind of mobile devices the students had access to, mobile communication applications they used to communicate, and the characteristics of their mobile phones. The researcher needed to identify the EFL undergraduate learners’ familiarity and ability to use their own mobile phones. The final section of the questionnaire, ranging from strongly disagree, disagree, neutral, agree, strongly agree, explored EFL learners’ attitudes towards the use of their mobile devices as a learning support.

It involved 200 participants at the selected University in Iran. The students were enrolled in fields of study, including Business Science, humanities, Social Science, and Engineering. All the students of this university needed to pass general and specialized English courses to be able to graduate for a Bachelor degree. General and specialized English courses are taught as an obligatory undergraduate subject to Iranian undergraduate students in the University.

IV. Challenges

A. Researcher

The main challenges related to the researcher were financial, lack of basic computer knowledge, and distance. As I was living in Kuala Lumpur, Malaysia, it was difficult and expensive for me to travel from Malaysia to Iran. So, distance was really a challenge for me. Financial constraint was another element that affected my work. I had to spend a large amount of money to travel and implement my research. The expenses of conducting the research were one of the top concerns I encountered during my collecting data. Financial worries made me to give up right from the beginning several times. I did not have any idea how to carry on my research without sufficient capital and what took me so long in finishing my research. I even was hesitant to start or even continue. All these factors played an important role in choosing this kind of method for collecting my data (using Online Questionnaires). But creating online questionnaire was another story. It was my first time to create an online questionnaire. It was challenging to work with something that I was not so familiar with. For a few weeks, I was just struggling challenges how to work with online templates and how to prevent the same user from responding more than once. I believe in Ragma’s (2017) saying: while doing a task that you do not know really well, you are likely to be stressed and challenged. Due to the lack of skills and knowledge in computer, I felt stressed and anxious that conducting research had taken a bit longer. I was typing the items many times, but I easily lost the data and I did not know how to recover it. The Quote “If you get tired, learn to rest not to quit” reminded me to stop worrying and keep working.

B. Participants

The biggest challenge was participants’ low response and low quality of the responses. Firstly, I shared the questionnaire link in the Telegram group of the university but unexpectedly no one answered and I decided to create a group with just my students in the target university and asked them to share the link of the Telegram group with other students to answer the questionnaire. For three months, I was sending the notification every day. The responses were very low. It was really time-consuming because I was waiting for more than 3 months in the hope to get higher responses. At the end, I decided to travel my country to conduct face to face questionnaires and distribute them among students.

After data collection, I found some unanswered questions on the questionnaires and also noticed that the open-ended questions had been answered irrelevently. I was not sure whether the participants have understood the questions, or whether they have taken the time to provide accurate data.

C. Supervisory Team

The supervisory team plays a key role supporting the success of PhD students doing research (Griffiths, Blakey, & Vardy, 2016). However, my supervisor always says to me “your research thesis is like your baby. So, it is your baby not my baby and you should take care of it.” Or whenever I asked her a question, she asked me to browse the Internet or search on google in order to find my answers. The other problem was our different field of interest. She was not knowledgeable enough in the field of my research topic and it doubled my workload. I had to ask the experts’ advice and guidance in the field of Applied linguistics but they did not have time to help and get involved in my research.
The study offers strategies and suggestions to government, administrators, researchers and supervisors to help future doctoral students and early career researchers in order to implement and finish their research.

1. Researchers require to think ahead about designing an instrument (questionnaire), about what data she/he needs to obtain and how to collect the information (Neville, 2007).

2. Researchers need to attend practical workshops, conferences, seminars and educational programs to gain experience, knowledge and skills that they cannot gain it from classes. It is an opportunity for novice researchers to be assisted by experts.

3. Researchers should have a strong intrinsic motivation and maintain fresh enthusiasm. The desire and inner drive of the researchers to finish what was started motivate them to stop worrying and move on in spite of the challenges ahead of them (Ragma & Almojuela, 2017). Regarding the reasons students pursue their PhD degree, many studies found that doctoral students who pursued the degree in terms of internal reasons report higher satisfaction, and academic success during the process and the outcome of their doctorate degree (Leonard, Becker, & Coate, 2005; Sverdlik, Hall, McAlpine, & Hubbard, 2018).

4. Concerning the expenses of collecting data, doctorate students should be provided with financial support opportunities such as government loans, scholarships, grants, as well as employment opportunities within the university like research or teaching assistantships (Sverdlik, et al., 2018; Tan, 2007).

5. The researchers should choose a supervisor with the same topics of interest and with adequate knowledge, enhanced theoretical and conceptual framework in the field of their research.

6. PhD students and their supervisors should be aware of their own responsibilities, commitment and expectations as part of a research team. For example, supervisors are accountable for providing relevant and adequate advice, support, knowledge, feedback and guidance, and students should be responsible to manage time for collecting data by careful planning a timetable, having meetings and discussions on conducting their research each time they meet with their supervisor.

7. An open and supportive relationship with supervisor would be essential for student’s success and progress. Having a face to face meeting with supervisor at least once a month would enable the researcher to carry out an excellent research.

8. Supervisors require additional training programs regarding how to supervise their students, research methodology and conducting research.

9. It would be helpful that supervisors provide students with a situation to present a paper at conferences, workshops, seminars and meetings.

10. There should be a system to evaluate students and supervisors in terms of research progress.

11. A student-supervisor relationship is essential in any stage of the doctoral process. They are supposed to collaborate on research process. As Sverdlik, Hall, McAlpine, and Hubbard (2018) state, a match between students and their supervisors can facilitate student progress and satisfaction.

12. The educational system of university of Malaya needs some changes in many aspects. Each faculty or department can provide a series of seminars in which research students are invited to share their experiences and challenges during data collection with peers within a friendly and safe environment. The university can offer them great social and academic opportunities to join the free conference and workshop and instead involve them in activities such as running or helping in the conference. In addition, it would be very helpful for PhD students that the university increases its research budget and help them to collect their data.

13. Regarding increasing response rate, it would be useful if PhD students distribute traditional paper-and-pencil (p&p) questionnaires and avoid online survey to ensure all questionnaires have been return.

14. Researchers or PhD students should establish a friendly relationship with their participants because it is difficult to convince them to answer the questionnaire (Bocar, 2009).

VI. CONCLUSION

This study has covered some of the issues the author as a doctorate student in the university of Malaya encountered during the process of data collection. The study also aims to provide possible solutions to address the data collection challenges identified. The most notable challenges in collecting data were attributed to the researcher, participants and supervisory team. The study provides numerous suggestions for dissertation advisors, future doctoral candidates, early career researchers, committee members of doctorate students and administrators to deal with the mentioned problems and improve the quality of quantitative research. Financial and research support from the research supervisor, experts in the field of research topic and dissertation committee members play an important role in facilitating the expertise in the supervision process and conducting data collection. Sharing the data collection experiences give valuable insights and solutions to novice doctoral students and anyone engaging in conducting a research. It is important for doctoral students and early career researchers to be aware of unanticipated challenges they may encounter with data collection while carrying on their research work.
REFERENCES


AUTHORS

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Socio-Economic Determinants of Food Insecurity at Household Level in Makueni County, Kenya

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Abstract- Food insecurity remains a great threat to many countries especially in the low – income countries. Many studies blame the problem of food insecurity especially in the Arid and Semi-arid Lands (ASALs) to the bio-physical factors such as climate, soil and altitude among others. However, Socio-economic determinants are important elements that influence food insecurity at household level. Thus, this study examined the socio-economic determinants of food insecurity at household level in Makueni County, Kenya. This region is one of the ASALs that face perpetual food insecurity in the Kenya. Guided by descriptive research design and based on a semi-structured questionnaire, data was gathered from households to examine the influence of socio-economic factors on food insecurity. Socio-economic factors were considered as independent variables and their relationships examined with food security as a dependent variable. From the 400 respondents selected in Makueni County, Kenya, the study revealed that the socio-economic factors such as lack of adequate capital, number of regular dependants, lack of extension services, gender, education level and lack of training among others tend to influence food insecurity situation and therefore influences the effectiveness of interventions of food insecurity at the household level. The study established that most of the farmers are robust and therefore the need to provide adequate support to the farmers so that they can be able to boost their food production. The study recommends the need to address the constraints that influence households’ food insecurity such as building on their potential by giving them credit facilities, training, use of technology and explore ways of diversifying farmers’ livelihood activities such as in setting up agro-based industries like food processing which would act as a fall back strategy during food insecurity situations among others.

Index Terms- Determinants, Food insecurity, Households, Kenya, Makueni, Socio-economic

I. INTRODUCTION

Large populations in many regions of the world remain food insecure in spite of the global development. FAO (2019) observes that the number of people suffering from hunger in the world has slowly increased for several years in a row, underscoring the immense challenge of ending hunger by the year 2030. Statistics show that almost a billion people live in extreme poverty (less than USD 1.25) per person per day and about 820 million suffer from hunger. Thus, much more must be done to achieve the Sustainable Development Goals (SDGs) on eradicating poverty and hunger by year 2030 (FAO, 2019 and FAO, 2015). The Government of Kenya in particular recognizes food security as one of the Big Four Agenda to be achieved as indicated in Kenya’s Vision 2030 (GOK, 2007).

Despite the importance of agriculture, this sector has remained below its potential in Africa. This is apparent in agriculture’s extreme undercapitalization and lack of competitiveness in world markets (IBRD, 2000; Fulginiti, et.al, 2004; GOK, 2007; Stanford, 2010). It is notable that while there is overproduction of food in the High Income Economies, most African countries experience a production shortfall, especially in per capita terms. Indeed, Africa as a whole has been a net agricultural importing region since 1980. The continent’s agriculture has been volatile partly due to erratic rainfall (Maxwell, 2003; AU and NEPAD, 2003; GOK, 2007; Stanford, 2010). About 50% of Kenya’s population is classified as poor and a third is estimated to be food insecure (GOK, 2002 and Barasa, 2010). About three quarters of the poor live in the rural areas most of them engaging in subsistence agriculture. Poverty and food insecurity levels are highest in Coast, North-eastern and Eastern Counties. Kenya’s agricultural development has continued to rely heavily on rain. Overall rainfall distribution in the country is not reliable and the country has continued to experience food deficits necessitating importation of food as well as dependence on food aid (Nyangito et. Al, 2004 and GOK, 2002).

Food insecurity therefore remains a key challenge especially in the low income countries and hence the need for more exploration into the inherent factors contributing to the problem at the household level. The general factors that are attributed to food insecurity include the bio-physical factors such as climate, soil infertility, diseases, slope and topography among others. The socio-economic factors that are also generally considered to have effect on food insecurity include population growth, weak infrastructure and markets (Waugh, 2002; Dyer, 2006; Pillariseti et.al, 2007; Kasturi, 2009; Singh, 2009; Obayelu, 2011).

Some empirical studies have been conducted to establish determinants of food insecurity. For instance, Ramsey et al. (2016) conducted a study in Australia on food insecurity among Australian Children. The study established that the potential determinants of food insecurity include: parental age; ethnicity; educational level; employment and poverty levels/income. The study collected data from households with children aged 3-17 years in a socio- economically poor suburb using mail survey and data analysed using logistic regression. This study throws some light to the current study because it reveals that socio-economically disadvantaged households may be more prone to...
food insecurity. Ramsey et al. (2016) also demonstrates that the problem of food insecurity is still a current problem not only in the low income countries but also in the developed countries. The current study however examined the socio-economic determinants of food insecurity with a focus in a low income country.

Foley (2009) carried out a study in South Australia which focused on analysis of factors associated with food insecurity. The results were based on data collected by South Australian Monitoring and Surveillance System (SAMSS). Based on logistic regression analysis, the study revealed that food insecurity was highest in households with low levels of education, limited capacity to save money, aboriginal households and households with three or more children.

Lê et al. (2015) examines the physical and financial access to food of the population of Dorset, a rural Municipality in North Eastern Tasmania (Australia). The study also focused on the impact that socio-economic factors have on food security and coping strategies they use when food shortage occurs. The study used both quantitative and qualitative research techniques focusing mainly on use of questionnaire method and focus group discussions. The study revealed that the community was vulnerable to food insecurity largely based on problems of food access, availability, affordability and knowledge issues.

Studies by Foley (2009) and Lê et al. (2015) informs the current study on some of the determinants of food insecurity such as financial ability to purchase food, level of education and number of children. Lê et al. (2015) also sheds light on the methodology to use such as use of questionnaires and focus group discussions that the current study also finds useful in the exploration of variables identified. However, the findings from these studies may not be generalized in the situation of Kenya in general and Makueni County in particular given that Australia is a high income country which is fairly food secure compared to Kenya.

Loopstra (2018) evaluated determinants of food insecurity and interventions to address food insecurity in high-income countries. The study is titled, “Interventions to address food insecurity in High-income countries” With regard to determinants of food insecurity, Loopstra (2018) reveals that household income is the most consistent and strongest predictor of risk of food insecurity. The study also indicated that populations who suffer from deep and persistent poverty have high rates of food insecurity. These include households with children, lone parents, adults with low levels of education and other vulnerable populations. Other factors that are linked to food insecurity include poor health, food inflation, poor financial management and lack of food availability (food desert). This study provides useful insight into the variables determining food insecurity but like Lê et al. (2015) its focused on the situation of high-income countries like USA, Canada and the United Kingdom.

Iheoma (2020) carried out a study on household food security and its determinants in agrarian communities in South Eastern Nigeria. Based on regression analysis, the study revealed that marital status, level of education, monthly income, dependency ratio and distance to market determined household food security status in the study area. The study emphasizes that households headed by unmarried persons with higher level of education and monthly income as well as with fewer number of dependents (< 5 persons) were more food secure, and food security decreased with increasing distance to market. The study recommends the need to address these determinants in order to enhance food security. Iheoma’s (2020) study is relevant to the current research study as it addresses some aspects of one of the variables under investigation, i.e. determinants to food insecurity.

In spite of the above, the socio-economic factors influencing food insecurity at the household level have not been properly addressed. Indeed, little has been done to examine how the dynamic nature of socio-economic factors such as technology, market and varying income levels have on food insecurity at the household level. Further, it is important to establish how education, employment status and imbalanced family expenditure on non-food items can have an impact on food insecurity at the household level.

It is against this backdrop that this study sought to establish the socio-economic determinants of food insecurity with the desire to establish pragmatic strategies that can make food insecurity a thing of the past. The objective of this study was to establish the socio-economic determinants of food insecurity at household level in Makueni County while the hypothesis that was tested was that there was no significant influence of socio-economic factors to food insecurity at household level in Makueni County.

II. METHODOLOGY

This research was undertaken in Makueni County, Kenya. The map of the region is as shown in appendix 1. This county was purposively selected because it falls within the ASAL regions of Kenya. The county is a representative case of low to medium potential areas and with many households involved in small-scale farming but most often faced with food insecurity. According to GOK (2013) and Government of Makueni County (2019), the region mainly lies within Agro-ecological zones 4 and 5 where crop failure is usually three times out of five seasons. Within these zones, communities are mainly agro pastoralists.

Makueni County has two rain seasons: the long rain season (April to June) whose average is 329.3mm and the short rain season (October to December) whose average is 372.4mm. The highest temperatures are usually in February (24.6°C) while the lowest are in July (20.2°C). High temperatures of up to 35.8°C are experienced in the low lying areas causing high evaporation which worsens dry conditions. The region has also experienced climate change and variability as a result of human activities such as farming on the top hills and burning charcoal among others. This has contributed more to crop failure and thus increased problem of food insecurity (GOK, 2013).

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In terms of research design, the study relied on descriptive research design. This design was used to collect data using a questionnaire that was administered to a sample of farmers in Makueni County. This helped to capture various variables that influence food insecurity among households in the county.
Considering food security as a dependent variable, its relationship was considered alongside various aspects of the independent variables, that is, socio-economic determinants of food insecurity. Food security was understood in terms of food production as well as ability to pay for available food stuff.

The target population was considered as the county’s 144,320 households based on the 1999 population census. Therefore, a sample of farmers was drawn from the 144,320 households and provided information on the socio-economic variables contributing to food insecurity. The sample size for the (households) was determined by using Yamane (1967) formulae as shown below:

\[ n = \frac{N}{1 + N \times \varepsilon^2} \]

Where \( n \) = Optimal size
\( N \) = Total number of respondents in the largest population
\( \varepsilon \) = The probability error or significant level; in this study \( \varepsilon = 0.05 \)

Thus, since the total number of households is 144,320, then the sample size is:

\[ 144,320 \times \frac{1}{1 + 144,320 \times 0.05^2} = 398.9 \text{ households } \approx 400 \text{ households} \]

Therefore, a sample of 400 farmers (households) was used to acquire the required information. A proportion of at least 66 households was selected in each of the six sub-counties in Makueni county.

Data was gathered using the semi-structured questionnaires. The questionnaire was administered by the Research Assistants who were recruited for this purpose. In addition, Photographs and Observation schedule were used to supplement the questionnaire in data collection and also to record the information.

After data collection, the responses were coded and entered for analysis using Statistical Package for Social Scientists (SPSS). Descriptive statistics such as the means, modes, percentages frequencies and correlations were derived to determine

households’ responses on socio-economic variables influencing food insecurity. Both Chi Square (\( \chi^2 \)) and regression/logit model were used to establish relationships between the various dependent and independent variables as stated in the hypothesis. The model was used to determine how food insecurity relates to a set of predictor variables, that is, the determinants to food insecurity.

### III. FINDINGS AND DISCUSSIONS

The objective of the study was to establish the socio-economic determinants of food insecurity at household level in Makueni County. A number of aspects were examined and the findings indicate that there are many factors that influence food insecurity in Makueni county. These are discussed in the sub-headings that follow.

#### Respondents’ Land Size in Acres

Land size is one of the variables that was examined to establish its influence on food insecurity. The respondents were asked to indicate their land sizes in terms of acre. The study revealed that, 123 (31%) respondents owned 1 acre of land, 69(17%) owned 1.5 acres, 57(14%) owned 2.5 acres, 36(9%) owned 2 acres, 33(8%) owned 3 acres, 26(7%) owned 4 acres, 18(5%) owned 6 acres, 13(3%) owned 10 acres of land, 12(3%) owned 0.5 acres, 8(2%) owned 7 acres and 5(1%) owned 5 acres of land. This implies that respondents who owned between 1.5-10 acres of land were more likely to engage in farming activities that would produce sufficient food to sustain their households and some to be sold in the market. However, those with less than 1.5 acres of land (about 34%) would not manage to significantly produce sufficient food due to the small size of the land.

#### Respondents’ Land Tenure

With regard to the respondents’ land tenure system, the findings are shown in Figure 1.
According to the study findings, 328 (82%) of the respondents indicated that the land they had was family owned, 35 (9%) indicated they owned the land through leases while another 37 (9%) indicated they owned it through freehold means. The results indicate that a bigger portion of the land was family owned and therefore the respondents did not incur leasing costs on land.

The respondents were asked to indicate and rank various statements on socio-economic factors that mostly contributed to food insecurity at the household level. The respondents were asked to indicate and rank various statements on indicate and rank the socio-economic factors that mostly contributed to food insecurity at the household level. The findings are shown in Table 2.

**Main Activities Undertaken on Land**

The main activities that were undertaken on the land by the respondents were examined, with 5 being the main activity while 1 was the least activity. The findings are shown in Table 1.

**Table 1: Main Activities Undertaken on Land**

<table>
<thead>
<tr>
<th>Main Activity</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Freq</td>
<td>Perc</td>
<td>Freq</td>
<td>Perc</td>
<td>Freq</td>
</tr>
<tr>
<td>Cash crops</td>
<td>229</td>
<td>57.3</td>
<td>96</td>
<td>24.0</td>
<td>37</td>
</tr>
<tr>
<td>Food crops</td>
<td>49</td>
<td>12.3</td>
<td>12</td>
<td>3.0</td>
<td>48</td>
</tr>
<tr>
<td>Grazing</td>
<td>49</td>
<td>12.3</td>
<td>217</td>
<td>54.3</td>
<td>85</td>
</tr>
<tr>
<td>Wood lot</td>
<td>296</td>
<td>74.0</td>
<td>39</td>
<td>9.8</td>
<td>13</td>
</tr>
</tbody>
</table>

The findings indicate that 296 (74%) and 229 (57.3%) of the respondents indicated that the land was least used for wood lot and cash crops respectively. Also majority of the respondents 206 (51.5%) indicated that the land was used for the cultivation of food crops. Another 217 (54.3%) of the respondents indicated that land was slightly used for grazing purposes. This means that the major activity on the land was food crop farming.

**Proportion of Land set aside for Food crops**

On the issue of the proportion of land that was set aside by the respondents for the cultivation of food crops, 65 (16%) of the respondents revealed that they had set aside 0.4 acres of land for production of food crops, 58 (15%) set aside 0.125 acres, 51 (13%) set aside 0.75 acres, 47 (12%) set aside 0.5 acres, 38 (10%) set aside 1.5 acres, 33 (8%) did not set aside any land for food crops, 26 (7%) set aside 0.25 acres, 17 (4%) set aside 3.5 acres of land, 14 (4%) set aside 3 acres, 8 (2%) set aside 1 acre and 2 (1%) set aside 4 acres of land for cultivation of food crops. The findings imply that very little land had been set aside for the cultivation of food crops with most respondents only setting aside land between 0-0.75 acres for the food crops which may contribute to the food insecurity situation in Makueni County.

**Proportion of Land set aside for cash crops**

The respondents were asked to indicate the proportion of land that they set aside for the cultivation of cash crops. Based on the findings, 122 (31%) of the respondents revealed that they had set aside 0.2 acres of land for production of cash crops, 77 (19%) set aside 0.25 acres, 68 (17%) set aside 5 acres, 43 (11%) set aside 1.5 acres, 39 (10%) set aside 1 acre, 22 (6%) set aside 0.5 acres of land for cash crops, 16 (4%) set aside 4 acres, 7 (2%) set aside 10 acres of land, and 6 (4%) set aside 6 acres of land for the cultivation of cash crops. The findings imply that very little land had been set aside for the cultivation of cash crops which means that the respondents have not benefitted much from income generated from cash crop production and therefore they lack supplementary income for purchase of food. Using the observation schedule, the study established that some cash crops are grown in the region. From the observations, majority of the farms, 351 (88%) had mangoes, while 33 (8%) had coffee, which has a positive impact on the farms. The findings therefore indicate that mangoes and coffee were the major cash crops in Makueni County.

**Table 2: Statements on socio-economic factors that mostly contributed to food insecurity at the household level**

<table>
<thead>
<tr>
<th>Statements</th>
<th>SA</th>
<th>A</th>
<th>DK</th>
<th>D</th>
<th>SD</th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>I do not have adequate land for food production to cater for my family</td>
<td>156</td>
<td>184</td>
<td>0</td>
<td>48</td>
<td>12</td>
<td>400</td>
<td>4.06</td>
<td>1.067</td>
</tr>
<tr>
<td>High cost of inputs limits adequate food production for my family</td>
<td>111</td>
<td>253</td>
<td>0</td>
<td>36</td>
<td>0</td>
<td>400</td>
<td>4.10</td>
<td>0.793</td>
</tr>
<tr>
<td>I do quick sale of my harvests to address other non-food family requirements such as paying school fees and medical care</td>
<td>48</td>
<td>255</td>
<td>0</td>
<td>37</td>
<td>60</td>
<td>400</td>
<td>3.49</td>
<td>1.256</td>
</tr>
<tr>
<td>Most of my food crops are destroyed by pests</td>
<td>36</td>
<td>144</td>
<td>24</td>
<td>136</td>
<td>60</td>
<td>400</td>
<td>2.90</td>
<td>1.286</td>
</tr>
</tbody>
</table>
I am not able to produce enough food for my family due to high cost of farm inputs 84 280 0 24 12 400 4.00 0.850
I am not able to produce enough food for my family due to lack of extension services on farming and grazing 180 171 0 13 36 400 4.12 1.175
I am not able to produce adequate food for my family as it is large in size 122 193 0 0 85 400 2.40 1.130
A lot of household income is wasted by my spouse in alcohol and/or tobacco consumption 36 62 0 73 229 400 2.01 1.417
I am not able to do good farming due to lack of credit facilities 126 238 0 12 24 400 4.17 0.748
I am not able to do good farming due to my old age 36 36 12 183 133 400 2.15 1.231
Lack of access for market for my farm products 12 243 12 85 48 400 3.22 1.174
Lack of information on weather and climate variability 86 266 0 24 24 400 3.92 0.995

From the findings, in Table 2 above, majority of the respondents strongly agreed with the statement that they were not able not able to produce enough food for their families due to lack of extension services on farming and grazing with a mean score of 4.12. Majority of the respondents agreed with the statements that they did not have adequate land for food production to cater for their families, the high cost of inputs limited adequate food production for their families, they quickly sold off their harvests to address other non-food family requirements such as paying school fees and medical care, most of their food crops are destroyed by pests, they were not able to produce enough food for their families due to high cost of farm inputs, they were not able to produce adequate food for their families as they were large in size, they were not able to do good farming due to lack of credit facilities, lack of access for market for their farm products and lack of information on weather and climate variability contributed to food insecurity at the household level with mean scores of 4.06, 4.10, 3.49, 4.00, 4.12, 2.40, 4.17, 3.22 and 3.92 respectively. Majority of the respondents strongly disagreed that a lot household income was wasted by their spouses in alcohol and/or tobacco consumption with a mean score of 2.01.

The hypothesis for the socio-economic determinants of food insecurity is: There is no significant influence of socio-economic factors to food insecurity at household level in Makueni County. This hypothesis was tested based on chi square. Data for the socio-economic variables were put in a contingency table as shown below in Table 3.

<table>
<thead>
<tr>
<th>Table 3: Contingency table for socio-economic factors &amp; food insecurity</th>
</tr>
</thead>
<tbody>
<tr>
<td>land size</td>
</tr>
<tr>
<td>Observed Outcome</td>
</tr>
<tr>
<td>Expected Outcome</td>
</tr>
<tr>
<td>family size</td>
</tr>
<tr>
<td>Observed Outcome</td>
</tr>
<tr>
<td>Expected Outcome</td>
</tr>
<tr>
<td>communication on weather and climate</td>
</tr>
<tr>
<td>Observed Outcome</td>
</tr>
<tr>
<td>Expected Outcome</td>
</tr>
<tr>
<td>availability of markets</td>
</tr>
<tr>
<td>Observed Outcome</td>
</tr>
<tr>
<td>Expected Outcome</td>
</tr>
<tr>
<td>Capital and technology</td>
</tr>
<tr>
<td>Observed Outcome</td>
</tr>
<tr>
<td>Expected Outcome</td>
</tr>
<tr>
<td>Total</td>
</tr>
<tr>
<td>Observed Outcome</td>
</tr>
<tr>
<td>Expected Outcome</td>
</tr>
</tbody>
</table>

\( \chi^2 = 15.001 \quad d=5 \quad p=0.05 \quad \text{Critical value}=12.924 \)
Hypothesis 1:

H₀: There is no significant influence of socio-economic factors to food insecurity at household level in Makueni County.

H₁: There is a significant influence of socio-economic factors to food insecurity at household level in Makueni County.

For this regression model, food insecurity was the dependent variable while social economic determinants were the independent variable. The results of the analysis are as shown in tables 4 and 5.

Table 4: Model Summary

<table>
<thead>
<tr>
<th>Model</th>
<th>$R$</th>
<th>$R^2$</th>
<th>Adjusted $R^2$</th>
<th>Std. Error of Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>0.607*</td>
<td>0.565</td>
<td>0.563</td>
<td>0.89132</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Socioeconomic

Table 5: ANOVA*

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>$F$</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>62.703</td>
<td>62.703</td>
<td>78.926</td>
<td>.000*</td>
</tr>
<tr>
<td>Residual</td>
<td>316.192</td>
<td>398</td>
<td>794</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>378.894</td>
<td>399</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent Variable: Food Insecurity
b. Predictors: (Constant), Socioeconomic

From the results shown in the Table 4 above, the $R$ square is indicated as 0.565 which is an indication that the independent variable (socio-economic determinants) explain 56.3% of food insecurity with 43.7 percent unexplained.

From the results shown in Table 5 above, the significant value ($P=0.000$) indicates the presence of a strong significant association between the predictor variable (socio economic determinants) and dependent variable (food insecurity). The $P$-value of 0.000 which is less than 0.05 signifies that the model of food insecurity is significant at the 5 percent significance level.

In conclusion, the study established that there are a number of socio-economic factors that influence food insecurity in the study area. These include land size, capital, family size, and education level among others. Whereas bio-physical factors cannot be ignored as determinants of food insecurity especially in the ASALs, effort should also be put to ensure that socio-economic constraints affecting food insecurity are fully addressed.

In conclusion, the study established that there are a number of socio-economic factors that influence food insecurity at household level in Makueni County.

From the results of socio-economic determinants of food insecurity, it is clear that the elements of food insecurity at household level are numerous. Apart from the bio-physical variables such as rainfall, the results revealed that socio-economic factors that influence food insecurity in the region are many. These include the land size, income levels, availability of markets, technology, access to information on weather and climate, destruction by pests, and lack of extension services. The demographic variables that seemed to have a bearing on food insecurity in the region include family size, gender, marital status, income, number of dependents, age and education level among others. Some of these findings are upheld by studies such as Rose, (1999), Ramsey, et.al (2016), Loopstra, (2018) and Iheoma (2020). Wambogo, et.al (2018) in their study on, “validity of the food insecurity experience scale for use in Sub-Saharan Africa and characteristics of food insecure individuals” also adds points out to the fact that food insecure individuals tend to be characterized by lower incomes, high dependency levels indicated by having many children, lower education attainment, lived in rural areas, were women and were older adults. Although the results of these studies are not generalizable, they do in one way or the other validate some of the socio-economic variables influencing food insecurity that the current study found out.

IV. CONCLUSION

In conclusion, the study established that there are a number of socio-economic factors that influence food insecurity in the study area. These include land size, capital, family size, and education level among others. Whereas bio-physical factors cannot be ignored as determinants of food insecurity especially in the ASALs, effort should also be put to ensure that socio-economic constraints affecting food insecurity are fully addressed. With over 75% of the households engaged in farming but still remaining food insecure, it is important that a paradigm shift be embraced. Food security can be enhanced if the households are also well supported to engage in non-farm activities that can generate income and savings which they can in turn use to purchase food. With a stable source of income, households can manage to offset the impending consumption balance and therefore remain food secure.

V. RECOMMENDATIONS

In the light of the findings from the study, it is clear that the socio-economic variables influence food insecurity in the region. Consequently, measures should be taken address the factors that influence food shortage in Makueni County. This study therefore recommends that efforts be put to improve access to credit and train farmers so that they can be able to do better investment in their farms. Policies that will make microcredit from government and nongovernmental agencies accessible to rural farmers will go a long way in addressing their resource acquisition constraints and eventually improving household food security in the county. It is also imperative to promote non-farm activities as alternative livelihood options for the households in the area. The study

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recommends that Makueni County should endeavour to take into
cognizance and put in place enhanced fruit factories so as to ensure
that there is adequate storage of fruits even after fruit harvesting
season. This will ensure that adequate food security is inculcated in
the county’s inceptions.

Institutions which foster agricultural research and extension and efficient land use, should also receive priority
attention in policy making at both the national and the county
governments so that their role of enhancing support to the
households can be well integrated and enhanced.

Finally, the local government should be encouraged to
partner with Information Technology experts to come up with
techniques such as farmer to farmer Short Text Messages (SMSs),
market prices for food crops, weather updates and harvest season.
This will enable farmers to acquire up to date information that can
enhance their food production, harvest and sale of their produce
without incurring losses.

APPENDIX 1: Map Kenya highlighting Makueni County

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The environmental impact of the clay industry in Sri Lanka: with special reference to Dankotuwa Divisional Secretariat Division (DSD)

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Abstract- This paper examines the environmental impact of the clay industry. Today, the environmental impact of the clay industry has gained a major concern. Among them the major impacts are raw materials of clay is obtained from the earth, digging huge pits in the earth's surface, loss of biodiversity, soil erosion, disrupts ecosystems, the formation of sinkholes, changing water quality, and land use. Therefore, this research mainly is aimed to identify the environmental impact and changes that have occurred in the land use patterns, as well as migratory measures that can be applied on the identified several issues of clay mining. The methodology of the research was the mixed method under the holistic approach. Data were collected from clay factory owners and the residents in the vicinity in Six Grama Niladari Divisions (GNDs) in the Ma Oya South bank of Dankotuwa DSD and obtained water sample test reports from Long Life Laboratory. The collected data were analyzed by using descriptive statistics such as mean, mode, median, standard deviation, regression and ANOVA, geoprocessing, and spatial analyze is (IDW) were used to identify land use changes and water quality changes. Through the analysis, there were 67951sq. (m) of water pits and 478663 sq. (m) of clay digging spots in 2004. Comparatively in the year 2018, there were 167633sq. (m) of water pits and 556907sq. (m) of clay digging spots. The maximum values of water quality were identified as 7.9 of PH, 462 mg/l of total dissolved, 107 mg/l of turbidity, 203 mg/l total hardness, and 489 us/cm of electric conductivity. There was a positive relationship between the income and expenditure (R=0.849) of the factory owners. The income of the population resides near these factories have been increased by 58.33% and 75% of the population resides by the Clay Pits. The knowledge of these people about the political influence on this industry varies; people near the clay pits are 100% aware and people near the factories, 75% aware of this factor. The result of the study further indicated that the highest land use allocation was given for the clay digging and deep water pits. Clay digging for brick and tile industries is a significant problem affecting negatively on the environment. Clay digging has also become a considerable issue in the Ma Oya reservation causing severe damage to the river bank and water quality. Finally, digging clay has drastically changed the landscape of the area and the land use has been changed. Therefore, the clay industry directly affects the environment in this region. To mitigate these issues, it can be suggested to implement such as restrictions on clay mining along the Ma Oya and enforcement of the existing laws on clay mining.

Index Terms- Clay industry, Environmental impact, Land use change, Ma Oya.

I. INTRODUCTION

The history of the clay industry, started after man stopped their hunting for food. The use of clay began and it was used for making home utensils, building homes, for decorations, and also recovered useful information, they used clay (Ranaveera, 2004). After they left the Stone Age, they began to use clay to build houses, by making bricks. Excavation has shown that man had used bricks to build houses. Civilization from the Indu River Vally, such as Mohendajaro and Harappa cities have clearly shown that they had used clay (Jesse, 2003). Buddhist stuphas have built by using clay, history shows used in Sri Lanka the use of clay started after they arrived of the Rev: Mahinda with the travel of Bikkuni Sangamiththa, many clay craftsmen came, and there among them houses build also (Sumangala, 2016). With the construction of many buildings, the bricks and tiles became very essential. So, Dankotuwa DSD became very prominent in the Puttalam district. Ma Oya becoming the center of the clay industry, at present, the economic, social, and environmental impact has become very clear (Panagoda, 2015). The studies conducted so far have shown clearly the environmental impact is very evident. The objective of the research is to find out and show the land use change, spatially, and temporally.

II. METHODOLOGY

The holistic approach has been used for this study. The random sample is 6 from the tile section, 6 from the brick section, people living area the clay mining area, that’s 12 persons, and also the resides living closer to the factories, that’s 12 persons. Irrespective of gender 36 persons were considered as samples for the above study. The data analyzed are as follows is tile production brick production sections. The qualitative and the quantitative data of the primary and the secondary data has been collected from interviews, discussions, and questionnaires. The data has been gathered from the various offices relative to the industry. Descriptive and statistical methods have been used to analyze a particular study. The computer software, such as SPSS, Microsoft excel, Arc GIS 10.7. The SWOT method used to analyze the qualitative and quantitative levels for the above study.
A. Study area

The Puttalam district is situated in the Western coastal line, in the North Western province. There are 16 DSDs in the Puttalam district. Out of these 16 divisions, Dankotuwa DSD has been identified as a study area. The Dankotuwa DSD area, that is 7890.5 ha has been distributed and the administration is looked after by 47 GNDs (DSD reports, 2018). The area between Kala Oya and Ma Oya is being used as industrial zones, so it has become urbanized. So, the wetland area and the low land area of the Dankotuwa DSD has been created. The land bordering a lot of clay, so the vast area such as Dikkwela, Yogiyana, Jankurawela, South Atiyawala, Metikotuwa, and Morukkuliya GSDs have been chosen to this study.

Map 1: The Location of the Study Area

B. Research problem and objectives

Has been the clay industry impact on the natural environment in Sri Lanka?
The main objective of the study is to identify the environmental impact of the clay industry. The other objects are,

- To identify the spatial and temporal land use change
- The impact on the people living in the area

III. FINADING

Through the analysis, the various impacts have been identified. The difference section of this study has been identified clearly.

A. Identify land use changes

The nature of the physical features has influenced the changes in land use, temporally. The maps of 2004 and 2018 have been used to show the land used difference.

Map 2: The Land Use Pattern 2004

Map 3: The Land Use Pattern 2004
Table 1: Trends of the Changing Land Use

<table>
<thead>
<tr>
<th>Land Use Type</th>
<th>2004</th>
<th>(%)</th>
<th>2018</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coconut</td>
<td>1588999</td>
<td>34.74</td>
<td>1369375</td>
<td>29.94</td>
</tr>
<tr>
<td>Paddy</td>
<td>459016</td>
<td>10.03</td>
<td>347589</td>
<td>7.60</td>
</tr>
<tr>
<td>Water pits</td>
<td>67951</td>
<td>1.48</td>
<td>167633</td>
<td>3.66</td>
</tr>
<tr>
<td>Clay Mining</td>
<td>478663</td>
<td>10.46</td>
<td>556907</td>
<td>12.17</td>
</tr>
<tr>
<td>Ma Oya</td>
<td>319593</td>
<td>6.98</td>
<td>343506</td>
<td>7.51</td>
</tr>
<tr>
<td>Business area</td>
<td>7295</td>
<td>0.15</td>
<td>7795</td>
<td>0.17</td>
</tr>
<tr>
<td>Home Garden</td>
<td>1610627</td>
<td>35.21</td>
<td>1730423</td>
<td>37.83</td>
</tr>
<tr>
<td>Residential</td>
<td>40957</td>
<td>0.89</td>
<td>49873</td>
<td>1.09</td>
</tr>
<tr>
<td>Total</td>
<td>4573101</td>
<td>100</td>
<td>4573101</td>
<td>100</td>
</tr>
</tbody>
</table>

The data relative to 2004 to 2018 has shown the decrease in coconut land and paddy land cultivation is due to clay mining. The land for coconut growing has been 34.74% in the year 2004, but in 2018 has been decreased up to 29.94%. The land for paddy cultivation has been 10.03% for the year 2004, but for the year 2018 the land has decreased up to 7.60%. The reason for this decrease is to clear due to clay mining in these lands. Relative to 2004-2018, the land area the South bank of the Ma Oya has increased, due to the water pits, in clay mining, Ma Oya, business area, home garden, and residents. The water pits in the year 2004 had been 1.48%, but in the year 2018 has increased to 3.66%. The clay mining in the year 2004, 10.46% has increased to 12.17%. During these 04 years continuous clay mining has increased the water pits. Compared to the bank of the Ma Oya land in the year 2004, it had been 6.98%, but in 2018 it has increased to 7.51%. The reason for the width of the bank of the Ma Oya is due to the flow of the water been collected in the water pits. The home garden area had been in 2004, 35.21% but in 2018 1.09%. With the migration of people to these industrial zones, the home garden, and the residential area has increased.

Map 4: The land use pattern of Ma Oya conservation zone 2004

Map 5: The land use pattern of Ma Oya conservation zone 2018

B. Spatial changes of the land use by effect from the Clay industry

Act 12 of 1990, environmental profanation of the North West Province has declared land area of 100 meters been prohibited from the bank of the Ma Oya (Karunarathne, 2004). But unfortunately the area of clay mining had gone beyond the permitted area, Table 3.2 And 3.3 shows it. The Metikotuwa, South Atiayawala, and Jankurawela GNDs, clay mining has been going on at an increased place. It is mainly due to the clay mining areas purchasing the land suitable for cultivation.
Table 2: The land use pattern according to the GNDs 2004

<table>
<thead>
<tr>
<th>GND</th>
<th>Coconut</th>
<th>Paddy</th>
<th>Water pits</th>
<th>Ma Oya</th>
<th>Business area</th>
<th>Home Garden</th>
<th>Residential area</th>
<th>Clay Mining area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morukkuliya</td>
<td>25</td>
<td>4.4</td>
<td>1.4</td>
<td>6.4</td>
<td>0</td>
<td>44.3</td>
<td>8.2</td>
<td>9.9</td>
</tr>
<tr>
<td>Metikotuwa</td>
<td>24</td>
<td>12.9</td>
<td>3.1</td>
<td>6.3</td>
<td>0.3</td>
<td>45.8</td>
<td>0</td>
<td>7.1</td>
</tr>
<tr>
<td>South Atiyawala</td>
<td>35.8</td>
<td>6.6</td>
<td>0.5</td>
<td>3.7</td>
<td>0</td>
<td>43.9</td>
<td>0</td>
<td>9.1</td>
</tr>
<tr>
<td>Yogiyan</td>
<td>10.2</td>
<td>29.1</td>
<td>0</td>
<td>3.4</td>
<td>0.6</td>
<td>53.6</td>
<td>0</td>
<td>2.8</td>
</tr>
<tr>
<td>Jankurawela</td>
<td>56.5</td>
<td>3.4</td>
<td>2.4</td>
<td>17.3</td>
<td>0</td>
<td>4.05</td>
<td>0</td>
<td>26.1</td>
</tr>
<tr>
<td>Dikwela</td>
<td>57.3</td>
<td>11.0</td>
<td>1.0</td>
<td>4.4</td>
<td>0</td>
<td>20.3</td>
<td>0</td>
<td>5.7</td>
</tr>
</tbody>
</table>

Table 3: The land use pattern according to the GNDs 2018

<table>
<thead>
<tr>
<th>GND</th>
<th>Coconut</th>
<th>Paddy</th>
<th>Water pits</th>
<th>Ma Oya</th>
<th>Business area</th>
<th>Home Garden</th>
<th>Residential area</th>
<th>Clay Mining area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morukkuliya</td>
<td>22.1</td>
<td>6.1</td>
<td>1.1</td>
<td>5.0</td>
<td>0</td>
<td>47.9</td>
<td>8.0</td>
<td>9.4</td>
</tr>
<tr>
<td>Metikotuwa</td>
<td>16.9</td>
<td>0</td>
<td>4.8</td>
<td>6</td>
<td>0.3</td>
<td>42.3</td>
<td>1.2</td>
<td>28.2</td>
</tr>
<tr>
<td>South Atiyawala</td>
<td>30.0</td>
<td>7.5</td>
<td>5.8</td>
<td>3.9</td>
<td>0</td>
<td>46.5</td>
<td>0</td>
<td>5.1</td>
</tr>
<tr>
<td>Yogiyan</td>
<td>15.4</td>
<td>26.6</td>
<td>0.1</td>
<td>4.4</td>
<td>0.5</td>
<td>48.1</td>
<td>0</td>
<td>4.6</td>
</tr>
<tr>
<td>Jankurawela</td>
<td>28.4</td>
<td>3.0</td>
<td>3.1</td>
<td>14.2</td>
<td>0</td>
<td>10.9</td>
<td>0</td>
<td>11.7</td>
</tr>
<tr>
<td>Dikwela</td>
<td>51.4</td>
<td>10.4</td>
<td>0.7</td>
<td>4.3</td>
<td>0</td>
<td>26.4</td>
<td>0</td>
<td>6.5</td>
</tr>
</tbody>
</table>

D. Spatial distribution of water quality

The water quality that has been tested from August to September 2018 that’s about the 8 samples has shown the chemical and the physical qualities. The water parameter’s result has shown the percentage of the change. Arc GIS 10.7 software used and to do spatial analysis the researcher has been used IDW tool, Weighted overlay tool to analyze water quality. It can be identified on the below map 6.

Map 6: The quality of water according to weight

According to the map Morukkuliya and Jankurawela GNDs and the area near the Ma Oya, water pollution is very great. The reason for the pollution is due to the deepwater pits. Dikwela area water quality is good because clay mining is less than other GND areas.

IV. CONCLUSION

The objective of this study was successfully reached, as current negative environmental impacts were identified in various stages of the clay industry in Sri Lanka. Especially digging clay near the Ma Oya river bank has drastically changed the landscape of the area in spatially and temporally. It has affected badly the quality of the well water around the Ma Oya residents. The reasons for the

Figure 2: The land use pattern according to the GNDs 2004
bad effects are due to, not following the rules and regulations of the environment authority. The bad effects on the land have been identified by this study.

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The Construction of Women in *Aroma Karsa* Novel by Dewi Lestari
(Semiotic Study)

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**Abstract**- One of the media that can build social construction is novel. Analysis of the construction of women in *Aroma Karsa* novel by Dewi Lestari uses semiotic study. Semiotics is defined by Saussure (Sobur, 2004: 12) as a science examining the life of signs in a society. Semiotics as a systematic study involving the production and interpretation of signs in the meaning process. Since it is seen as a kind of code that is composed of meaningful signs, it convinces researchers used Roland Barthes semiotic study categorizing five semiotic codes namely hermeneutic code or puzzle code, semic code or connotative code, symbolic code, proairetic code or action code, and genomic code or cultural code. The study of *Aroma Karsa* novel used a qualitative approach because the data studied are in the form of words, phrases, and sentences. Data collection technique used was text analysis in the form of novel language exposure. Women in *Aroma Karsa* novel are portrayed as more dominant than men. This is motivated by the figure of the writer in the novel who is also a woman, namely Dewi Lestari/Dee. Dee's alignments with female characters in the novel are clearly revealed through her dominance in the story line. This shows the special attention of the author towards intergender relations. Dee realizes the imbalance of relations between women and men in real life so that she deconstructs it in her writing. The female figure in the novel is constructed as a female leader in power.

**Index Terms**- construction, women, *Aroma Karsa*, semiotics

**I. INTRODUCTION**

The theory of social construction is a theory of sociology. Social construction is a statement of belief (a claim) and also a point of view (a viewpoint) that the content of consciousness, and how to deal with others are taught by culture and society (Ngangi, 2011: 1). In social construction, there is a relationship between reality and social life. The figure who plays a role in social construction theory is Peter Berger. According to Berger, reality is formed socially. Berger and Luckmann say that social reality consists of three types, namely objective, symbolic, and subjective reality. *First*, objective reality is a reality that is formed by experience in the objective world that is outside the individual self, this reality is considered as reality. *Second*, symbolic reality is a symbolic expression of objective reality in various forms. Subjective reality is a reality that is formed from the process of re-absorption of objective and symbolic reality into individuals through internalization (Arawinda, Ucca, 2012: 5).

One of the media that can build social construction is novel. Novel is a written and narrative prose fiction work; usually in the form of story. The author of a novel is called a novelist. Aminudin (1987: 66) states, as a fiction work, a novel contains a story or tale carried by certain actors with certain characters, setting, and stages, also a series of stories that depart from the imagination of the author, thus intertwining a story. It can be understood that a novel is a fiction or story that is formed according to the imagination of the author which contains culture, norms, values, and rules that apply in society. The novel also describes the social situation of the community at a time and place.

*Aroma Karsa* novel by Dewi Lestari is a best seller novel telling the story of the search for Puspa Karsa which is a plant that has supernatural powers. Various methods were carried out by Raras Prayagung as the main character to get Puspa Karsa. In this novel, many female characters become the center of the story.

The researchers are interested in analyzing the construction of women in *Aroma Karsa* novel by Dewi Lestari by using semiotic study. Semiotics is defined by Saussure (Sobur, 2004: 12) as a science examining the life of signs in society, and thus this science becomes part of social psychology. Semiotics is a science or method of analysis to study signs (Mulyana, 2008: 15). Semiotics is the study of signs, the functioning of signs, and the production of meaning (Tinoburko, in Malinda, 2011: 36). According to Ratna (2016: 256) Semiotics is defined as a systematic study involving the production and interpretation of signs in the meaning process. In essence, this science intends to show how the formation of signs and rules governing it. Thus, basically semiotics is a sign science concept. A sign is something that for someone means something else. In Zoest's view, everything that can be observed or made observable can be called a sign. Therefore, sign is not limited to objects. The existence of events, absence of events, structure found in
something, habit of all these can be called signs (Tinoburko, in Malinda, 2011: 36). The sign object according to Peirce is not only a systematic language and communication system but the entire contents of the world as far as related to the human mind so that humans can establish relationships with their surroundings. Although Peirce included the entire contents of the world as a sign, he did not deny that language is the most basic sign system. While others such as gestures, thought forms, forms and ways of clothing, ways of speaking: high and low tones, human creative works, how to look at an object, selection and rejection, etc., are seen as a kind of code that is composed of signs meaningful signs that are communicating based on relationships.

Roland Barthes categorizes five codes in semiotics, namely hermeneutic or puzzle code that revolve around the reader's expectations to get the truth to questions that appear in the text, semic or connotative code, symbolic code, proairetic or action code, and genomic or cultural code. This study describes the construction of women in *Aroma Karsa* novel analyzed by Roland Barthes's semiotic study.

II. METHODS

This research uses a qualitative approach. The study of *Aroma Karsa* novel used a qualitative approach because the data collected and examined are in the form of words, phrases, sentences in the novel. This data research are in the form of words, phrases, sentences, and dialogue of the characters *Aroma Karsa* novel, such data were obtained by reading carefully, meticulously, and repeatedly so that the researchers got what they wanted in their study. The data source in this study is the novel's text entitled *Aroma Karsa* written by Dee Lestari. The identity of the data source are: the novel’s title is *Aroma Karsa*, the author is Dee Lestari, the page number is 702, the publisher is PT Bentang Pustaka Sleman, Yogyakarta, and the first print was on March, 2018.

The data collection technique in this study was text analysis in the form of language exposure in the novel. This textual technique was used to collect research data in the form of literary works by (1) the researcher read carefully the research data source, (2) the researcher identified the absurd event units of each paragraph, (3) the researcher put a code on the language exposure contained in *Aroma Karsa* novel by Dee Lestari. In this study the data collected were data having a relationship with the analysis being studied, namely natural, current, and original data in *Aroma Karsa* novel. In the data collection, the researcher played active roles and could not be represented. In this case the researchers were also the data collection tools and even the key instruments. The data analysis in this study used the method of interpreting data. The method of interpreting this data is was translated into: (1) targeted objectives, (2) procedures, (3) roles of other element relationships, (4) roles of data unity, (5) and steps of interpreting the data with the analysis method of the absurdity of the characters. The data presentation was done informally by using words that are easily understood.

III. RESULT AND DISCUSSION

**Novel Synopsis**

This novel tells about the search for Puspa Karsa, which is nothing but a legendary plant only considered as a fairy tale, in fact it is actually hidden in a secret place. Starting from Raras Prayagung's obsession to hunt Puspa Karsa, a magic flower able to control willng and can only be detected through its scent. The core theme of the novel is about scent and smell. This led to several figures with a high sense of smell to compete with one another in searching for Puspa Karsa, such as Jati Wesi and Tanaya Suma.

The second meeting do not start well. Tanaya Suma, the eldest son of Raras Prayagung considers Jati Wesi to be full of negative views. During the time with the intensity of frequent meetings, it grows the love between Jati Wesi and Tanaya. The expedition continues until various mysteries begin to unfold, including the true figure of *Aroma Karsa*.

**The Women in *Aroma Karsa* Novel by Dewi Lestari**

1. Janirah – Court Retainer - Female Thief

Janirah is a court retainer who has lived for 300 years living in a palace for generations. She lives rather freely in and out of the Yogyakarta palace. With a ‘less grateful what given by others’ soul, Janirah tries to pry the cupboard and takes the contents in the cupboard. By using her two flagship tools, Janirah manages to break through the mysterious cupboard. There are various abysmally goods in it. One that draws her attention. An iron box as big as a shoe box. Dull and simple. Far from the sparkling shadows of treasure chests in his fantasy. The box, somehow, is like wailing to be opened (p.7).

Janirah is described as someone who wants to learn. This can be seen when she tries to read the papyrus pages she found.

... With a strong desire, Janirah then secretly watches a private teacher who was brought in to teach noble children in the palace. From a distance Janirah joins in practicing writing, reading, and arithmetic (p.8).

After four months Janirah has able to read the *Hanacaraka* script series with an oil lamp. After few years and Janirah has begun to mature, she leaves the palace and does not want to be a court retainer and wants to open an herbal medicine and scrub business for women. The business has rapidly advanced in Yogyakarta, so Janirah moves to Sentul, South Jakarta.
At that time Ibu Janirah has been married, but Janirah's husband lives in abundant wealth and squanders company assets until he is sick to death.

2. **Raras-Billionaire-Woman in wheelchair**
Raras is the central figure in this novel. She is Janirah's granddaughter and successor. Raras has an ambitious nature. Raras curiosity is very high, so she tried to find the existence of Puspa Karsa. Raras is also a warrior figure. This can be seen from her efforts to carry out an expedition looking for Puspa Karsa. Raras is also a smart and successful businesswoman. Her wealth is abundant. Her ambitious spirit has made her a successful businesswoman who can bring her cosmetics company from adversity.

3. **Puspa Karsa-Myth and Mysterious Figure**
Puspa Karsa is a respected sacred figure. Is as a magical figure and tangible secret. In every story, Puspa Karsa is always portrayed as a figure of secret nature and magical power. Supposedly, there is no power in the world can match the power of Puspa Karsa. Even in each appearance, the power from Puspa Karsa itself is able to change the order of the archipelago. In addition, Puspa Karsa is also described as a figure that can only be found by selected people who are able to detect his/her body's scent.

4. **Tayana Suma**
Tanaya Suma is another important figure, she is a child of Raras Prayagung. Since childhood, Suma always lives with wealth. She is also talented in dealing with several obstacles in her company. Suma also has a strong smell instinct besides Jati. In contrast, unlike Jati who had never been sick, since childhood Suma had often been sick and weak. Suma is easily offended, her character is curt, ignorant, arrogant, but she also has her own good side.

**The Construction of Women in Aroma Karsa Novel by Dewi Lestari**
The women in *Aroma Karsa* novel are portrayed as more dominant than men. This is motivated by the figure of the writer in this novel who is also a smart woman, Dewi Lestari. Dee Lestari's alignments with the female characters in the *Aroma Karsa* novel are clearly revealed through their dominance in the story line. Male figures, except for Jati Wesi, are imaged as having many weaknesses and comply to the rules made by female figures. This shows the author's special attention to this intergender relationship. It seems that Dee Lestari is aware of the imbalance of relations between women and men in real life, so she deconstructs it in her writings. Gender construction can be created and socialized through media, one of which is novel. In the view of feminism, there are fundamental differences between sex and gender. Gender can be constructed by humans so that their position can change. Priyatna (2018) outlines Moi's statement in his essay *Feminist, Female, and Feminine* (1991) states that femininity is a set of characteristics that are culturally defined, feminism is a political position, while femaleness 'readiness' is a biological thing. Thus, all biological facts (menstruation, pregnancy, childbirth, and breastfeeding) are "destiny" which is more or less irreversible. Furthermore, femininity and gender are socio-cultural constructions attributed to women. Because social construction is created by humans, femininity and gender are liquid, not steady, and can change. Something that is considered 'feminine' depends on who defines it, where these people are, and what have influenced their lives.

The women in *Aroma Karsa* novel are constructed as women in power. Raras as the main character is depicted as a dominant figure whose position influences men's actions. Even though she is married, Raras' power does not change. In line with the results of research by Kartika, (2019) which states that the activeness of women in the public sphere is more taken into account than its role in the domestic sphere. Thus, marriage does not become a barrier to the growth of women in public spaces.

**IV. CONCLUSION**
The women in the Aroma Karsa Novel are portrayed as more dominant than men. This is also motivated by the figure of the writer in this novel who is also a smart woman Dewi Lestari. Dee Lestari's alignments with the female characters in the novel Aroma Karsa are clearly revealed through their dominance in the story line. The women in Aroma Karsa novel are constructed as women in power.

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District Water Conservancy contrivance an approach for Water resource Management in lessening Water Scarcity and Floods in Rwanda-East Africa

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Abstract-
Water is vital for human health, industry, agriculture and ensuring the integrity and sustainability of the ecosystem. The water resources are the top affected by climate variability hence causing floods and droughts, the rapid population growth also increases water demand and affects water allocation systems as well as water resource management plans to suit the basic water needs for both human and nature hence causes the scarcity of water. Rwanda is among the countries that experiences and is expecting to continue undergoing such situation if nothing is done for skirmishing the existing conditions. Counting on water problems, inadequate capacity of water supply systems for Rwanda, we are suggesting this approach for sustainable water resources access employ and management in Rwanda and the involvement of systems for capturing water such as reservoirs, Dams, Concrete underground tanks would be precisely measures for dealing with Rwandan water problems and we are advocating for the adoption of the suggested approach.

Basing on Meteo norm 7 software, A 10-year flood protection level employed to determine the rate of urban damage, its effects on Gross Domestic Product (GDP) and the Population at risk. It is observed that Rwanda has more than 20% probability of inland flooding in any given year however a 10-year flood has a 10% probability of occurring in any given year and could cause roughly $6.1 million urban damage; $865.6 million affected GDP and 837.2 thousand affected population if there is no flood protection. Flood and drought events cannot be totally eradicated but their consequences can be tampered with the proposed approach in this paper as well as the inclusiveness of preparedness before its occurrence. Taking into account the population of Rwanda which is approximately 13 million heading to about 25 million in 2050 and be under the changing climate where since 1970 temperature rose by 1.4°C and is foreseen that in 2050 to be about 2.5°C it confirms a predictive severe effects on water resources in Rwanda for the next couple of years.

Keywords: climate change, population growth, water resource, water scarcity status in Rwanda.
INTRODUCTION

Water is important for human health, agriculture, industry and in ensuring the integrity and sustainability of the ecosystem. Most parts of the world are facing water scarcity due to different reasons, and this could be due to physical shortages (physical water scarcity), institutional failures or lack of adequate infrastructures to ensure regular supply even in places where water is abundant (economic water scarcity) and lack of lessening and adaptation capabilities [1, 2]. The world population significantly grew after the industrial revolution from 3.7 billion in 1970 to 6.08 billion in 2000 heading to about 9.7 and 11.2 billion by 2050 and 2100 respectively [3]. Over the last centuries water use has grown at more than twice the rate of population increases globally and it is still increasing in all sectors. The effect of climate change will intensify the risks of droughts as well. Over 2 billion people live in countries experiencing high water stress by today and the scale is expected to keep on increasing. Thus, balancing the available water and its growing needs mainly driven by population growth and the changing climate creates a big challenge to the governments and its subordinating institutions for water resources management[4]. Hence alternatives for supplementing the existing planning needs to be altered and adopting them. Like any other countries, Rwanda’s water resources are basic to many sectors including power generation, agriculture and fishery. However, water resources are the top affected by climate variability and population growth [2, 5, 6]. The discernible and potential effect of climate change on water resources in Rwanda includes flooding, landslides, and change in the periodic droughts [7, 8].

Rwandan Water Resources Overview

Description of the study area

Rwanda occupies a surface of 26,338 km² on the eastern shoulder of the Kivu-Tanganyika Rift in Africa. It lies between 1°4’ and 2°51’ south latitude and 28°53’ and 30°53’ east longitude[9]. Rwanda has two rainy seasons the first begins from March to May and the last begin from October to November with an average rainfall of 110-200 mm per month. The first and short dry season starts from December to the end of February while the longer one lasts from June to early September. Rwanda’s average temperature ranges between 19 to 27°C [10-12]. Rwanda is made up of five administrative subdivisions locally known as provinces (Northern, Southern, Eastern and Western Province + Kigali City being the capital); each province is further subdivided into five to eight districts (Figure1). Rwanda is relatively rich in water resources about 188,190 ha are occupied by lakes (Table 1 and figure 1) approximately 7,260 ha are for rivers, while wetlands seize an approximate area are 77,000 ha. The surface water generally has a pH ranging between 6 and 8 [13, 14]. This expresses that Rwanda has many water resources being lakes, rivers and marshlands. Nevertheless, rapid population growth, Climatic changes, inappropriate household and industrial wastewater management, insufficient measures for rainfall harvesting and monitoring that affects topography (steep slope) and facilitating the sediments and nutrients transport into Watersheds becomes water pollutants in Rwanda as well as water scarcity. All these phenomena have multiple implications on the quantity and quality of water like reducing the river flows and lake levels drying up of some water sources and undermining water biodiversity. Therefore, this expresses the problem of water quality and quantity in Rwanda and calls for appropriate adaptation measures. In this manner, the objectives of this Paper are to designate status and causes of water problems and suggesting appropriate approaches to undertake for sustainable water supply in Rwanda.
Table 1: Rwandan Major Lakes and their corresponding characteristics [15]

<table>
<thead>
<tr>
<th>Lakes</th>
<th>Surface area (Km²)</th>
<th>Surface area in Rwanda (Km²)</th>
<th>Mean elevation above the sea level (m)</th>
<th>Maximum Depth (m)</th>
<th>Minimum Depth (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kivu</td>
<td>2700</td>
<td>1330</td>
<td>1460</td>
<td>480</td>
<td>220</td>
</tr>
<tr>
<td>Muhazi</td>
<td>34.6</td>
<td>34.6</td>
<td>1443</td>
<td>13.8</td>
<td>10.1</td>
</tr>
<tr>
<td>Burera and Ruhondo</td>
<td>28</td>
<td>28</td>
<td>1862</td>
<td>3.9</td>
<td>2.1</td>
</tr>
<tr>
<td>Cyohoha, South</td>
<td>630</td>
<td>100</td>
<td>1553</td>
<td>11</td>
<td>5.2</td>
</tr>
<tr>
<td>Mugesera</td>
<td>40</td>
<td>40</td>
<td>1300</td>
<td>3.8</td>
<td>2.2</td>
</tr>
<tr>
<td>Rweru</td>
<td>100</td>
<td>20</td>
<td>1160</td>
<td>2.1</td>
<td>3.9</td>
</tr>
<tr>
<td>Ihema</td>
<td>90</td>
<td>90</td>
<td>1292</td>
<td>7.0</td>
<td>5.0</td>
</tr>
</tbody>
</table>

Trends of water in Rwanda

Climate change and population growth is the most considerable factors that are affecting the ecosystems consequently, the impact of climate change on water is attributed to changing hydrology and air temperature [16, 17]. The water quality in Rwanda is being exposed to several degrading and polluting forces being natural and man-made.

Water availability

The water availability in Rwanda, Table 2, is another issue. The National water resources management policy notes that the data on water consumption in Rwanda is scarce and incomplete [18]. Most estimations of the current water use of any catchment are based on a number of assumptions: water availability and discharge from springs or boreholes, the production capacity of piped water supply systems; the water capacity of rainwater harvesting irrigation ponds and marshlands, the different yearly supply of irrigation from surface or groundwater resources for western and eastern areas and the different volumes of irrigation water expected from dam sites in eastern and western areas.
Pressure and impacts

There are a number of challenges to water provision and threats include poor water resources management, population growth, urbanization, droughts and floods that will be increased by the climate change and the lack of water resources management skills. Industrial water users including coffee industries need 30 m³ to produce one ton of a fully washed coffee, mineral processing, tanning and other industries are pressuring water resources in Rwanda. The tourism and increase in irrigation and other activities that involve water retention affect fish and aquatic biodiversity as well as water from human consumption [19]. Land use practices consider also threats to water resources in Rwanda, Wetlands in Rwanda are mainly threatened by reclamation and degradation especially those outside national parks. Human activities threatening wetlands in Rwanda include settlements and road construction drainage, unplanned conversion to agriculture, industrial pollution sewage and excessive harvest of products. A study on water quality conducted by the National University of Rwanda in 2002 confirmed that water quality is an issue in the country [19]. Water resources have been subjected to a heavy pollution due to the untreated wastewaters (both domestic and industrial). Inadequate institutional operational framework contributes to the degradation of water resources [19]. Climate change predictions show that with increasing rainfall variability, Rwanda will experience extreme weather patterns (flooding and droughts) [20]. Rwanda is a densely populated country made up of hills and valleys and erosion is a problem. Flood and drought constitute the major part of natural disasters in Rwanda the north western is highly affected due to its topography high rainfall intensity and degradation of land cover. According to a report on natural disasters and hazards in Rwanda flood is the most occurred extreme event in Rwanda but third on the list after epidemics with regards to loss of lives however, drought is the second on the list with regards to loss of lives but third in terms of occurrence of natural disasters in Rwanda[21]. About 237 people out of 4.16 million people have lost their lives from 1900 to 2015 because of drought events, however, about 183 people out of almost 82,000 people lost their lives from 1900 to 2015 due to flood events[21]. Six drought events have occurred in Rwanda because of long periods of dry season or delayed in rainy season: a long dry period from 1998-2000 and an annual drought from 2002-2005 resulting in 237 deaths and affecting almost 4.2 million people. During this period, the country’s economy was affected especially in the agricultural sector due to food insecurity. This affected crop yield and reduced livestock production especially in the Eastern and Southeastern parts of Rwanda [22]. Due to the prolonged drought in 2005, water-levels in Burela and Ruhondo lakes declined to result in a deficit in hydropower production leading to power crisis[21]. In May 2016, the BBC News reported that at least 53 people have been killed by landslides and floods caused by heavy rains in Rwanda, said by Government officials and most of the victims were believed to have been children[23]. The worst hit areas were the districts of Gakenke and Muhanga. As many as 34 people died in Gakenke, 8 in Muhanga, 4 in Rubavu and 3 in Ngororero. Around 26 injuries also were reported. The Ministry of Disaster Management and Refugee Affairs (MIDIMAR) reported that over 500 houses were destroyed leaving thousands homeless[24]. Future projections show that temperatures will increase to 2.7°C and 4°C in 2050 and 2080 respectively. Rainfall projections on the other hand show an increase of 20% by 2050 and 30% by 2080 which means that the increase in temperature and rainfall in Rwanda will result in more floods and droughts events in the future [21].

Table 2: Water statistics 2011-2013 [19].

<table>
<thead>
<tr>
<th>Items</th>
<th>Status</th>
<th>Potentials</th>
<th>Status</th>
<th>Potentials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface water</td>
<td>101 lakes covering an area of 149.48ha, and 861 rivers of total length 6,462km</td>
<td>7-6 billion m³/year</td>
<td>101 lakes covering an area of 149.48ha, and 861 rivers of total length 6,462km</td>
<td>6.826 billion m³/year</td>
</tr>
<tr>
<td>Ground Water</td>
<td></td>
<td>5-4.5 billion m³/year</td>
<td></td>
<td>4,554 billion m³/year</td>
</tr>
<tr>
<td>Rain water</td>
<td></td>
<td>28-25 billion m³/year</td>
<td></td>
<td>27,505 billion m³/year</td>
</tr>
<tr>
<td>Water yield/person</td>
<td>1,135-193</td>
<td>m³/person/year</td>
<td>670 m³/person/year</td>
<td></td>
</tr>
<tr>
<td>Water storage/Person</td>
<td>7-5 m³/person/year</td>
<td></td>
<td>447 m³/person/year</td>
<td></td>
</tr>
</tbody>
</table>
Methodology

The methodology used to conduct this study is based on the comparable cases strategies. The comparative methodology focuses on rationale rather than statistical significance in nature [25]. The extensive policy research is usually restricted to policy inputs and outputs. Secondary data was used through as

Results

Rwanda is a water scarce country. Water is the most valuable of the natural resources of the country. Due to the climatic changes, population and the economic growth development of Rwanda, the Government of Rwanda has put in place the institutional framework for the conservation, protection, and management of the country’s water resources resulted in the formulation of the water and sanitation policy of 2004 revised in 2011 and became the National Policy for Water Resources Management and the Water Law No. 62/2008 to strengthen the water resources management sub-sector. Government of Rwanda together with its water and sanitation stakeholders has set priorities to achieve in terms of water supply in line with Economic Development and Poverty Reduction Strategy (EDPRS) by the government by 2012 and the Vision 2020 as an umbrella under which all the programs and policies are supposed to contribute to. Moreover, aligning programs with Millennium Development Goals (MDGs) was a prime goal which governments including Rwanda government have been striving to achieve. Government has been giving promises to overcome such persistent challenge of spreading water in Kigali. By implementing this strategy Rwanda government was expecting to achieve 85% water supply coverage by 2015. “We have a number of projects to address this shortage. One of the projects is Nzove II to add 25,000 cubic metres. Work is expected to be completed by the end of November and it will be full productive by the end of December 2015,” said WASAC Director General. Though there were promises to combat this challenge in Kigali city, still the water treatment plant capacity is not sufficient to cover the entire country. Being insufficient for the city means, its capability of supply the whole country is still low, that is why we have brought up with another proposed strategy that can support the existing one and that is “District surface storage or District Water conservancy contrivance”

<table>
<thead>
<tr>
<th></th>
<th>2000 (P’ple)</th>
<th>2010 (P’ple)</th>
<th>2020 (P’ple)</th>
<th>2030 (P’ple)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Stress</td>
<td>1,745,800</td>
<td>1,988,098</td>
<td>2,724,863</td>
<td>0</td>
</tr>
<tr>
<td>Water Scarcity</td>
<td>1,221,727</td>
<td>3,991,852</td>
<td>2,373,304</td>
<td>6,204,669</td>
</tr>
<tr>
<td>Absolute Scarcity</td>
<td>1,631,416</td>
<td>2,150,409</td>
<td>4,387,060</td>
<td>5,325,795</td>
</tr>
<tr>
<td>% of people living in water scarce area</td>
<td>36%</td>
<td>58%</td>
<td>50%</td>
<td>70%</td>
</tr>
<tr>
<td>Total Population</td>
<td>7,956,772</td>
<td>10,546,509</td>
<td>13,477,414</td>
<td>16,396,486</td>
</tr>
</tbody>
</table>

Table 3: Rwanda Water Stress Index
Proposed approach for sustaining and alleviating water scarcity and floods in Rwanda.

For properly mitigating the scarcity of Water in Rwanda, adequate planning needs to be involved basing on the real basis life of citizens, proper measures and techniques needs to adopted and implemented as well. For this issue, we have proposed new system of constructing surface storages (dams, reservoirs) having the capacity to serve at least 5 neighboring districts when combined and introducing new system of rain harvesting which is construction of concrete underground Cisterns (UST). These tanks may serve as storage tanks for channeled floods and the stored water may be used for irrigation systems during drought seasons.

The construction of mini dams and reservoir in the districts as mentioned will serve as the supplement water supply to the insufficient existing supply systems with in the country where people in districts shall have full access on water with in their respective districts and it may also promote fishing, power generation, irrigation systems as well and control of floods. Whereas for mitigating floods cannels, Municipal storage centers (MSC) and national reservoir centers (NRC) should be constructed where the municipal storage centers (MSC) feeds into national reservoir center (NRC) and the waters for NRC may be used for different purposes.

Conclusions and Recommendations

Water quality and scarcity are widespread problems and its sustainable management is becoming a quite challenge. Even though a range of resolving suggestions have been provided such as provision of investment in water infrastructure maintenance, water reuse, recycle flotation, chemical precipitation, ion exchange and membrane filtration and coagulation-floculation, the rapid human population growth, increase on point and non-point water pollution sources are threats to water quality. The government of Rwanda has launched the Integrated Water Resources Management, an approach of developing, monitoring and managing water resources. Nonetheless for the policy to be fruitful and sustainable there is a great need of managing the wastewater, the rapid expanding urbanization and informal settlements, industrial and mining activities. Therefore, the followings are suggested for the water quality management, Control of floods and total eradication of water scarcity in Rwanda.

Rapid population growth is increasingly leading to natural resources degradation we are advising to set a fixed number of children per family with penalties or tax incentives to those disregarding the policy. Since Rwanda is rich in precipitation throughout the year it is good to consider maximum rain harvest this will increase the Underground storage and enables local communities to supply water to their infrastructure and reduces sediments carried into watershed.

Population growth requires sufficient food to do so irrigation is proposed to boost the agricultural production however it is good to first check on environmental pros and cons of every irrigation technique (sprinkler and flood irrigation drip irrigation) before use.

Rwanda as a developing country with high water demand, water reuse and desalination would help much, where industrial, saline water and household wastewater can be turned into usable water for other uses such as garden watering, carwash, toilet uses. This will be a good option and reduce the wastewater associated consequences.

It is suggested to promote environmental research and education from basic schools; hydrological data sharing and free access for water quality management enhancement.

Although the government prioritized Crop Intensification Program (CIP) with one crop at appropriate location, it would be good to initiate and promote break crop system, different crops at once this will enhance soil fertility and maintain soil at a level of not demanding high chemical fertilizers and reduces water pollution.

Even though environmental management is a cross Cutting issue at every decision-making level monitoring and evaluation of its execution and success basing on community’s reality and national development plans is highly suggested. We are advocating to the government for promoting district underground concrete tank systems in order for disseminating sufficient water supply program.

Urbanization is the key vital when it comes to allocation or distribution of water to the citizens. We recommend the government of Rwanda to manage the land use by owning the land and after leading the use of it according to the designed masterplans and allocating people in a modernized system.
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Perception of Urban Consumers in Mumbai Towards Food Delivery Platforms

Tanishka Goel, Varun Mujumdar, Vreha Surya, Yash Kundlia, Vineet Saraf, Srishti Bhardwaj

Abstract- The delivery of restaurant meals to consumer’s houses is undergoing rapid change as new online platforms race to capture markets and customers. This is in light of the rapidly changing global trends; Indian consumers have also kept up with the pace and have shown a change in consumption patterns since the emergence of these online food delivery platforms. It is thereby of great importance to study the consumer behaviour towards different food delivery platforms and the factors and attributes pertaining to the same. This paper has tried to study the consumer perception towards online food delivery and various food delivery platforms.

The paper studies the various factors responsible for the shift of consumers’ preference towards ordering food online and the challenges faced by them. The study also tries to establish how consumer behaviour has changed after the launch of such food delivery in terms of the change in their eating habits. The study also highlights the factors that lead to consumers making choices between different food delivery apps. It tries to assess the level of importance that consumers assign to various attributes pertaining to different online food delivery platforms and what are the shortcomings of these platforms as perceived by the consumers. The paper also tries to find the most preferred food delivery app among consumers based on various attributes such as price, food quality, variety etc.

Index Terms- Consumer Behaviour, Consumer Perception, Online Ordering, Online Food Delivery, Food Delivery Apps

I. INTRODUCTION

There has been a surge of technological advancement in India. It is on its way to becoming a digitally advanced nation; over 40 percent of the population has an internet subscription. But India is already home to one of the world’s largest and most rapidly growing bases of digital consumers. The country had 560 million subscribers in September 2018. Indians now download more apps—12.3 billion in 2018—than residents of any other country barring China. The average Indian social media user spends 17 hours on the platforms each week (McKinsey Global Institute, March,2019).

Due to this deep penetration of smartphones and internet connectivity in India, the e-commerce business has seen an exponential growth as the consumer shifts to such online platforms for fulfilling their needs and wants. The Indian consumer uses the internet for a plethora of options such as booking hotels, flight tickets, ordering groceries, online banking, e-learning and even ordering food.

The food delivery apps have completely changed the landscape of food industry in India. By partnering with restaurants, these food delivery apps act as aggregators connecting various restaurants to the consumers. They have an easy to use interface from which consumers can select any meal, from any restaurant of their choosing and get it delivered at their doorstep in a few clicks.

According to (Panse, Rastogi, Sharma, & Dorji, 2019), food delivery has become a very competitive market in India. The revenue of online food delivery (restaurant to consumers and platform to consumer) is in the tune of $5867 million in 2017, as reported in a FICCI report.

II. LITERATURE REVIEW

(Miglani & Jenvild, 2014), in their paper “The New Indian Consumer”, have explained the causes for the increase in takeaway and home delivery options as urbanization, increase in number of working women, rise of the younger population and higher disposable incomes combined with increased time constraints. The findings from the paper indicate that the growth of demand for take-away despite slowdown in Quick Service Restaurants (QSR) dine-in, which suggest that consumer preferences are moving away from QSR dine-in. The authors have stated that the tastes of the new Indian consumers are evolving, eating out at QSR outlets is no longer perceived as an occasion in India. The dine-in trends are either fine dining or at café outlets, whereas QSR is demanded in a fast and convenient manner which consumers prefer delivered to their doorstep. Through their paper they have explained the role of internet and the development of apps as a driving force behind the rapid rise in consumer’s preferences towards ordering food online. Social media is guiding the consumption.

(Das, 2018) has discussed the consumer’s perception towards online food delivery services and have concluded convenience while ordering and doorstep delivery to be the most important factors for consumers. They cite that the main reasons people don’t use these apps are because of bad past experiences, as well as influence from their friends and family.

(Karthika & Manojanaranjani, 2018) in their paper have studied that Most of the respondents felt the delivery charges to be important factors for consumers. They cite that the main reasons for consumer to not order online ordering food through online.

(Rathore & Chaudhary, 2018) intend to explore the consumer’s perception towards online food ordering. The data for
the study was gathered through two structured sets of questionnaire, and an online survey was used to collect the data for this study. The survey was done by gathering data from students of Indore. The first part of their questionnaire included questions about the factors which make the consumers order food online and have cited as time being the most important factor, because early delivery equals less time wastage and hence it influences the consumer as everyone in this dynamic world no one wants to spend on non-productive things. The 24 by 7 services have a major impact as the consumer is not restricted to the certain time limit. Convenience is the biggest factor driving online food ordering. Consumers do not have to leave their home nor travel to find and obtain food online. Convenience offers the consumer to have a sense of control and an authority over what to buy, the next it also helps in the selection of products on a wide variety on the internet. The other factors include ease of accessibility, multiple payment options and flexibility provided by online food delivery apps.

Similar factors have been studied by (Vinaik, Goel, Sahai, & Garg, 2019) who have concluded that the most important factors are convenience, easy payment method, delivery time and receiving the expected order, good customer service and receiving the right order. However there are still a lot of people who don’t order food online. This is because of factors such as; consumers don’t feel safe sharing their personal and financial information, they face problems while using digital payment options, or are not very comfortable with the technology aspect of it.

(Parashar & Ghadiyali, 2020) analysed the change in consumer behaviour after the development of food delivery apps and the reasons behind the transition. Primary data is collected to study consumer behaviour, whereas secondary data is used to collect information about the types of apps used by consumers. Its findings were that the fast-paced life of individuals and the convenience of ordering food online has led to the boom of food delivery apps. It also found that consumers value the speed of delivery the most, while quality of service and discounts were also important factors affecting the consumers’ behaviour. The main challenge faced by consumer is the prices of food items available on the food delivery platforms are higher than what the consumer pays at the restaurant itself. Another challenge faced by consumers is the non-availability of some restaurants on the apps.

(Jacob, Sreedharan, & K, 2019) have discussed the general views and perceptions of online food delivery apps like Swiggy, Uber Eats and Zomato amongst common consumers. The research was conducted mainly in order to see the impact of these applications on traditional way of food serving, youth and in order to analyse their success in the current market. The information regarding this research was collected through a mixed approach which consisted both of qualitative and quantitative methods, including collection of data from 300 users and 100 non-users of the app which consisted people of different age groups. Even after the limitations regarding the respondent number and consumer perception, it was concluded that online food ordering system has its own benefits and limitations, additionally it was found that youth are more inclined towards these apps with Swiggy being the most successful.

Similar findings have been suggested by Thomas Lim in his paper, the paper states that the competitive world across India was badly hit by the recent economic slowdown. As an attempt to strive towards maintaining at least the style of living, most urban population have changed the food habit, opting for eating out, picking up anything on the way or back from work and lately online food aggregators with special discounts turned out to be a bliss for all sections of urban society during the recession (Lim, 2019).

(Janib, Gayathri, & Shabu, 2019) have discussed the consumer perception towards Swiggy digital food application service by conducting an analytical study. They wanted to find out a relationship between the service provided by the Swiggy app and the consumer’s satisfaction achieved through the usage of this particular app. For the study, approximately 100 respondents were taken as sample and the information was collected from them with help of a series of questions. The questionnaire included inquiries regarding the offers provided by Swiggy, delivery time, price of food, income of consumers, and various other questions regarding the consumers experience till date with Swiggy for analysis and to find out how they are correlated with consumer satisfaction. Even though there were time and respondent limitations, research was enough to extract some findings which lead to the conclusion that Swiggy remains one of the top food delivery food applications but it could be improved by removing minimum order value and improving method of consumer recommendation and feedback process.

III. RESEARCH GAP

When we studied how food delivery apps influenced consumer eating habits, we studied many papers but could not find any conclusive data on how the consumer behaviour such as food consumption and spending patterns have changed after the launch of food delivery apps in India. Therefore, this is the research gap that we found and this is one of the objectives of our study.

1. Research Objectives
1.1 To study the Factors affecting consumers’ behaviour while ordering food online.
1.2 To identify the challenges faced while ordering food online.
1.3 To understand how food delivery apps influence eating habits
1.4 To determine which is the most popular food delivery app
IV. FINDINGS

1.5 Factors affecting Consumers’ Preference towards Food Delivery Apps

Chart 1: Reasons for which consumers do not prefer to order online

From chart 1, we can see that 20% of the total sample size are hesitant to order food online. Six factors were studied to understand why consumers do not prefer online ordering. 52.3% of the respondents cited health concerns as the primary reason for this, followed by poor taste and quality (35.71%). Other factors included minimum order criteria, price and packaging. It has been observed that these food delivery platforms provide a large range of fast food options. Since the Indian consumers have started shifting towards a healthier lifestyle, they tend to avoid ordering food online due to the lack of healthier offerings. The second major reason cited by respondents is taste and quality since they fear that the same taste and quality might not be maintained if the food is delivered as compared to the quality offered at restaurants.

Source: Primary Data Sample size: 42
Unit of measurement Y- Axis: 1 unit = 1 respondent
Five main factors that influence people to order food online were studied. From chart 2, we can see that the most important factor is the variety of options available on the food delivery platforms. By bridging the gap between restaurants and consumers the food delivery apps have provided consumers with numerous options of restaurants as well as cuisines to choose from at a tap on their phone. For example, Swiggy is a dedicated food app and it has close to 12,000 partner restaurants in eight cities (Kanteti, 2018). Other factors include convenience and lower delivery time. Few respondents also said that the offers given by these apps also influence them to buy online and while some said that their social anxiety is also a factor that influences their preference because it prevents them going out and hence getting food delivered at their doorstep without having to step out of their house seems like a comfortable option.

Table 1: Importance of various factors while ordering food online

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Price</th>
<th>Food Quality</th>
<th>Delivery Time</th>
<th>Delivery Charge</th>
<th>Discount &amp; offers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>3.82</td>
<td>4.23</td>
<td>3.54</td>
<td>3.54</td>
<td>3.68</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>1.08</td>
<td>1.03</td>
<td>1.13</td>
<td>1.18</td>
<td>1.15</td>
</tr>
</tbody>
</table>

Source: Primary Data Sample size: 171
Unit of measurement Y- Axis: 1 unit = 1 respondent
Respondents were asked to rank five factors based on the importance assigned to each factor while ordering food. From Table 1, it can be concluded that the most important factor considered by respondents is food quality. It has been considered even more important than the price as the consumers don’t want to compromise on the taste and quality of the food even if it means paying a little extra for the same. Various discounts and offers such as Zomato Gold and Swiggy. It given by apps are also appreciated by the consumers and it tends to influence their purchase decision. For example, if the restaurant of choice is available on more than one food delivery platform, then consumers choose the app which offers a higher discount. Delivery time taken for the food to reach to the consumer’s doorstep and the delivery charges levied by the restaurants are considered as relatively less important.

Chart 3: Occasions at which consumers order food online

<table>
<thead>
<tr>
<th>OCCASIONS</th>
<th>NO. OF RESPONDENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>When no other option is available</td>
<td>98</td>
</tr>
<tr>
<td>As a substitute to home cooked</td>
<td>98</td>
</tr>
<tr>
<td>To replace home cooked meals</td>
<td>47</td>
</tr>
<tr>
<td>During a social gathering with friends or family</td>
<td>35</td>
</tr>
</tbody>
</table>

Source: Primary Data Sample size: 171
Unit of measurement Y-Axis: 1 unit = 1 respondent

Various occasions at which consumers normally order food online have been studied in this paper. In chart 3, we can observe that mainly, people order food when there is no other option available. The next most common occasion is during a social gathering with friends and family. People like to order food during social gatherings because not only does it provide many options but is much more convenient for people. Some people also order food online to substitute or supplement home cooked meals. Swiggy released a campaign based on a similar
insight called “Ghar Ka Khaana, Saath Mein Thoda Swiggy!” that attempts to strike a chord with most Indian families today, where consumers like their home cooked meals but also look forward to an exciting element that complements their routine (BrandEquity.com, n.d.).

1.6: Challenges while ordering food online

Online food delivery services are growing rapidly and are set to grow at a rate of 15% in India, but they still face a number of problems which dissuade consumers from ordering food online.

Chart 4: Consumers’ agreeableness on minimum order criteria

Source: Primary Data Sample size: 171
Unit of measurement Y-Axis: 1 unit = 1 respondent

One of the major problems faced by consumers is the fact that some restaurants have a minimum order criterion, which states that an order must exceed a certain amount or else it will not be delivered. 43% of the respondents were against this feature. Their opinion was that the minimum order criterion forced them to overspend and buy things they did not want. It also prohibits them from ordering small items, such as desserts or drinks. However, if you look at the app’s point of view, this rule is logical as it reduces the delivery costs of orders which are miniscule.

Chart 5: Major factors influencing consumers’ ordering behaviour

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Another major factor that affects consumers is the pricing. Delivery apps often price their food above the normal rate charged by the restaurant. On top of that, there is often a hefty delivery charge and an even heftier packing charge. Over and above that, many restaurants post inexplicable charges that results in a massive bill. Consumers generally feel this is unjustified as they end up paying higher without experiencing the ambience of the restaurant. Also, all restaurants are not available on the delivery apps. This is a major complaint of the consumers, as they can see the restaurant and their app but cannot order as a message saying “Does not deliver” is shown alongside it.

Another worry people had while ordering food online was the maintenance of quality. The time period between when the food is ready and when it is delivered to your doorstep has a ton of potential problems. The first is temperature; if not properly packed, the food can lose its ideal temperature and can become soggy ad unpleasant. The delivery process is another issue; consumers have said that they have no idea how the food is actually transported, and how sanitary the transportation method is. Also, there is no guarantee that the delivery guy will maintain your food; he may sneak a few fries and even sip your drink. Consumers have reported poor experiences in the past which therefore dissuades them from ordering food.

Chart 6: Frequency of dissatisfaction faced by consumers

Although consumers have reported poor condition of the food delivered, our study has shown that a majority of the respondents rarely have problems. Over 80% of the respondents showed dissatisfaction less than once in 5 orders, of which 11% said they have never had a problem with the food delivered. In fact, the leading problem among consumers is that the delivery took too long and came late. Although this is still a problem, it is not as serious as lack of maintenance of quality.

With the explosion of food delivery, things like packaging are constantly improving. Sealed containers are being developed in order to prevent any sort of tampering. In fact, Lamb Weston, a supplier of frozen potato products, has recognised that soggy French fries are unpopular, and is working on creating a new line of fries only for delivery. These fries will be stored in a vented container to reduce the moisture and thus the sogginess (The Official Wasserstrom Blog, 2018). If such solutions are developed, the problems faced by consumers would reduce significantly.

4.3 : How Food Delivery Apps Influence Eating Habits

With the introduction of food delivery apps, almost 65% of the respondents said they have started spending more on food, whereas the same number were of the opinion that these apps led to them ordering midnight feasts and giving in to those late-night pangs of hunger. Hunger sees no time and no location, and ever since food delivery apps launched late deliveries, consumers started ordering more food at these late hours (Bahukhandi, 2018). Indians tend to eat light lunches and then eat a more extravagant dinner, especially if the last meal of the day is very late at night. Therefore, the post-midnight market is also a key market and has been well exploited by the food delivery apps (Bhushan, 2018).
Chart 7.: Influence of online delivery apps on trying more restaurants

Source: Primary Data
Sample size: 171
Unit of measurement Y-Axis: 1 unit = 1 respondent
These consumers also said they used to get to experience a whole new host of restaurants. Since a variety of options are available on these apps, consumers get to browse through a whole list of options, and get to look at places they’ve never seen before. However, at the same time, the respondents said they don’t really get to try new cuisines. This may be because consumers aren’t that open to new types of food, or they don’t want to experiment when it comes to food.

Over 50% of the respondents said that they tend to go out less often, and would rather eat at home. This is mainly because of the convenience factor. The respondents would rather have food delivered to their doorstep than have to take the effort to go out to a restaurant. In fact, restaurants which are not associated with any food delivery apps will eventually end up losing sales, and may even have to shut down over time.

6.4 To determine which is the most popular food delivery app?

In order to determine the most popular food delivery app, we compared various apps on the basis of different factors. These factors included price, discounts and offers, grievance redressal, delivery time and maintenance of food quality in transit. On beginning this study, we found that Zomato and Swiggy are the most popular apps, with 47% and 41% of the population using these two apps respectively.

Chart 8 Preference of Consumers’ Amongst Delivery Apps

Source: Primary Data, Sample size: 171
Table 2: Statistical Test on ranking scale of different online food delivery Apps

<table>
<thead>
<tr>
<th>Item Statistics</th>
<th>Mean Rank (Zomato)</th>
<th>Mean Rank (Swiggy)</th>
<th>Rank Mean Rank (Restaurant’s apps)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price</td>
<td>3.34</td>
<td>3.46</td>
<td>2.9</td>
</tr>
<tr>
<td>Discounts and offers</td>
<td>3.74</td>
<td>2.9</td>
<td>3.56</td>
</tr>
<tr>
<td>Grievance Redressal</td>
<td>2.95</td>
<td>3.51</td>
<td>3.44</td>
</tr>
<tr>
<td>Delivery Time</td>
<td>3.49</td>
<td>3.57</td>
<td>3.42</td>
</tr>
<tr>
<td>Maintenance of food quality</td>
<td>2.98</td>
<td>3.71</td>
<td>3.53</td>
</tr>
</tbody>
</table>

Source: Primary Data Sample size: 171

In the above table, we have calculated the mean of each of the factors and apps we have studied. We collected the data from respondents by asking them to give each app a scale of 1 to 5 on the basis of a particular attribute, which we then used to calculate the values as shown above. When we compare the pricing policies of the respective delivery apps, Swiggy’s prices are comparatively lower than Zomato’s prices because most of the respondents gave a better rating to Swiggy in terms of price i.e., 3.3. However, Zomato offers a lot more discounts and offers to its consumers. Another area where Zomato surpasses Swiggy is the delivery time; Swiggy is perceived to be slower at delivering orders than Zomato. However, Swiggy is better at addressing problems of the consumers, and it also maintains the quality of the food better. Since Zomato is comparatively better than Swiggy on the basis of a majority of factors, it has a slightly higher popularity of 47% compared to Swiggy’s 41%.

However, that being said, Zomato and Swiggy are going through a cut-throat competition in order to be the most popular food delivery app. They are both constantly redesigning and innovating in order to make their app better. They could do this by modifying the design so that it becomes more user friendly. They could also offer GPS systems through which consumers can track their order in real time. The number of restaurants they partner with also makes a difference; consumers would obviously want a wider variety to choose from. If either app makes some significant ground on the other, it may be very difficult to catch up (Hariharan, 2018).

V. CONCLUSION AND RECOMMENDATIONS

1.7 : Conclusion

The paper has identified five factors that influence consumers to order food online, with variety of options that are provided by these food aggregator apps as being the most important factor. By bridging the gap between restaurants and consumers the food delivery apps have provided consumers with numerous options of restaurants as well as cuisines to choose from at one tap on their phone. The food delivery apps have made food ordering convenient. They can select their order on the app which reduces the chances of a wrong order. The apps have multiple payment options available and hence offer great convenient to consumers which is the second most importance factors influencing consumer preference towards online food delivery apps.

The most important factors considered by consumers while ordering food online is the taste and quality, followed by price. In our study we found that the consumers mostly order online when there is no other substitute available but a lot of respondents also order online food as a substitute to home cooked meals or during social gatherings with friends and family.

Only 20% of the total sample size said that they do not prefer ordering online citing health concerns as the primary reason because the food delivery apps predominantly serve fast food options and lack the option for healthier food choices. Other major factor that the respondents cited for not ordering online are taste and quality of the food delivered vis-à-vis the quality provided in the restaurants along with minimum order criteria set by restaurants for ordering online.

There are various challenges faced by the consumers while ordering food online amongst which the major challenge faced by the respondents is the minimum order criteria set by the food delivery apps as it forces them to overspend especially when they are looking for small food items such as a drink or some snacks. Another major challenge is the inflated and dynamic pricing policy of food delivery apps. These apps usually charge a higher price from consumers for items that are available at a cheaper price at the restaurants and these prices tend to go even higher if the demand for a particular order is high. Another challenge is the
maintenance of food quality in transit because the time taken for
the food to reach the consumer’s doorstep can cause various
problems. For example, an incorrect temperature, if the food is not
properly packed or the delivery takes more time than expected, the
food can lose its ideal temperature and can become soggy and
unpleasant. Also, there is no guarantee that the delivery guy will
maintain the quality and hygiene of the food; he may sneak a few
fries and even sip your drink. Consumers have reported poor
experiences in the past which therefore dissuades them from
ordering food (news18.com, 2018).

The paper has also studied how consumer behaviour has
changed after the introduction of food delivery apps. The
consumers have start to spend more after the advent of food
delivery apps because more than half of the respondents (61.4%) agree
that they tend to give in to their midnight cravings due to the
availability of various food option even late at night. 71.9% respondents have also agreed that they tend to try more restaurants and 66.08% respondents have agreed that they try more cuisines because of food delivery apps.

Among the different food apps studied in this paper, Zomato is the most used app by the consumers having a share of 48% of the sample size, followed by Swiggy (41%) and other restaurant apps (11%). Zomato also offers more discounts and offers than other apps which can be the reason as to why most of the respondents use Zomato. However, the grievance redressal system of Swiggy is considered to be the best by the respondents. It has the promptest customer service system and responds to customer grievances immediately often returning the full amount in case it fails to satisfy the consumer (your story academy, 2019).

1.8: Recommendations

- There has been a shift in the consumer preference towards a healthier lifestyle. People are becoming more and more health consciousness and therefore are very careful of their diet. This health conscious consumer segment does not find its need fulfilled by the food delivery apps as they lack healthy and low calorie food options. Introducing restaurants that cater to such needs of consumers can increase the market share and brand loyalty of the food delivery platforms.

- Many consumers do not appreciate the restaurants setting a minimum order criteria and this often dissuades them from ordering online. Bringing down this minimum order criterion to a reasonable amount in such a way that it does not affect the profitability of the food apps and at the same time not be a hindrance in consumer’s preference of online ordering.

- Though more restaurants are available, consumers are rigid in their food choices and don’t tend to experiment with cuisines. The various food apps such as Zomato and Swiggy can encourage customers to try more cuisines by giving additional offers and discounts on a ‘never tried before’ cuisine, and can try running an advertisement or PR campaign such as Twitter interaction with consumers who have tried a new cuisine or showing pop up ads. This will lead to an increase in share of wallet and deeper market penetration.

- The most important factor cited by consumers for preferring online food delivery is its ability to provide a variety of options. The food delivery apps can work towards bringing more variety in their services to attract more consumer. There should be an option of combining two orders from different restaurants. This will not only provide more variety but also give more flexibility and control to the consumer.

VI. LIMITATIONS

1.9 Sampling Limitations

The study has taken a sample of 213 respondents and not the entire population. Therefore, the findings of this study is based on the data collected from these respondents and might not hold true for the entire population. If census or population study had been used, this problem would have been solved.

1.10: Sampling Method

This study has used Non probability sampling technique. Convenience sampling method was used to select samples. These samples selected might not be a true representation of the entire population and may result in bias on the part of the researcher.

1.1 Cross sectional study

A Single cross sectional study was conducted and data was collected from the samples only at a particular point of time and therefore the findings stand true only for this period and might not hold true in future and may change as time goes.

1.1 Objective Limitation

The research problem identified i.e., Consumer perception towards online food delivery is a broad area of study and therefore this research paper has done a limited study on this research problem covering four objectives under this study.

1.2 Location

The data has been collected only from the respondents residing in Mumbai and therefore the findings cannot be generalized for a larger population residing in any other state or country.

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Ameliorative effects of some phytochemicals extracted from Cola acuminata leaf on altered liver function indices of mice infected with Plasmodium berghei (NK-65)

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Abstract- Alterations in liver function indices are among classic features of malaria complications resulting from activities of the parasite in the liver. Cola acuminata has been reported to contain phytochemicals with antimalarial activity. This study assessed the effects of some of these phytochemicals on liver function indices of Plasmodium berghei infected mice. For each phytochemical, 7 groups (A-G) of five mice each were used. Group A served as normal control, B-F were treated with Plasmodium berghei; group B served as untreated control while groups C-F were treated with 20mg/Kg body weight chloroquine, 12.5, 25 and 50 mg/kg body weight of the different phytochemicals respectively. Group F was treated with 50mg/Kg body weight of phytochemicals only without parasite inoculation thus serving as extract control. Treatment commenced 72hrs after inoculation; once orally for four consecutive days. A week after treatment, the mice were sacrificed under diethyl anesthesia and blood was collected for evaluation of liver function indices. Liver function indices including total bilirubin, albumin, total protein, the transaminases and alkaline phosphatase were evaluated. Infection with Plasmodium berghei caused a progressive increase in total bilirubin concentration as well as the activities of AST, ALT, and ALP and decrease in total protein and albumin concentration. Treatment with all phytochemical extracts improved liver function indices in a dose-dependent manner comparable to the normal group at the highest dose. Thus, they can be a promising source of effective antimalarial therapy individually or in combined therapy.

Index Terms- Cola nitida, phytochemicals, liver function indices, Plasmodium berghei

I. INTRODUCTION

Hepatic involvement in malaria is a common presentation, and presence of jaundice is one of the indicators of severe malaria as defined by World Health Organization in 2008. Malaria infection results in systemic manifestation with effects on vital organs like kidney and liver (Adelakun et al., 2015). The effects of this infection on the liver are attributed to the hepatic stage of the life cycle of the parasite in the host which takes place in the liver (Zailani et al., 2020). The sporozoite invasion of hepatocytes during the exo-erythrocytic stage of malaria parasite life cycle contributes immensely to liver dysfunction in malaria. The presence of sporozoites in the liver during exo-erythrocytic as well as accumulation of haemozoin in the liver during erythrocytic stages of malaria parasite life cycle induces immune-mediated damages to the hepatocytes. This causes leakage of parenchymal and membranous enzymes of the liver into the general circulation which might be responsible for the increase in serum activities of these liver marker enzymes. The alteration in the liver function markers have been found to correlate with parasite density as well as the severity of the infection (Enechi et al., 2019). As reported in previous studies, the liver damage manifests as a sudden increase in serum activities of liver marker enzymes in malaria infected individuals (Jarikre et al., 2001; Onyemos and Onyemakonor, 2011). On the other hand, clinical trials of novel antimalarial drugs have reported abnormalities in liver enzymes, and/or total bilirubin (TB) (Cheaveau et al., 2019). Plant materials used in sub-saharan Africa (including Cola acuminata leaf) for the treatment of malaria have been found to contain active substances that exhibit antimalarial activity either individually or in combination (Zailani et al., 2016; Eromosole and Kehinde, 2018; Zailani et al., 2020). This work was aimed at evaluating the effects of some phytochemicals extracted from Cola acuminata leaf on liver function parameters of Plasmodium berghei (NK-45) infected mice.

II. MATERIALS AND METHODS

2.1 Collection and identification of plant material

Fresh leaf samples of Cola acuminata was collected from Gembu, Sardauna Local Government of Taraba State, Nigeria. The leaves were identified and authenticated at the Department of Plant Sciences, Modibbo Adama University Technology Yola, Adamawa State.

2.2 Experimental Animals

Seventy (70) Swiss albino mice (about 6 to 8 weeks old) were obtained from the animal breeding unit of the University of Jos, Plateau State. The average body weight of mice (22.02±1.37g) was measured using a Shimadzu (UX4200H) top pan animal balance to the nearest 0.1g. The mice were housed in...
plastic cages and maintained under standard laboratory conditions with free access to rat pellets and tap water ad libitum.

2.3 Parasite Strain
Chloroquine sensitive strain of Plasmodium berghei (NK-65) was obtained from Department of Pharmacology and Therapeutics, Faculty of Pharmaceutical Science, Ahmadu Bello University Zaria, Kaduna State Nigeria. The parasites were maintained by weekly serial passage of blood from the donor-infected mice to healthy uninfected mice via intraperitoneal (IP) injection (Ounjaijean, et al. 2019).

2.4 Chemicals and reagents
Chloroquine diphosphate salt, immersion oil, and Giemsa stain were obtained from Sigma Chemical Company St. Louis, Mo, USA. Assay kits for enzymes and liver function indices were obtained from Randox Laboratory Ltd, UK.

2.5 Preparation of plant sample
Whole fresh leaves of Cola acuminata were washed with water and dried in the shade at room temperature. The dried leaf sample was ground to powder using an electric blender (Mazeda Mill, MT 4100, Japan). It was then packed in a sealed plastic bottle until extraction.

2.6 Extraction of flavonoids
Flavonoids were extracted according to the method described by Yahaya, (2015).

2.7 Extraction of phenolics
Phenolics were extracted according to the method described by Velioglu et al. (1998).

2.8 Parasite inoculation
The mice were inoculated from the same donor mouse. Each mouse was inoculated intraperitoneally on day 0 with 0.2 ml of infected blood containing about 1 x 10⁷ Plasmodium berghei parasitized red blood cells. They were then monitored for 72 hours after which infection was confirmed by observing tail blood microscopically before treatment was started.

2.9 Extract and chloroquine administration
Experimental groups to receive extract or the standard drug (chloroquine) started receiving treatment 72 hours after infection. The administration of the extract as well as the standard drug was carried out orally using an intra-gastric tube and treatment was maintained daily for 4 days.

2.10 Experimental design
For each phytochemical, the mice were divided into seven groups (A-G) of five mice per group.

Group A was not inoculated and not treated and served as normal; group B was inoculated but untreated and served as infected control. Group C was treated with 20mg/Kg body weight of chloroquine (treated control). Groups D, E and F were inoculated with Plasmodium berghei (pb) and administered 12.5, 25 and 50 mg/kg body weight of the different phytochemicals respectively while group G was treated with 50mg/Kg body weight of the phytochemicals only without parasite inoculation thus serving as extract control. A week after treatment, the mice were sacrificed and blood collected to evaluate the effect of treatment on liver function indices.

III. DETERMINATION OF LIVER FUNCTION INDICES AND ASSAY OF SOME ENZYMES
A week after treatment, the mice were sacrificed after diethyl ether anesthesia and blood was collected in plain sterile containers and centrifuged for 5 minutes at 2500rpm using Wisperfuge centrifuge (model 1384, Samson, Holland) to obtain serum. The serum was then collected for the assay of liver function markers as indicated below:

3.1 Determination of Aspartate aminotransferase (AST) and Alanine aminotransferase (ALT) and Alkaline Phosphatase (ALP) activities.
These were done as described by Reitman and Frankel, (1957).

3.2 Determination of Bilirubin concentration
This was determined using the calorimetric method of White et al. (1958).

3.3 Determination of Total Protein concentration
The method of Tietz, (1976) was adopted in the determination of serum total protein concentration.

3.4 Determination of Albumin concentration
The method described by Doumas et al.(1971) was adopted to determine serum albumin concentration.

IV. STATISTICAL ANALYSIS
The grouped data was expressed as mean ± standard error of mean (SEM) and the significant differences were determined using Statistical Package for Social Sciences (SPSS V. 25).

V. RESULTS
Table 1 shows the results of the effects of some phytochemicals extracted from Cola acuminata leaf on the activities of some liver enzymes in mice infected with Plasmodium berghei (NK-65). Infection of the mice with Plasmodium berghei significantly (P<0.05) increased the activity of the enzymes studied. Treatment of the infected mice with chloroquine and the extracts resulted in significant (P<0.05) improvement of the distorted indices towards normal. Results obtained for the extract control group showed that the phytochemicals did not cause any significant changes in the activities of these enzymes compared to normal.

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chloroquine and all the phytochemical extracts significantly improved (P<0.05) all the function indices towards normal in a dose dependent manner. Similarly, the extract control group did not elicit any significant changes in the function indices at the highest dose compared to normal control.

RESULTS

Table 1: Effects of flavonoids and phenolics extracted from *Cola acuminata* leaf on some liver enzymes in mice infected with *Plasmodium berghei* (NK-65).

<table>
<thead>
<tr>
<th>PHYTOCHEMICALS</th>
<th>TREATMENT</th>
<th>AST (IU/L)</th>
<th>ALT (IU/L)</th>
<th>ALP (IU/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FLAVONOIDS</strong></td>
<td>Normal control</td>
<td>12.87±1.70a</td>
<td>50.75±3.59a</td>
<td>63.75±4.00a</td>
</tr>
<tr>
<td></td>
<td>untreated control</td>
<td>41.90±1.04b</td>
<td>83.25±6.36b</td>
<td>82.60±1.22b</td>
</tr>
<tr>
<td>treated control</td>
<td>12.5mg/kg b.w.t of chloroquine</td>
<td>11.78±0.65a</td>
<td>52.22±2.06a</td>
<td>65.32±3.48a</td>
</tr>
<tr>
<td></td>
<td>extract + pb</td>
<td>35.05±0.73c</td>
<td>75.00±8.23c</td>
<td>76.75±5.69c</td>
</tr>
<tr>
<td></td>
<td>25mg/kg b.w.t of extract + pb</td>
<td>14.98±0.67a</td>
<td>54.10±3.00a</td>
<td>70.02±8.22a</td>
</tr>
<tr>
<td></td>
<td>50mg/kg b.w.t of extract + pb</td>
<td>12.77±1.98a</td>
<td>52.75±2.43a</td>
<td>68.72±7.41a</td>
</tr>
<tr>
<td></td>
<td>50mg/kg b.w.t of extract without pb</td>
<td>12.50±0.99a</td>
<td>51.90±2.05a</td>
<td>64.27±3.03a</td>
</tr>
<tr>
<td><strong>PHENOLICS</strong></td>
<td>Normal control</td>
<td>9.50±0.99a</td>
<td>50.75±3.59a</td>
<td>68.72±7.41a</td>
</tr>
<tr>
<td></td>
<td>untreated control</td>
<td>51.90±1.04d</td>
<td>103.25±6.36d</td>
<td>162.60±1.22d</td>
</tr>
<tr>
<td>treated control</td>
<td>20mg/kg b.w.t of chloroquine</td>
<td>11.78±0.65a</td>
<td>54.75±2.42a</td>
<td>83.75±4.17a</td>
</tr>
<tr>
<td></td>
<td>extract + pb</td>
<td>33.15±1.35c</td>
<td>73.25±3.96c</td>
<td>115.75±9.30c</td>
</tr>
<tr>
<td></td>
<td>25mg/kg b.w.t of extract + pb</td>
<td>26.20±2.31b</td>
<td>64.75±4.13b</td>
<td>95.25±4.83b</td>
</tr>
<tr>
<td></td>
<td>50mg/kg b.w.t of extract + pb</td>
<td>14.65±0.73a</td>
<td>53.25±2.53a</td>
<td>84.60±4.12</td>
</tr>
<tr>
<td></td>
<td>50mg/kg b.w.t of extract without pb</td>
<td>10.40±0.93a</td>
<td>51.50±2.25a</td>
<td>69.99±8.27a</td>
</tr>
</tbody>
</table>

Values are means of 5 replicates± SEM. Means in the same column with different superscripts are significantly different (P<0.05). pb = *Plasmodium berghei*

Key: AST= aspartate transaminase, ALT= alanine transaminase, ALP=alkaline phosphatase.

Table 2: Effects of flavonoids and phenolics extracted from *Cola acuminata* leaf on some liver function indices of *Plasmodium berghei* (NK-65) infected Mice.

<table>
<thead>
<tr>
<th>PHYTOCHEMICALS</th>
<th>TREATMENT</th>
<th>TP (mg/mL)</th>
<th>ALB (mg/mL)</th>
<th>TB (mg/mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FLAVONOIDS</strong></td>
<td>Normal control</td>
<td>89.33±1.12a</td>
<td>37.65±1.74a</td>
<td>2.77±0.20a</td>
</tr>
<tr>
<td></td>
<td>untreated control</td>
<td>48.85±2.93b</td>
<td>27.97±1.41b</td>
<td>9.73±0.84b</td>
</tr>
<tr>
<td>treated control</td>
<td>20mg/kg b.w.t of chloroquine</td>
<td>86.05±6.61a</td>
<td>35.60±1.32a</td>
<td>2.83±0.55a</td>
</tr>
<tr>
<td></td>
<td>extract + pb</td>
<td>33.15±1.35c</td>
<td>73.25±3.96c</td>
<td>115.75±9.30c</td>
</tr>
<tr>
<td></td>
<td>25mg/kg b.w.t of extract + pb</td>
<td>26.20±2.31b</td>
<td>64.75±4.13b</td>
<td>95.25±4.83b</td>
</tr>
<tr>
<td></td>
<td>50mg/kg b.w.t of extract + pb</td>
<td>14.65±0.73a</td>
<td>53.25±2.53a</td>
<td>84.60±4.12</td>
</tr>
<tr>
<td></td>
<td>50mg/kg b.w.t of extract without pb</td>
<td>10.40±0.93a</td>
<td>51.50±2.25a</td>
<td>69.99±8.27a</td>
</tr>
<tr>
<td><strong>PHENOLICS</strong></td>
<td>Normal control</td>
<td>89.33±1.12a</td>
<td>37.65±1.75a</td>
<td>2.77±0.20a</td>
</tr>
</tbody>
</table>


VI. DISCUSSION

Malaria infection has been reported to involve liver damage (WHO, 2008; Adelakun et al., 2015; Zailani et al., 2020) which manifests in the activities of liver function enzymes (alanine transaminase ALT, aspartate transaminase AST as well as alkaline phosphate ALP) and haemolysis which leads to alterations in the normal bilirubin concentration (Adelakun et al., 2015; Zailani et al., 2020). These reports are supported by findings in this study (Tables 1 and 2). These alterations, usually associated with the sporozoite invasion of hepatocytes during the exo-erythrocytic stage of malaria parasite life cycle contribute immensely to liver dysfunction in malaria (Onyesom, 2012). The presence of sporozoites in the liver during the exo-erythrocytic stage as well as accumulation of haemozoin in the liver during erythrocytic stages of malaria parasite life cycle induces immune-mediated damage to the hepatocytes which causes leakage of parenchymal and membranous enzymes of the liver into general circulation, which might be responsible for the increase in serum activities of these liver marker enzymes as observed (Burtis and Ashwood, 2001). Increased haemolysis on the other hand was reported to result in the elevation of bilirubin concentration (Adelakun et al., 2015). Previous findings reported by Zailani et al. (2016) and Zailani et al. (2020) asserted that some phytochemicals of Cola species exhibit antimalarial activities.

Results in Table 1 shows that the treatment groups significantly (P<0.05) improved the altered enzyme activities towards normal in a dose dependent manner. These findings can be attributed to the antimalarial properties of the phytochemicals previously reported by Zailani et al. (2016), membrane stabilization and maintenance of hepatocyte integrity potentials (Oyedapo and Famurewa 1995), by preventing the leakage of liver enzymes (AST, ALT and ALP) into the circulatory system or antioxidant activity of these phytochemicals which reduces hepatic oxidative stress (Momoh and Longe, 2014; Zailani et al., 2016). All these suggest that these phytochemicals possess hepatocurative and ameliorative activities on hepatic dysfunction induced by malaria infection.

Malaria parasites require various host factors for their development and survival. These factors include purines as they are not able to synthesize them de novo, iron and amino acids from the host haemoglobin and extracellular milieu as haemoglobin does not contain isoleucine and is low in several amino acids, such as methionine (Tougan, et al., 2020). This is a possible reason for the significant (P<0.05) reduction in the plasma concentrations of albumin and total protein in the untreated control group (Table 2). Significant improvement in the deranged indices in all the treatment groups of the phytochemicals in a dose dependent manner suggests that the extracts were able to improve liver function during malaria infection possibly due to parasite clearance (Chierinto et al., 2014; Zailani et al., 2016).

Understanding the mechanisms by which these phytochemicals act facilitates the development of novel antimalarial drugs and also helps in understanding the mechanism of parasite resistance. Some of these phytochemicals have been reported to selectively clear these parasites both in vivo and in vitro (Tajuddeen and Van Heerden, 2019). Parasite clearance by these phytochemicals may be due to one or more mechanisms employed by these phytochemicals. Terpenoids for example act by inhibiting the growth phase of the plasmodium parasite from ring form to trophozoites and inhibited nutrient intake by the parasites by inhibiting the permeation pathway. Flavonoids on the other hand work by inhibiting the influx of L-glutamine and myoinositol into the infected red blood cell. Anthraquinone could kill the parasites through various mechanisms, resulting from aldehyde at C-2 (Umar, et al., 2017). Some phenolics act through detoxification of haem by inhibiting β-haematin formation. Alkaloids act on protein metabolism I the parasite by inhibiting chaperon and ATPase as well as cytoplasmic lysl-tRNA synthetase functions (Tajuddeen and Van Heerden, 2019).

VII. CONCLUSION

All the phytochemicals in this study improved the distorted liver function indices as well as plasma protein concentrations induced by Plasmodium berghei infection. This can be attributed to the parasite clearance and antioxidant activities of these extracts as reported in previous literature. Therefore, these phytochemicals can be promising sources or a component of antimalarial agent either individually or in combined therapy.

<table>
<thead>
<tr>
<th></th>
<th>untreated control</th>
<th>treated control</th>
<th>treated control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>48.85±2.93</td>
<td>85.58±1.63</td>
<td>51.75±1.25</td>
</tr>
<tr>
<td>20mg/kg b.w.t of</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>chloroquine</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>extract + pb</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.5mg/kg b.w.t of</td>
<td>34.50±1.75</td>
<td>30.55±1.13</td>
<td>8.93±0.78c</td>
</tr>
<tr>
<td>extract + pb</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25mg/kg b.w.t of</td>
<td>47.3±0.55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>extract + pb</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50mg/kg b.w.t of</td>
<td>33.66±1.26</td>
<td>31.45±1.25b</td>
<td>6.33±0.56b</td>
</tr>
<tr>
<td>extract + pb</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50mg/kg b.w.t of</td>
<td>34.50±1.75</td>
<td>39.65±1.75a</td>
<td>3.01±0.86a</td>
</tr>
<tr>
<td>extract without pb</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Values are means of 5 replicates± SEM. Means in the same column with different superscripts are significantly different (P<0.05).

Key: TP=total protein, ALB= albumin, Pb = Plasmodium berghei
REFERENCES


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Conflict and conflict management in Social work in the kingdom of Saudi Arabia

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Abstract: Conflict is inevitable between top management and workers in working environment. Conflict in school social work in the KSA has remain one of the challenging phenomena to policy makers. The conflict normally occurred between social workers and other professionals like the teachers and top administrative staffs due to unclear role by the ministry on the social work as a profession. The Social work in schools has been considered as one of the professions that has emerged as a response to a range of pressing concerns such as rising behavioral problems and existence of other cultures. Though, most of literature regarding conflict and conflict management in social work are Eurocentric or American based, signifying that there was a limited study done on this issue in the KSA. This research intends to examine conflict and conflict management strategy in social work in the KSA and contributes to the limited available literatures. The study is fulfilled through the utilization of content analysis. Form the literatures the study understands that social worker in KSA faces a series of conflict in discharging their duties which includes conflict in role, conflict resulting from the negative perception, interpersonal conflict among the social workers and stress, and role ambiguity. In order to manage the conflict effectively, the study recommends that the policy makers should design a clear role, duty and responsibility for the social workers in the designated place of work and the school managements should also avoid mixing social work with teachings thereby recognizing and respecting the social workers at the work place (school).

Keywords: social work, conflict, management, role, work place.

Introduction

In educational institutions conflict between professionals, both co-workers and beneficiaries are inevitable especially in social work. (Goian, et.al, 2018). Conflict can never be ignored as it is an indispensable feature of working as a team. Conflict can be described as a struggle or a dispute between people with conflicting needs, ideas, beliefs, values or objectives. Team conflict is inevitable; however, conflict outcomes aren’t clearly defined. Conflict could increase and contribute to unproductive results, or conflict can be resolved in a beneficial way and lead to quality end products. Conflict is a result of behaviours. It constitutes an integral part of human life. Conflict always occurs when there is interaction. Conflict means an expression of hostility, negative attitudes, antagonism, aggression, rivalry and incomprehension. It is also linked to situations involving a conflicting interest between two rival groups. It can be defined as a discrepancy between two or more people or groups with each person or group trying to gain acquiescence of their views over others (Thakore, 2013). Conflict management on the other hand refers to the acquisition of conflict resolution skills, self-awareness about conflict modes, communication skills and the establishment of a conflict management structure in an organizational environment (Thakore, 2013).

Therefore, conflict in social work in the KSA is inevitable as it results to series of problems between the social workers and their top administrative and this is occurred as a consequence of undefined role and clear or specification of duties and responsibilities between the social worker and the working environment by the ministry of education. This issue has created a conflict in social work leading to stress, because social work is not recognized and downgraded. Systematic reviews of stress among social workers show that they typically encounter more stressors and experience relatively high levels of stress reactions when compared with normative populations (Coyle et al., 2005). Although there is evidence that social workers may experience higher levels of stress and resulting burnout than comparable occupational groups, the quantity and quality of empirical research of this problem is still weak, mostly supported only by anecdotal evidence, and without enough comparison with other occupational groups (Lloyd et al., 2002).

Though, the education system in the Kingdom of Saudi Arabia (KSA), a country in Western Asia constituting the bulk of the Arabian Peninsula, was founded in 1925 by the establishment of the Directorate of Education. A year later, with an official order of law, the Directorate led the establishment of a central national government project. In 1927, the establishment was made to form the Knowledge Council. The principal aim of the establishment was to institute an educational system to supervise...
education in the Hejaz region in the west of present-day Saudi Arabia. The country later expanded the development of the Directorate of Education from initially focusing only the Hijaz area, which later expanded to include all educational affairs throughout the country encompassing 323 schools from a beginning of only four. In 1952, the Ministry of Knowledge was established during the rule of King Saud bin Abdul-Aziz Al Saud. The Ministry of Knowledge was an extension, upgrading and development of the Directorate of Knowledge. The Ministry was entrusted with the planning and supervision of general education for boys in three stages of education (elementary, middle and secondary). With the development of education in the KSA, there had been an increase in the number of students and schools throughout the country. The noble commitment of the Ministry in helping students and their families to cope up with social and behavioral problems was found to be necessary and timely (Ministry of education of Saudi Arabia, 2018).

In 1954, the Department of Social Education and Social Activity were established. Subsequent to the establishment of formal system of education in the KSA, the Ministry of Knowledge was rebranded to Ministry of Education. The Ministry developed social workers’ specialist programs in schools responsible for building and developing social performances of students, as well as preventing students from falling into problems in misbehaviors that could lead to various deviations, as well as to overcome behavioral, family and social problems. Due to these problems, social cohesion may be affected and this may hinder academic performance. The Ministry, which holds the responsibility on the practice of social work, is the Ministry of Social Affairs but delegated the authority to the Social Welfare Agencies under its Ministry. The welfare agency continuously employing social workers for a long time, despite lack of monitoring, follow-up and weak identification of tasks, responsibilities and roles. This has led to poor professional performance and expected outputs. However, the placement of school social workers in the organizational structure of the school is commendable and appeared to be in the right direction. A social worker is considered as an educational, vocational and technical support to connect school, student, family and community at large (Albrithen, 2013). The program started with two colleges and one university, known as the King Saud University. Presently, the number has increased to seven universities with social work departments, especially those universities with master and doctoral degree programs. Six out of the seven universities are for both males and females whereas the Princess Noura bint Abdulrahman University, being reserved for females only.

Social work in schools has been considered as one of the professions that has emerged as a response to a range of pressing concerns such as rising behavioral problems and existence of other cultures brought in by foreign students especially in major cities. The social worker, while performing his professional obligations, gives assistance to students to benefit from the educational processes and helps school to achieve its roles and functions. Social work as a profession encounter a lot of conflict with the top management while discharging their responsibilities and this has become an unending challenge to government and policy makers in KSA. This conflict is psychosocial problem that constitutes three factors: affective conflicts (emotions), intellectual (on ways to analyze situations differently) and mix conflicts (both causes) (Negruti, 2012). However, there are numerous types of conflict, but in each of them the true cause must be identified, to succeed in resolving and restoring the effectiveness of communication (Pâniloara, 2003). This is to view that a cause of conflict in social work with other professions at the work place in the KSA is highly associated with lack of communication, unclear responsibility and role of social work by the Ministry of Education.

**Problem statement**

In the KSA social workers at school perform a lot of routine work, such as filling in the required records, writing reports which may require a lot of time to complete. Professionals may face conflicts between their roles as professionals and their duties as employees. Social workers, as professionals, always feel that they are not allowed to work due to many problems surrounding them such as administrative restrictions, inadequate level of training, inadequate professional form, and unclear roles. Working in such difficult situations, it is possible that the situation is not stable and the environment is not appropriate and encouraging for creativity. Social workers are most likely to separate their feelings and personal ideas from following the rules provided, professionally and practically (Sloan, etc al, 2017). Al-Goaib (1988) point it out the challenges often faced by social workers when exercising their roles within the school is in relation with customs, traditions, family cohesion and privacy. There is no governing body or department in the Ministry of Education that serves as a substitute for social workers who defended their rights and looked at the challenges they faced in the field. This has resulted to many conflicts between the social workers and the top management in various school in the KSA. School social workers in most schools in the KSA do not operate under specific standards due to this conflicts. In fact, they operate as conventional social workers without paying attention to specific needs of school children. Specific standards for the KSA are totally absent (El Sendiony et al, 1987; Carrillo, 2019)

In most institutions and especially in secondary schools, this has relegated the activities of social workers. The roles they perform in schools are unclearly defined and this has rendered their activities less important in the eyes of the schools and the community. The lack of a defined role for them to follow and what they actually do have created a vacuum and this has affected their obligations (Al saif 1991; Balobaid, Qari, & Al-Zaidan, 2016). Therefore, this study explore the social workers conflict and the strategies they adopt in managing those conflict while playing their roles in schools. On this justification, the researcher finds it necessary to conduct a study that explores conflict management between social work and counseling practices among social work in schools. In this regards, this study explore conflict management between social work and counseling practices among social workers in schools in the KSA using the available literatures.
Conflict theory

Social work in the 1960s was somewhat affected by dynamic thinking and simulation. Criticism was directed at the practice of social work that because it focuses on the individual and internal factors and hides the impact of the relationship between social issues and society. To achieve this criticism to confront social problems on a large scale and start defending rights. In the beginning of the 1970s began to use the perspective of conflict in social work and had an impact on the social work practice. The influence of sociologists on social work practice is less than the influence of psychology. But he gave the theory of conflict deriving Karl Marx (Marxism) is another dimension of social work practice and prejudice to social issues. It served as a support for social work practice and claiming and defending his rights. Parsons (1991) noted that one of the most important historical roles played by the social worker since 1970s is the role of the mediator in solving family disputes, disputes and disputes over child custody, a role derived from conflict theory.

Criticism of society became an important axis of social work, and demands for changes in many institutions began to benefit individuals and the profession in general. The conflict model also had an impact on the methods of doing work in social work. As the social and political fluctuations affected the necessity of moving towards this model. Where societies are characterized by differences, conflicts, and sometimes coercion to change. Conflicts that occur between groups or social classes within society based on considerations of strength and weakness will result in the victory of some, the acquisition of some privileges, and the loss of others (Gould,1987). The theory of conflict provided a careful analysis of the society’s situation, the difference between its classes and classes, and the identification of oppressed groups through their position within society. The theory gave an understanding of the different dimensions and how a distinction can be made between the conflicting groups based on different interests. The evolution of the use of conflict theory in social work to try to help persecuted people and those in a position of helplessness and vulnerability to be active in society. They can claim and obtain their rights. Contribute to changing and supporting, as well as changing the society to which they belong. Parsons (1991) noted that the effect of force and repression cannot be overlooked by the regime that has the most influence on the regime that has the least influence.

Findings

Conflicts

Based on the available literatures, the study understands that conflict in social work in the KSA can be categories into the following themes;

Role conflict

The concept role conflict relates to a collision between two or more roles or conflicting characteristics of an individual in the same role. Such misunderstandings may involve specific desires, needs, beliefs and attitudes. There can be two different types of role conflict: intrarole conflict, associated with incompatible specifications in the same role. And interrole conflict, referring to conflicting interests within the same person from separate roles (Allard, Wortley & Stewart, 2003). Ideally, Society is structured such that people and organizations have roles in all social structures, as well as social workers. A role is said to be a set of behaviors, expectations, and relationships based on the position that a person occupies. It is important for a person to learn to work as a member of a multidisciplinary team and to know the limits and requirements of the role. A professional requires not only to obtain qualifications and skills, but also to recognize his colleagues from other professions. Role theory emphasizes how people learn the roles attributed to them and understand the role attribute as well as the behaviors associated with it (Schofield, et al., 2013). Due to external forces and the different roles people held with different expectation, interest leads to conflicts with other professionals in the same working environment. In the KSA conflicting role emerge as a result of unclear specification of duty between the social workers and the teachers. It is shown that most of the teachers in KSA schools are given and play a role of social workers and at the same time a teacher. Because, they have the believe that as teachers they know the problems of their student far better than the professionals of social work. As such the social worker was left with nothing to do in the place of work. In most cases, the social workers tend not to report to their working place regularly as expected, because they have the feelings that their job is taken away from them. Even though, most of teachers lack the practice, skills and experience to carry out the social work properly. This has relegated the work of the social work in most schools thereby creating conflict between the two professions

Role ambiguity

The school social workers’ role has been a subject for discussion for a long time (Costin, 1969; Kelly, Berzin, et al., 2010; Meares, 1977). According to Alshuler and Webb (2009), the role ambiguity of school social work adds to the underutilization and misinterpretation of services that are provided by school social work, since their clinical effort will likely be perceived having a strong link to the schools’ overall mission, besides, their visibility in the services that they deliver is going to be reduced. Richard & Sosa (2014) role ambiguity might be experienced by school social workers as a result of their role having a lack of clarity, continually evolving, and being context-dependent, which could affect theirs have job satisfaction as well as performance. When expectations are ambiguous, role ambiguity will ensue among employees in a certain position making ambiguity that arises with ill-defined tasks and anticipated results (Kahn et al., 1964). This is resembling the role of the school social worker since there has not been a precise school social worker’s role fixed or prescribed as the standards have been laid down via national organizations or states (Richard & Sosa 2014). Besides, school social workers could certainly experience role ambiguity as the
job descriptions are not always stating the role of a school social worker or adjust in accordance with the changes that take place in the educational policies that leave its effect on the role of a school social worker in a direct way (Richard & Sosa 2014).

When employees’ role is not clear, they likely to undergo a reduction in their job satisfaction, stress, burnout, as well as increased tendencies towards withdrawal or turnover (Bebetsos, Theodorakis, & Tsigilis, 2007; Miles, 1975), which result in hostile effects on self-efficacy for these employees (Eys & Carron, 2001; Weiner, 2005) as well as a higher likelihood of leaving their job (Bedein & Armente- kis, 1981). Additionally, according to Agresta (2004, 2006) role clarity is needed to both differentiate and comprehend the overlap in roles among the school social workers, psychologists, as well as counselors. Role ambiguity is another conflict distorting the profession of school social work in KSA. As a result of the unclear responsibility in the profession, many social workers have turnover, withdraw and many have switch to other professions. This has reduced the number of required skills personal in the profession of social work.

Conflict resulting from the negative perception of social workers by other staff
In addition to voicing concerns about the general lack of understanding about the roles of social workers, Nguyen et al.’s (2019) pointed out to the other staffs’ concern about the potential “turf wars” between existing staff and social workers in the public sector settings. According to their study, more than a third of survey informants selected this concern as one of their top two reasons against creating additional positions for social workers in the public sector services. The reality demonstrates that many school social workers in KSA have the feeling that other professions have no respect or recognition to their jobs as people who help in administration and teaching, apart from their main duty. In fact, most of the administrative officers and some of the teachers sees the social work as not part of the school requirement or job needed. Moreover, most of the family of the students don’t recognize the social work as people who help their children to grow socially and academically. Whenever, the parents have problem with their child performance or any social issue they tend to discuss it with the teachers than the social workers

Nguyen et al. described that they are worried that integrating social work as an independent profession might cause disharmony among existing staff and disruptions in the models of how they deal with things. The findings of their study revealed that other staff thought that social workers might take over their own tasks or those of other professionals. According to Dash & Mohan (2015), social work in schools is facing problems in involving teachers in the class and activities to make their programs sustainable. Their study found that many teachers consider social workers as their replacement and they engage themselves in other works when facilitators are there in the class. Social workers sometimes sense a lack of initiative from teachers’ side, as the schools have the authority to say no to them anytime, they compromise now and then to sustain in the school (Dash & Mohan, 2015). Dash & Mohan reported social workers saying that school teachers expect help from them in administrative work, and many times it’s a challenge for them to make headteachers believe in their values, methods, and activities.

Interpersonal conflict among the social workers and stress
Social workers throughout their work experience many interpersonal conflicts, both from communicating with other agencies, management, and services and from making communication with their clients in complex circumstances. According to Pines and Kafry (1978), indications are suggesting that social workers’ stress is more contingent upon their interpersonal relations with clients and colleagues than it is on their intrinsic working conditions. Besides, a significant stressor for social workers found to be their relationships with other people (Bennett et al., 1993). Consequently, it might be helpful to look at interpersonal conflicts in the job stress context. According to Barki and Hartwick (2004) interpersonal conflict is defined as “a dynamic process that occurs between interdependent parties as they experience negative emotional reactions to perceived disagreements and interference with the attainment of their goals” (p. 234).

According to Vrgović’s (2018) study, social workers not only reported higher stressor exposure but also displayed more skill when managing interpersonal conflicts than displayed by employees from other public institutions engaged in similar workshops. Vrgović (2018) maintained that formal education background that social workers often have open doors for them to manage interpersonal conflicts. Also, they frequently participate more in the activities of informal education, such as direct transfer of knowledge from their colleagues, and soft-skill training and workshops. Finally, based on their job choice and education, helping other people for most of them is probably interests them intrinsically, making them more inspired to constructively find resolutions for interpersonal conflicts (Vrgović, 2018).

The roles that social workers play in schools differ from place to place. Social workers devote their energy and time to working with students individually or collectively. They also often meet the psychological and social needs of students (Webber, 2018). School social workers, who are overburdened with the primary responsibility for counseling and guidance, carry out their tasks of “stand at the interface not only with students and schools,” but also parents, families’ community and schools. Albrithen and Yalli (2012) indicated that social workers in Saudi Arabia suffer from job stress as a result of the increase in the number of working hours and the small number of practitioners. In schools, for example, there is one social worker with a large number of students. This is one of the major problems facing social workers in all fields of practice in Saudi Arabia.

Conflict management strategies

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Conflict management strategies has and quite deservedly been the topic much debate in terms of its implications for team building and group dynamics as well as for related organizational issues (Richardson, 1995). Nordly, (2018) posited that conflict resolution skills of managers have also been described in the literature on conflict management as their managing styles, communication abilities and ability to communicate correct values and attitudes. It has been widely reported that managers need conflict resolution skills to ensure sound organizational results. As such, Managers need to consider how constructive conflicts are good for their organization and the detrimental effects of disruptive conflicts. Therefore, Conflict can only be triggered or resolved through contact. Managers must also consider the types of contact experiences that can trigger conflict, and the communication patterns that are most effective after conflict has formed. A successful communicator may actually carry tension to the surface and turn it into a constructive process (Williams, 2019). The following are identified as the major strategies adopted and suggested to social workers in the KSA in discharging their responsibilities, these strategies are found on the current available literatures as discuss below.

Avoidance
The desire to withdraw from or suppress a conflict (Kodikal et al, 2014). Avoidance is generally the denial of conflict. The avoider usually side steps an issue by either changing the topic or withdrawing from the controversy. This strategic response is sometimes more effective (Asadmir, 2012). For instance, a social worker may decide to avoid or ignore any situations leading them into conflict with other professionals in the same working environment. In order to protect the relationship with others, the social worker may decide to denied himself what he wants for the benefit of others. This signifies a high level of sacrifice and cooperativeness (Al-Ajlan, 2000). Most of the literatures in this aspect in KSA, have shown that most of the social workers tends to be avoiders not because they don’t want their interest to be protective but because they want to maintain the co relationship with other professions and avoid any issues that can result to conflicts between them. While, others tend to be less avoiders, this type of social workers restrict themselves from any work that was not assign to them. If any attempt to take their job or responsibility they responded negatively. Avoidance is a strategy used by many social workers in KSA schools to avoid conflict with others, especially the staff at top management in the school or at the ministry (Al-Ajlan, 2000). Alotaibi (2007) study, which is a study on the reality of conflict between workers in Saudi schools, revealed that the avoidance strategy is one of the most used strategies. Providing recent studies related to the most prominent strategies used in conflict management and training employees in Saudi schools is necessary and important (Alzahrani, 2009). The study recommends to the ministry and school administration to be sending professionals to training especially on conflict management to reduce or manage the conflict that exist between the various staff.

Competition
This is another form of strategy used by many social workers as posited by scholars. This is a kind of I win you lose game (Burrell, 2001). It associated with winning a conflict with competition between two conflicting people on same position. Competing is regarded as assertive and un co-operating leading to a desire to satisfy your interest regardless of the impact on the other party to the conflict (Kreitner, 2009). Alsufyani (2009) believes that the competition method is used by some school social workers in a study on the relationship between the organizational climate and the methods of conflict management used in schools. The study found that there is a negative relationship between the use of the competition strategy and the dimensions of organizational communication. In order for the organization to achieve its goals, it must rearrange the priorities and adopt effective conflict management strategies, to take advantage of the conflict as much as possible by aligning the goals and values of the organization along with the individual goals and values of the workers (Rabi, 2014). Competition is one of the strategies used by social workers to avoid conflict with other professions in the schools. Some of the competition were introduce by the administration while others are introduced by the various professions. This has helped the social work in conflict management.

Collaboration
Collaboration is a technique of I win you win. It is associated with teamwork and cooperation aim at helping each other in achieving targeted goals while maintaining the strong relationship (Kozlowski & Ilgen, 2006). The success of any organization in achieving its goals requires creating a comfortable working atmosphere based on cooperation in order to support stability, which reflects positively on the satisfaction of all employees. Modern management thinking is based on the recognition that conflict exists and that it is an inevitable thing that cannot be ignored. Although ignoring the conflict can cause inactivity. The problem is not with the conflict in itself, but rather with how to best handle and manage it. Taking advantage of the conflict properly can solved that the avoidance strategy is one of the most used strategies in Saudi schools. Ajlan (2000) also pointed out that the use of cooperation strategy reduces the sense of the severity of the conflict among workers to a large extent, because it allows the presentation of opposing views and try to find possible solutions that satisfy everyone.

Compromise
This is another method of I bend you bend, signifying that winning a goal while losing a little is ok. That is both professionals are placed against the middle in an attempt to serve the common interest while ensuring each party maintain something of their original position. This explain the desire of each party to a conflict is willing to give up something (Whetten & Cameron, 2014).
Conflict management techniques are different and vary from person to person, but there are still some of the methods that require skill in their application. Especially among some cultures, such as the Arab culture. There is always a kind of intrinsibility in giving up something, which the person believes he is entitled to even if it causes trouble with other parties. People with high self-confidence tend to try to bridge points of view with others in order to reach a compromise that satisfies all parties, but ultimately depends on the other’s ability to relinquish any of its convictions. One of the methods that subordinates always desire is to find a compromise and put forward all conflicting ideas for discussion and dialogue. Whereas, Abdulwahid (2008) recommends the necessity of training the subordinates in cases where it is possible to resort to the use of a compromise strategy according to the data, the circumstances and the development of solutions taking into account the authentic Arab customs and culture. Social workers in Saudi schools often tend to find possible solutions that help them overcome any conflict, even if it costs them to do work that is not one of their main tasks. Al-Namlah (2007) study revealed that the compromise strategy comes second after the cooperation strategy as the most used strategy in Saudi schools by managers and employees.

Al-Asri (2007) indicated that the presence of conflict may cause disintegration between individuals within the organization and arise from blocs that may lead to the disintegration of collective action and the concentration of the service of the blocs to which they belong. Alnamlah (2007) argues that conflict can have positive effects in honing individuals’ energy and energy towards excellence and creativity. Conflict has many useful aspects as it shows problems in order to be dealt with and confronted. Sometimes it leads to a situation of cooperation between the members of the group within the work environment. Conflict management techniques are usually based on “the concept of a desire for effective and productive arrogance,” which may inspire enthusiasm in individuals and groups for creativity and innovation (Eid, 1997).

Conclusion and recommendations

From the foregoing discussion therefore, it can be understood that conflict in social work as a profession in KSA is quite a challenging phenomenon to the policy makers and supervisors. Conflict normally arose between social work and other professions as a result of unclear specification or direction of responsibility. Most of the conflict faced by social work in KSA like any other profession includes role conflict between social workers and other teachers in the school, role ambiguity, conflict resulting from the negative perception of social workers by other staff, interpersonal conflict among the social workers and stress. These conflicts are inevitable. In order for the social workers to manage the conflict studies suggested the application of strategies such as avoidance, compromise, competition and collaboration. It is found that these strategies are diligently utilized by the social workers to manage the current conflict confronting them. Despite applying the strategies yet, the conflict remains unresolved especially in discharging their duties. To manage the conflict effectively this current research recommends that policy makers should design a clear role, duty and responsibility for the social workers in the designated place of work. Establishment of rules and regulation that distinguishes the role of social work and teachers is also needed. There is need for constant training among the school staff. The school managements should also avoid mixing social work with teachings or given teachers to act as social workers, this has to be avoided. Recognizing and respecting the social work at the work place (school) by all professions is very crucial. Regular orientation needs to be done to students’ family on the function, role, responsibility and importance of the social work. The study further recommends for an in-depth research to understand the main conflict and conflict management directly from the social workers both in qualitative, quantitative and mix method. There no adequate data to explain this problem in the KSA based on the empirical data. Exploring their experience on this matter is quite important.

Finally, the research is concluded with acknowledging and appreciating both Universiti Kebangsaan Malaysia (The National University of Malaysia) and Al Imam Mohammad Ibn Saud Islamic University for sponsoring as well providing the conducive atmosphere in the entire research process.

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Protection of Rights of the Third Gender Persons in India

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Abstract- Transgender persons are individuals of any age, religion, faith and sex whose appearance, personal characteristics, or behaviors differ from normal about how men and women are ‘supposed’ to be. Transgender people have existed in every culture, race, country and class since the time immemorial. The term “transgender” arose in common parlance in the mid 1990s from the traditional society of gender-different people. In contemporary practice, transgender has become a “common and umbrella” terms which is used to describe a wide arena of identities and experiences, including but not limited to transsexual people, male and female cross-sectionals.’

In our country there are a host of socio-cultural and traditional groups of transgender people like hijras/kinnars and other transgender identities like shiv-shaktis, jogtas, jogappas, Aradhis, Sakhi, etc. However, these socio-cultural and traditional groups are not the only transgender people, but there may be those who do not belong to any of the groups but are transgender persons individually.

The Preamble to the Constitution of India mandates Justice, Social, Economic and Political Equality of Status. However, many of the Indian State’s policy of recognizing only two sexes and refusing to recognize hijras as women, or as stroke of several rights that include the right to vote, the right to own property, the right to marry, the right to claim a formal identity through a passport and a ration card, a driving license, the right to education, employment, health so on and so forth. Such deprivation secludes hijras from the very fabric of Indian civil society.

The Supreme Court while recognizing the third gender category, the Court ruled that fundamental rights are available to the third gender in the same manner as they are males and females. Further, non-recognition of third gender in both criminal and civil statutes such as those relating to marriage, adoption, divorce, etc is discriminatory to the third gender.

The present paper is an effort to know the historical account of transgender people. How are they discriminated persistently and how they managed themselves protecting their rights from different developments. Does there are any eminent threats in their survival? How far the Indian laws have become instrumental to their rights in India one must start with the determination between the much sidelined or may be purposely under-played distinction between the concepts of “gender & sex”. The term “gender” refers to what is recognized by the society and, which may or may not correspond with the sex assigned with at birth. Sex, on the other hand, refers to what you are born with. Both of these are immanent to one’s personality and are aspects of self-determination, dignity and freedom.

Third genders are the types of gender, in which people are of any age or sex whose appearance, personal characteristics, or behaviors’ differ from formulaic about how men and women are ‘supposed’ to be. The term “third gender” is generally used to describe those who transgress social gender norms. National Legal Services Authority V Union of India’ is a landmark decision by the Supreme Court of India, which declared transgender people to be a ‘third gender’. Transgender is often used as an umbrella term to third gender to signify individuals who defy rigid, binary gender constructions, and who express or present a breaking and/or blurring of culturally prevalent stereotypical gender roles. Transgender people may live full-or part-time in the gender role ‘opposite’ to their biological sex. In contemporary usage, ‘transgender’ has become an umbrella term that is used to describe a wide range of identities and experiences, including but not limited to- pre-operative, post operative and non-operative transsexual people (who strongly identify with the gender opposite

Index Terms- Equality, Freedoms, Bill of Rights, Constitutional law of India, Gender Persons, Third gender, Transgender, Right to Personal Liberty, Dignity, Exploitation.

I. METHODOLOGY

The present study is based on doctrinal method of research. A comprehensive review of existing literature, journals, articles, reports, mixed with magazines, newspapers articles are primarily relied in order to get clear updated picture of the current position of the transgender persons in India in Constitutional law regime and its conflicts with statutory laws in rapid pace of modern legal development. Case laws of various Courts are basically referred.

II. INTRODUCTION

While discussing regarding the third gender persons and their rights in India one must start with the determination between the much sidelined or may be purposely under-played distinction between the concepts of “gender & sex”. The term “gender” refers to what is recognized by the society and, which may or may not correspond with the sex assigned with at birth. Sex, on the other hand, refers to what you are born with. Both of these are immanent to one’s personality and are aspects of self-determination, dignity and freedom.

Third genders are the types of gender, in which people are of any age or sex whose appearance, personal characteristics, or behaviors’ differ from formulaic about how men and women are ‘supposed’ to be. The term “third gender” is generally used to describe those who transgress social gender norms. National Legal Services Authority V Union of India’ is a landmark decision by the Supreme Court of India, which declared transgender people to be a ‘third gender’. Transgender is often used as an umbrella term to third gender to signify individuals who defy rigid, binary gender constructions, and who express or present a breaking and/or blurring of culturally prevalent stereotypical gender roles. Transgender people may live full-or part-time in the gender role ‘opposite’ to their biological sex. In contemporary usage, ‘transgender’ has become an umbrella term that is used to describe a wide range of identities and experiences, including but not limited to- pre-operative, post operative and non-operative transsexual people (who strongly identify with the gender opposite
to their biological sex) male and female ‘cross-disorders’ (sometimes referred to as “transvestites”, “drag-queens”, or “drag kings”) and men and women, regardless of sexual orientation, whose appearance or characteristics are perceived to be gender atypical. A male-to-female transgender person is referred to as “transgender woman” and a female-to-male person as “transgender man”. The terms “transgender” or “transgender people”, used in this brief, while more encompassing than transgender women, are used to refer to Trans- Women given this brief’s focus. Sometimes, for brevity, the abbreviation “TG” is used to denote transgender women. Transgender people have existed in every culture, race, and class since the story of human life has been recorded. That includes people who do not self-identify as transgender, but who are seen as such by others and thus are subject to the same social oppressions and physical violence as those who actually identify with any of these categories.²

III. DISCRIMINATION IN GENERAL:

Gender based discrimination and torture are violations of human rights. In common parlance, women are the subject matter of gender based violence. However, the studies show that the transgender community stands in the list overtaking women. Quoting Ban Ki Moon³ the Secretary General of the United Nations, “We see a pattern of violence and discrimination directed at people just because they are gay, lesbian, bisexual or transgender. There is widespread bias at jobs, schools and hospitals and appalling violent attacks, including sexual assault. People have been imprisoned, tortured, even killed. These are a monumental tragedy for those affected and stain on our collective conscience. It is also violation of International Law”. The statement reveals widespread abuse and gross human rights violations against sexual minority including transgender at global level. When it comes to India, a country having deep rooted cultural and religious beliefs and notorious societal taboos directed against unnatural sexuality, their existence is more pathetic. It is a shocking reality that the transgender in India are not being considered even as human beings. They are being discriminated, excluded and alienated from all fields of social life. There is no proper legislative attention to recognize their existence as human beings and bring them up to the main stream. The plight of transgender is universal in nature. Even in the countries where exist strong legislative framework to recognize their grievances are not adequately addressed. In a vast country like India, where religion and morality play a vital role in shaping the criminal law, their condition is more problematic.

IV. INDIAN SCENARIO:

When speaking about the transgender with regard to India, we see there is a unique position they did not have any identity. Here is a society that has not totally accepted the third gender or transgender in society. Some people here have thought of transgender as normal and it has gone up to the extent where some people consider them as sacred. The Indian position becomes unique as compared to the rest of the world whereby although society has partially accepted the third gender, but there was no legislation which recognized them unlike in most other cultures. So they are treated as men, so as a result they suffer lots of difficulty in document, employment etc. Due to the Hijra social movements which have campaigned for recognition as a third sex with the increasing demand, in 2005, Indian passport application forms were updated with three gender options: M, F, and E (for male, female, and eunuch, respectively). Furthermore, in November, 2009, with the intention of ensuring further recognition for the third gender India agreed to list eunuchs and transgender people as “others” distinct from males and females, in voting rolls and voter identity cards. These steps are some of the ways in which the Indian Government has tried to integrate the Third Gender in Indian Society but this has not been a complete success as there is still a section of society who fails to understand the third transgender which leads to discrimination. But in 2016 after the Naz Foundation case⁴ the transgender was recognized as third gender in India. Now there are three genders in India they are man, woman and third gender. But the situation of these people did not change but we can hope in future they are treated as normal as other person in society. Some initiative were taken by Indian States Government so they could uplift them and now a days in Government documents the option are given for these people also was named as ‘other gender’. Slowly they are getting their identity in India⁵.

V. HISTORICAL ACCOUNTS:

Transgender persons had been part of Indian society for centuries. There was historical evidence of recognition of “third sex” or persons not confirm to male or female gender in near the beginning writings of ancient India. The concept of “tritiyaapakrit” or “napuunsaka” had been an integral part of the Hindu mythology, folklore, epic and early Vedie and Puranic literatures. The term “napuunsaka” had been used to denote the absence of procreative ability, presented by signifying difference from masculine and female markers. Thus, some of the early texts extensively dealt with issues of sexuality and the idea of third gender which was an established thought therein. In fact, the Jain text even mentions the concept of “psychological sex”, which emphasized the psychological makeup of an individual distinct from their sexual characteristics. Lord Rama, in the epic Ramayana, was leaving in the forest upon being banished from the kingdom for 14 years, turns around to his followers and asks all the ‘men and women’ to return to the city. Among the followers, the hijnas alone did feel bound by this direction and decide to stay with him. Impressed with their loyalty, Rama sanctioned them the power to confer blessings on people on auspicious occasions like child birth and marriage, and also at inaugural functions which, it was supposed to set the stage for the custom of badhai in which hijnas sing, dance and confer blessings. Aravan, the son of Arjuna and Nagakanya in Mahabharata, offer to be sacrificed to Goddess Kali to ensure the victory of the Pandavas in the Kurukshetra war,
the only condition that he made was to spend the last night of his life in marriage. Since no woman was willing to marry one who was doomed to be killed, Krishna assumes the form of a beautiful woman called Mohini and married him. The Hijras of Tamil Nadu considered Aravan Transgender persons had been part of Indian society for centuries.

Hijras also played a famous role in the royal courts of the Islamic world, particularly in the Ottoman empires and the Mughal rule in the Medieval India. They appointed as well known positions as political advisors, administrators, generals as well as guardsians of the harems. Hijras were consider clever, trustworthy and fiercely loyal and had free access to all spaces and sections of population, thereby playing a crucial role in the politics of empire building in the Mughal era. One such example is the Nizams of Hyderabad who employed and honoured hijras. The sixth Nizam Mahboob Ali Pasha employed hijras as confidantes and advisors, domestic supervisors and menial domestics. Even the Hyderabad State had an Inspector for hijras in the Police Department to look after their welfare and assured that they not be harassed. Hijras had claims on the public revenues through grants of cash and land and in some places they possessed an official and codified right to begin in India. However many laws were introduced against hijras which led to their miserable situation. According to the Andhra Pradesh (Telangana Area) Eunuchs Act 1329, which is a State Statutory Law, the term eunuch was used for those who admitted to be impotent or was proved impotent after undergoing a medical inspection. Though the term eunuch was used to refer hijras, impotency was necessary to be eligible to be called as a eunuch. As per this Act the Government was required to keep a register to keep record of names of hijras and their resident details. Restriction was also placed on hijras engaged in badhai or any other kind of street entertainment activity carried out secretly. There was also restriction on self emasculation and emasulation performed on others. The Act thus had a close surveillance on the lives of hijras, their traditional occupation, and also on their rituals.6

VI. POSITION DURING BRITISH REGIME:

The situations of hijras started deteriorating when British colonial rulers came with their ideologies of sex/gender binaries bodies and hetero-normative sexuality perspectives. The hijras body was problematic because of its ambiguity and its difference with the able procreative/ homosexual body. Gradually various laws against hijras were introduced due to which the hijras community were deprived of their privileges provided by the Kings and Mughals. Hijras were classified under the list of criminal caste/tribes during the colonial rules. The Criminal Tribes Act (Act 27) of 1871 stated ‘registration, surveillance and control of certain tribes and eunuchs’. This Act was applicable in all States of India. This was the Act that which was written on the bodies of the so-called criminal cases. Thus the bodies and labor of hijras were controlled. The lands given to hijras during the Kings and Mughal rule were also taken back by the colonial rulers. Like the Criminal Tribes Act. Section 377 of the Indian Penal Code (IPC) was also introduced during the colonial period since 1860. The Section banned same sex relationship and is often referred to as “Anti Sodomy Law”.7

VII. POSITION IN POST INDEPENDENCE INDIA:

After Independence, the Prime Minister in 1952 repealed the Criminal Tribes Act 1871 calling it ‘a blot on the law book of free India’. However, the same year the Government of India passed the Habitual Offenders Act, which preserved most of the provisions of the CTA except for the premise that an entire community can be born criminal. The focus now shifted from criminalizing a tribe to criminalizing an individual. Immoral Traffic Prevention Act of 1956 which was amended in 1996 has become gender neutral legislation. The domain of the Act now applies to both male and female sex workers along with those whose gender identity was indeterminate. With the amendment both the male and hijra sex workers became criminal subjects as this gives the police the legal basis for arrest and intimidation of the transgender sex workers. The transgender community lives a life of exclusion-socially, culturally, economically and politically. The India Government’s Census process which is the most authentic source of information on demography, literacy and housing amongst other data points did not include transgender for the first 64 years after Independence in its exercise. In the year 2009 consensual same sex-acts between adults in private was decriminalized by the Delhi High Court. When the community was given the option of identifying themselves as transgender in the statistical exercise for the first time in 2011 half a million persons (amongst a 1.2 billion populace) identified themselves as transgender. The top three states with highest concentration of self identified transgender in India are Uttar Pradesh, Bihar and Maharashtra. Only 46% of transgender are literate as compared to 74% literacy rate amongst the general population. Those who continue to be part of the education system often report harassment, bullying, physical and sexual abuse at the hands of older classmates and peer. In a landmark judgment in April 20148 the Supreme Court of India observed that “the transgender communities, generally known as “Hijras”, are a section of Indian citizens who are treated by the society as unnatural and generally as objects of ridicule and even for on account of superstition. In its judgment the Supreme Court passed the ruling that “in view of the constitutional guarantee, the transgender community is entitled to basic rights i.e. Right to Personal Liberty, Dignity, Freedom of Expression, Right to Education and Empowerment, Right against Violence, Discrimination and Exploitation and Right to Work”. Moreover, every person must have the right to decide his/her gender expression and identity, including transsexuals, transgender, hijras and should have right to freely express their gender identity and be considered as a third sex. Thus, today the transgender people in India are considered to be the Third Gender.9
Studies reveal that State is one of the most powerful institutions which discriminate against the transgender community in India. There are a number of legislations which apparently discriminate against their rights. Section 377 of the Indian Penal Code, 1860 which penalizes unnatural offences, plays the major role. Similarly, certain offences under the Indian Penal Code and also some statutory enactments impliedly penalize the sexual acts of transgender community in a tacit manner. Another notable example is Section 45 of the Army Act, 1950, which penalizes indecent acts which would possibly include the acts of transgender community. It is also to be noted that in India sexual minorities have no freedom to form association/union. The sexual minority is not a recognized Person for the purpose of insurance claims, compensation under Employees Compensation Act, and nomination for the purpose of gratuity benefits. The reality is that, the transgender community in India lives in a precarious environment dominated by oppression, discrimination and systemic exclusion. Paradoxically, India is a signatory to a number of international human rights treaties, which impose certain international obligations upon India to protect and respect the rights of transgender community as well. Conversely, at the international level, no sincere effort has ever been adopted to address their plight through law making treaties.

VIII. COURTS ON CONTROVERSIAL SECTION:

The validity of Section 377 of the Indian Penal Code was challenged in Naz Foundation Vs Government of National Capital Territory of Delhi10, because it penalizes consensual sexual intercourse between two adults in private. The challenge against the Section was founded on the ground that it violates Articles 14, 15, 19 and 21 of the Constitution of India. They argued that their works were impugned by the discriminatory actions of the State against the sexual minorities. The basis of their argument was that the sexual minorities have a vested interest in not being identified because they would be harassed and subject to inhuman treatments which would eventually hamper the petitioner’s efforts to prevent the aforesaid diseases. The petitioner also submitted that the scope and ambit of Section-377 should be confined only to non-consensual penal, non-vaginal carnal penetrative acts against the children. It was further observed that by introducing the Sexual Offences Act, 1967, England decriminalized the acts of homosexuality so as to ensure equality and precious human rights of sexual minority. It is pertinent to note in this juncture that there were two contradicting affidavits filed by the two different wings of Union of India. The first affidavit is on behalf of Ministry of Home Affairs, Government of India which argued for the retention of the impugned provision. But the more sensible submission appeared form the Ministry of Health & Family Welfare that existence of the impugned Section has hampered the efforts of prevention of HIV/AIDS. The Ministry of Home Affairs founded their argument on the ground that the retention of Section 377 of Indian Penal Code is very essential since it not only penalizes homosexual acts, but also acts as a shield against child sexual abuse and complimenting lacunae in the rape laws. The arguments by the Ministry of Home Affairs were left uninterrupted since the very purpose of maintaining the criminal justice system is to provide punishment to the law breakers. Union of India argued that Indian Society is impatient to homosexuality. But in reality we have learned to tolerate the acts of sexual minorities for centuries. The reflections of such tolerance can be found in religious texts, Hindu mythologies and ancient arts of stone carvings etc. It is to be noted that transgender had been given a respectable position in Indian society before the arrival of British. Section 377 of the Indian Penal Code was actually the result of British efforts to impose their Biblical values upon their colonies. It is worth mentioning here that they had always tried to regulate the activities of transgender people by enacting specific legislations. In this case, the Court observed that there is a growing jurisprudence relating to the human rights of person with sexual deviancy which would be seen in United Nations sponsored human rights treaties. The Court identified and categorized this human rights legal doctrine under three heads, viz: “non-discrimination, protection of private rights; and ensuring of special general human rights protection to all, regardless of sexual orientation or gender identity.” Accepting the arguments of petitioners in this case, the Court held that “so far as it penalizes consensual sexual acts of adults in private, is violative of Articles 21, 14 and 15 of the Constitution. The provisions of Section 377 IPC will continue to govern non-consensual penile non-vaginal sex involving minors...”

However, in Suresh Kumar Koushal & Ors Vs Naz Foundation & Ors,11, the decision in Naz Foundation Vs The Government of National Capital Territory of Delhi12 has been put in to severe legal scrutiny. The appellant in this case founded their argument on the ground that the Honorable High Court committed a serious error since the Writ Petition did not contain any fundamental facts to decide on constitutionality of a statutory provision. It was further submitted that Section 377 of the Indian Penal Code was being used for prosecuting homosexuals as a class and not for discriminating against transgender. The basis of their argument was that Section 377 of the Indian Penal Code is a gender neutral provision which is extensively used for penalizing homosexual acts regardless of gender. Another argument put forward by the appellant was that carnal sexual acts between two homosexuals increase the risk of HIV/AIDS and it is even dangerous when the female partner of a homosexual is unaware regarding the conditions of her partner. One of the major contentions levelled by the appellants is that there is no proper evidence to show that the existence of Section 377 of the Indian Penal Code hampers the efforts of preventing HIV/AIDS. The Court observed in this case that, while striking down a provision as unconstitutional, the courts must be guided by the presumption of constitutionality of the impugned provision. The Court also observed that the deletion of Section 377 of the Indian Penal Code was recommended by the Law Commission of India in its 172nd Report, which was not taken into consideration by the Indian Parliament and it shows that the legislature, undoubtedly the representatives of the people has thought it improper to delete the provision. So unless and until a clear violation of the Constitution is proved, the Court is not empowered to strike down a statutory

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provision. By observing that a mere chance of abuse is insufficient to strike down a statutory provision, the Court allowed the appeal undermining the rays of hope in the life of transgender community.

In National Legal Services Authority vs. Union of India and Ours, the petitioner was the National Legal Services Authority, constituted under the Legal Services Authority Act, 1987 to provide the legal services to the weaker and marginalized sections in the society, approached the Honorable Supreme Court with a common cause for the transgender community. The petitioner argued that every person of transgender community has a legal right to determine their sex orientation and identity. It was also submitted that non-recognition of transgender as a third gender would offend Articles 14, 16 and 21 of the Constitution of India. It was also submitted that by not recognizing them as a third gender, they are being deprived of many rights which other persons enjoy as the citizens of India. It was further submitted that, due to this discrimination, they are denied their right to contest in elections, cast vote, access to education, get license and also public employment. Another submission made on behalf of the petitioner was that the transgender have to be declared as socially, educationally and economically backward class and all benefits of that class are to be extended to them. The Court was reluctant to deal with the constitutionality of Section 377 of the Indian Penal Code in this case since it was decided by Division Bench of the Honorable Supreme Court in Suresh Koushal’s case and the rights of transgender is altogether a separate issue.

IX. Present Position:

After these many judgments of the Supreme Court for paving the way for enshrining the rights of transgender in law, the first effort at framing legislation for the same was made in December 2014 by Tiruchi Siva, a Dravida Munnetra Kazhagam (DMK) Rajya Sabha MP. The Rights of Transgender Persons Bill, 2014 was introduced as a Private Member Bill in the Rajya Sabha by Mr. Siva. It was unanimously passed in the Upper House but was never debated in the Lok Sabha.

The Bill passed in the Rajya Sabha had many progressive clauses including the creation of institutions like the National and State Commission for transgender, as well as transgender rights courts. The remedial measures to prevent sexual discrimination were done away with when the Government drafted a new The Rights of Transgender Persons Bill 2015, which was vehemently criticized by the NGOs workings for the community.

However, the Supreme Court rulings on August 24, 2017, that the Right to Privacy was a fundamental right, and was thereby applicable to the protection of sexual orientation of citizens gave a reprieve to the LGBTQ community. Once again a new and re-modeled Bill i.e. The Transgender Persons (Protection of Rights) Bill, 2017 was drafted and placed and is subsequently sent to the standing committee on social justice and empowerment for consultation & slated to be re-introduced in next session of the Parliament.

In January 2018, the Supreme Court agreed to hear petition to revisit the 2013 Naz Foundation judgment. On 06th September, 2018, the Court ruled unanimously in Nevtej Singh Johar V Union of India that Section 377 was unconstitutional in so far as it criminalizes consensual sexual conduct between adults of the same sex. The judgment was given by a five judge’s bench comprising the then Chief Justice of India Dipak Mishra, Justices R. F. Nariman, D. Y. Chandrachud, A.M. Khanwilkar and Indu Malhotra. The Section 377 was partially struck down by the Constitution Bench and will no longer apply to consensual same sex acts between homosexuals, heterosexuals and lesbians but will continue to apply to bestiality and sexual acts without consent by one of them.

After the above judicial developments the Lok Sabha tabled and passed a new version of the bill in December, 2018. In the light of lapse of the Transgender Persons (Protection of Rights) Bill 2018 which was preceded by a 2016 version, were both met protests and criticisms by Trans- groups, lawyers and activists in India. The Minister of Social Justice and Empowerment, Thawar Chand Gehlot now proposed an Act of the Parliament of India on 19th July 2019 The Transgender Persons (Protection of Rights) Bill 2019 with the objective to provide for protection of rights of transgender persons, their welfare and other related matters. The Bill did away with few of the severely criticized provisions of the 2018 Bill, such as criminalization of begging and the establishment of a District Screening Committee to process applications for issuance of transgender person certificates. The 2019 Bill was passed by the Lok Sabha on 05 August 2019 by a voice vote, amidst chaos in the house over the Revocation of the Special Status of Jammu and Kashmir on the same day.

X. Conclusion:

The Judgments of Courts are all for affirmative action in education, primary health care, and that transgender is identified as beneficiaries of social welfare schemes. The blueprint for transgender rights legislation draws from the court’s directives. Some of the recommendations that find a place in the final draft include the rescue, protection, and rehabilitation of transgender. Educational institutions have been directed to adopt an inclusive approach that is gender-neutral. The Government has also formulated welfare schemes especially targeted at transgender such as basic medical facilities including sex reassignment surgery. Vocational training programmes are also in the pipeline. With these much developments of rights of the transgender the legal process of integration has been halted for some time. However, transgender community in India still occupies a distinct position. Now, here is a society which is very slowly accepting the transgender community. People of society still have thoughts of transgender as normal sometimes and somewhere it has gone up
to the extent where some people consider them as scary and undesirable.

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Transwomen Domestic Workers in Jamshedpur City
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Abstract- The continuing marginalization of transgenders manifested in diverse forms including the stigma, limited work opportunities and restricted integration with the community remain a concern in Indian society. This research offers an intersectional analysis of interaction between gender, sexuality and work in a growing industrial city by examining the case of transwomen domestic workers in Jamshedpur, Jharkhand. The thesis argues that the interaction between gender and work both shapes and is shaped by community organization and development. In the case of transwomen domestic workers the thesis finds the possibilities of inclusion and social transformation in context of the urban space. The qualitative research examines the nature of this inclusion, its condition and challenges in context of a city through the interpretation that transwomen themselves attach to their work and its impact on their lives.

Index Terms- Transgender, Gender, Domestic Work, Jamshedpur, Inclusion, Gender-sexuality-work.

I. INTRODUCTION

This article joins the emerging scholarship on gender and labour focusing especially on transgender and work in urban context. The term “Transgender” became popular post 1990s and can be considered a relatively new term. It was preceded by the term “transsexual” that referred to people born as neither a woman nor a man (Boswell, 1991 as cited in Weiss, 2009). Now the term “transsexual” is used only to refer to people who have undergone sex change surgery to have a gender identity they relate themselves with. Transgender is an umbrella term that researcher often find difficult to break into subsets. Recently Weiss (2009) argued that transgender and its various subsets illustrate that the transition of a person’s gender occurs at a point of time in their life after which starts their quest for a new gender identity, instead of it being fluid and constantly shifting. He tries to portray that this transition phase is a one-time process as the second gender identity they affiliate to suits their skin and they do not find the need to rigorously change it further. Weiss points out that different terms are used describe transgender according to geographical areas.

In India, the term ‘Hijra’ is often used to denote a transgender person referring either to men who opt for hormonal treatment, or those who undergo sex-change operations, or those who are born as hermaphrodites. They divide themselves into Gharanas or houses and the strength of the hijra community lies in its close knit relationships, their sole source of support against the social ostracism they face in mainstream society (PUCL, K 2003 as cited in Narrain and Bhan, 2012).

The “third gender” has been subjected to exclusion in the society socially, politically, economically as well as culturally. The society has an innate peculiarity of classifying everything as either normal or abnormal. As we have talked before about gender identity, transgender has been excluded by the society for not being born as a boy or a girl or for that matter changing their gender gradually. Discrimination, harassment and exclusion often occur because of some pre-conceived notion of the people of how women and men are expected to appear or behave (ILO, 2012). This breeds ground for growth of stigma in the society. As illustrated by (Khan et al. 2009), the behaviour of the society increases the level of insecurity and confusion that the transgender people are already facing. But often their vulnerabilities, frustrations and insecurities are overlooked by the mainstream society. The notion of the community is key to understand transwomen's life in India, that help them belong to a hierarchical frame and survive as a "parallel society", though they are marginalized and socially excluded communities in the Indian social fabric (Turner, 1977 as cited in Jose and C.V, 2014). (Narrain and Bhan, 2012) decodes society as social structures which define and defend what is known as hetero-normative ideal; rigid notion of what it means to be a man or a woman, how the two should relate and the family unit that should result from such relationships. All those who dare to think outside this perfect ideal are considered threats to morality and society at large. There is a clenching link between exclusion and rights that highlight the gender based discrimination, harassment and loss of dignity.

While talking about exclusion, it becomes imperative to understand the discrimination faced by transgender in matters of work and employment. Workplace is a crucial site both for the reproduction of gender inequality as well as for the “coming out”
of transpeople (Connell, 2010). Till recent years it was common for people belonging to the third gender to hide their identity in order to be employed and sustain their employment. This is a direct violation of their rights. Again, the decision to be “out” must be individually analysed as the transpeople go through complex and contradictory situations ranging from psychological to political as well as personal consideration. That is why their decision to disclose/hide their gender identity should be understood in historical context of violence and repression in the environment. It is not as simple as free choice (Seidman, 2002 as cited in Connell, 2010).

Given the historical marginalization, stigma and abuse, transgenders had to resort to a parallel society and culture of their own. They are invisible in publicly visible and respectable occupations, and are forced to earn from offering ‘badhai’ i.e. blessing the new born or newly-wed which offers limited public acceptance and largely unsustainable life. With limited earning options, many are forced to take up begging such as in trains, traffic signals which ultimately builds a negative public perception about them. Other alley open to them is being involved in sex work which again raises question about their morality in the society. Prevailing poverty and illiteracy among transgenders reveal a complex scenario: while poverty makes inclusion in order to be employed and sustain their employment. If historical marginalization of transgender is/was a condition arising from organisation of the community and its continuing underdevelopment, if the incidences of transgender finding jobs that empower them as individuals is a sign of their inclusion within the community and community transformation, then it becomes crucial to investigate the sites of inclusion and nature of inclusion in order to understand whether these are one off, isolated incidences or any real possibilities for sustainable community development. This study responds to this need by studying the case of transgender domestic workers in Jamshedpur city. Having said that, it is merely a fragment of a nationwide picture, life of a transgender cannot be generalized but it can be simplified to some extent to find examples of inclusion of a section that has been stigmatized for a long time.

II. FIELDWORK, METHODOLOGY AND ETHICS

This research aimed to study the interaction between gender and work by focusing on the case of transwomen domestic workers in the city of Jamshedpur. For this purpose, the study relied on qualitative research methods to interpret the meaning transwomen attach to their work and its impact on their lives. This chapter first explains the field methods and techniques applied in this study; it then discusses the month-long fieldwork conducted in Jamshedpur, and finally concludes with a discussion of challenges including ethics that shaped the scope of this thesis.

FIELDWORK AND METHODOLOGY:

I used an exploratory research design for the study because the transgender domestic workers remain a less-known and under-studied subject, especially in India. An exploratory research design was considered best suited to allow exploration of the subject without any pre-conceived notions or expert filters.

During my field visit I found that the Harijan Basti of Jamshedpur has 560 households. The initial field research itself revealed that the community has 31 transgenders who are involved in various occupations ranging from domestic help to begging. Among the 31 transgenders, 5 transgender women work as domestic help in neighbouring localities within the city where their work entails tasks like housekeeping, cooking, child care etc. It is this group of 5 transgender domestic workers that forms
the core respondent group of my research. Along with them, an employer became my 6th respondent who has employed one of the 5 transgender as domestic help to study the perception of the employers about gender and work. The fieldwork involved conducting original in-depth interviews of these 6 respondents (5 transwomen and 1 employer) over a period of one month from 23th December 2016 to 21th January 2017.

To understand if and how domestic work indicates inclusion of these transgender people, I conducted in-depth interviews to understand their life narratives. Narrative research focuses on exploring the life of an individual needing to tell stories of individual experiences (Creswell, 2013). Interviewing each respondent to understand their life story helped me in understanding the nature, condition and challenges of this inclusion. Giving my respondents scope to narrate their life through in-depth interviews in a progressive order, starting from their childhood experiences to present employment as adults helped me in learning about their life histories which both shaped and shaped by the interaction between gender and labour in context of a city. For the interviews I used a ‘purposive sampling’ method to identify the six respondents who are domestic workers and an employer thus satisfying the purpose of my study and research questions (Bryman, 2012). The interviews touched upon topics such as their childhood experiences, their educational background, their family relationships, their experiences within the larger society, their friendships, their work place experiences, their self perception and aspirations etc. One-on-one interaction using an open-ended set of interview questions gave scope to my respondents to take time to recall and recount their life experiences (discussed in next chapter).

ETHICS: CHALLENGES AND CONSIDERATIONS

In accordance with standard research protocols, I conducted each interview after securing prior informed consent from each respondent in a language they were familiar with, and with due regard to confidentiality and anonymity for protection of my respondents from any unforeseen consequences. Assuring respondents with the procedure applied to protect their anonymity and use of information only for academic purpose visibly made them more comfortable. Having said this, I only used the real names of respondents where they explicitly allowed me to do so for considerations of fairness and their right to self-determination. I was sensitive while asking questions and tried not to offend my respondents in the course of the research in any way while maintaining an emotional distance for objectivity.

The fieldwork was challenging. Firstly, the community is mainly Oriya speaking so initially I faced difficulty in explaining my questions. But by spending a lot of time with them, gradually they started to understand what I wanted to know from them. In the later phase of data collection, medium of conversation became Hindi which made the process of data collection and transcription less cumbersome. Secondly, the respondents were initially skeptical towards my research as I am not a resident of Jamshedpur and my questionnaire focused on personal information such as their experiences with their family, community and at workplace. Unsurprisingly, they were initially reluctant to share their experiences with me. I therefore invested the first week of fieldwork in building basic rapport with the identified respondents, and explaining them the objectives of my research. I lost quite a bit of my time in the process but later compensated it when they opened up to me and the interviews gained momentum. Thirdly, getting interview appointments was very difficult because of my limited fieldwork duration and my respondents’ schedule and engagements. Moreover, most of them were also busy preparing for their religious festival, Tusu Parv. Thus I had to change my strategy and instead of just waiting for them, I tried to make judicious use of the time I had with them. I, therefore, started walking them to their work places as well as accompanying them for lunch so that our conversations can continue. Yet, due to lack of time, there remained many unexplored questions and themes. This mainly involved questions on their childhood experiences that I could not much delve upon as I had the urgency to learn more about their experiences as transgender domestic worker. Although all my respondents were dalit transgenders residing in Harizan basti in Jamshedpur I could not sufficiently explore the impact of caste and its interaction with gender and work. The rivalry and competition with women domestic workers from the same area also could not be investigated. This study, therefore, while offering an illustrative account of the transgender domestic worker’s life and struggle for inclusion, paves way for more comprehensive intersectional research in context of gender, caste and labour.

III. ANALYSIS OF FINDINGS

This chapter deals with the life narratives of the transwomen residing and working as domestic workers in the Harijan Basti of the industrial town Jamshedpur of Jharkhand, India. The narratives of transwomen, based on in-depth interviews with six respondents, seek to understand their inclusion in a community and through thematic discussion offer an illustrative account of interaction between gender, sexuality, and work in context of a growing industrial city. This chapter argues that this interaction both shapes and is shaped by community organization and development. The community is a site of contestation as well as opportunities. Paradoxically, the opportunities of community re-configuration arise as a reaction to constrictions one faces in the community and the possibilities that one sees through reacting.

1. Experiences of life

The in-depth interviews on the basis of my thematic interview guide helped me to open chapters of their life one after another. The experiences they shared about their childhood gave me different dimensions of abuse and support which helped to make the process of owning up to their identity smooth. Though they have faced challenges in the process of gaining independence, their experiences at work place helped in developing a level of interaction with the community. The projection of their feeling of independence enhanced the objectivity of the study by letting me understand the reason behind such freedom. For instance, while Natwar and Raja find courage to reclaim their voice and accept their gender identity as a reaction to childhood abuse,
Somiya derived her inspiration and acceptance of self through examples of Natwar and Rajiya who demonstrated that community inclusion is not a dream but a real possibility (elaborated below). Similarly, community largely is a site of institutions that both restrict and expand one’s sense of belongingness and inclusion – such as family and gharana.

2. Freedom

Freedom is an important indicator to determine the quality of life. It gives the person the power to make their own choices. Freedom is both a process that enables an individual to participate in community development while the freedom one has within the community may itself be a product of the kind of development occurring in the community. The freedom enjoyed by my respondents can be summarized below-

2.1 Financial independence: Being able to meet individual expense and take up the responsibility of family makes my respondents feel secured and financially strong. They feel free to fulfill their wishes and this in turn is raising the quality of their lives. Rajiya says:

“I earn money and with that I support my family. I cannot have my own kids so I raise my brother’s kids like my own. I even save my own money so that I can do social work. I buy clothes with my own money and I don’t have to ask money from anyone. Even in festivals I take my friends out to eat snacks. Not having to ask money from anyone encourages me to work harder. Every day that I go out in the sun street from street to work is worth it because I can take care of my family.”

Bittoo and Somiya feel financially strong by being employed. They say, “I like to wear good clothes. So with my income I can stitch beautiful salwars. It makes me really happy”.

Natwar, during her conversation with me mentioned an incident which further substantiates the point that I am making. She said,

“Few months back my neighbour’s daughter got married. My neighbour is poor. So I paid for the marriage with my savings. He is so grateful to me. I feel so happy that I could help someone in their time of need and situations like this makes me feel proud that I work so hard and earn money to try to create an identity of a good human being.”

With whatever they are earning, they are taking up little responsibilities of their lives and the lives of the people around them. This is fostering a sense of solidarity and relationship with the community which in turn is similarly reciprocated by the community. The study population is starting to dream and aspire by meeting present targets. This independence is also making them realize their self worth and establishing their position in the society. This growing confidence is also projected in other areas of their lives, even in their ability to choose their occupation.

2.2 Freedom of choice of occupation: What is fascinating here is the fact that they have started to realize their potential and their skills and also using the same as a means to earn and empower themselves instead of using their identity alone. This has created a sense of self worth within the community and is helping them to assert their individuality as a respectable member of community and not get trapped within the marginalities created by compulsions traditionally carved out by community for third gender. This self assertion helps them to be themselves and gives them the freedom to express their true self without fear and inhibition. In this context Natwar says-

“When I was at my guru’s place I had to do badhai and ask money in train. In train for 10-20 rupees people touch you inappropriately. Again in badhai, you remain just a kinnar who is supposed to ask for money in lieu of blessings. I did not want to follow my guru’s orders so I started working as a domestic helper. Now the houses I work in and everyone around know me as Natwar who cooks well and works well. I am not just a Kinnar now. I am so much more than that.”

But Rahul brings in new light to this context by saying

“I have a partner since 5 years and everybody knows. I go everywhere with him. Once there was a puja in my employer’s house, many guests were supposed to come that day. So uncle aunty told me to dress up beautifully and come. I said what will your guests think? Then they replied that I should never say something like this. I should never try to be someone else. I am like their daughter. I love to wear beautiful dresses so I should come wearing make-up.”

An important inference can be projected by the fact that the better educated the community is the more is the acceptance level towards the transwomen. This stresses on the angle that the transwomen here own up to their identity because the society is making them feel comfortable in their own skin, more so in their workplace which is paradoxical. This comfort level that they enjoy in the workplace makes them explore different avenues of income and gives them the freedom to do so.

2.3 Freedom to be oneself: It is very necessary for a person to have the liberty to be in the society as he/ she wishes to be. Hiding identity to be accepted in the community takes away the basic essence of life. On being asked whether they had to hide their identity of being a transwomen at work place or in the society almost all of the responses were indicative of the freedom they attain by not hiding their identity. The cheerfulness of Bittoo is indicative of the relationship and solidarity that she enjoys with the community which is a site of meeting one’s core need for affection. This is reflective in her response when she says

“I stay like a boy at home because my mother has expectations from me as a boy. But since I am not a boy, when I go to work being a kinnar, wearing jeans top and my employers have no problem with me. I am more comfortable at work space since they have no problem with my identity.”

With whatever they are earning, they are taking up little responsibilities of their lives and the lives of the people around them. This is fostering a sense of solidarity and relationship with the community which in turn is similarly reciprocated by the community. The study population is starting to dream and aspire by meeting present targets. This independence is also making them realize their self worth and establishing their position in the society. This growing confidence is also projected in other areas of their lives, even in their ability to choose their occupation.

2.4 Multiple avenues of income: These specific transwomen who are my sample has the opportunity to select a profession that suits them the best. They even have the
opportunity to venture into new jobs and if need arises, they have the liberty to go back to earning money through identity specific work like badhai etc. They admit that blessing people in Badhai and asking for money in trains has been their profession since early times when society ostracized them. But as society is evolving, newer avenues of income are opening up for them like domestic help. Complimenting it are other works like working in petrol pumps as part time, giving dance classes in free time as well as being apprentices in beauty parlours. But one noticeable regret is seen among a few of my respondents that they wish they completed their basic primary education. Being a drop out they are losing out on many opportunities of income that could have completely substituted their need of going for badhai. Somiya displays regret when she says “I sometimes wish I studied more. I wish I could learn English. Then I could work in offices. But I did not complete my study. So opportunities are less”.

Since dropping out of school and not completing education is a common regret amongst them, I tried to dwell into the reasons behind it. This took me to the aspect of their ‘coming out’ which is an assertion of their gender identity at an individual as well as societal level.

3. Early influences before ‘coming out’

3.1. Having a role model: All my respondents have come out in front of the society as a transwoman at an early stage of their lives. Some of them have given the credit to the other kinnar woman in the community that helped them through the process. Like Somiya mentions,

“When I was around 6-7 years old, I started feeling completely like a girl. I used to see other Kinnar in our slum like Natwar and Rajiya who used to go out to work, come back home and help family. I wanted to be like them. Natwar and Rajiya helped me a lot to become a woman and they helped me when I had so much confusion in my mind about my identity. Even now, whenever I need help, they and other friends of mine rush in. I could always depend on them.”

This has helped them a lot when they themselves were undergoing a state of physical and mental turbulence and confusion. Seeing people like them in complete harmony with the community made them confident in seeing them in a manner that is beyond the ‘normal’ prism of society and look at their new found identity with dignity and respect. But things were not so rosy for people like Natwar and Rajiya who are their role models. They had to face a lot of abuse and segregation.

3.2. Childhood abuse: Taunting, teasing, physical-emotional-sexual torture has been meted out to some of my respondents because of which they believe they grew to be stronger and strive for independence. The feeling of earning money to take up responsibilities grew in order to be accepted by their near and dear ones. There were instances found that they dropped out of school because they had to wear male uniforms which they were not comfortable in, they were taunted with demeaning names when they wanted to play football or cricket which have tormented them till date. This compelled me to ask the same question of childhood abuse to each of my respondents. Natwar opened up to me in a complete heart wrenching way when she says,

“I was born this way. What is my fault in that? My family and the people of the slum used to torture me, curse why I was born. There were times when I got so tired of it that I wanted to die by either hanging myself or drowning in the river. But then I realized that I should not waste my life. I should do something so that the people around and my family will accept me just the way I am. I started working in households as domestic helper and I became financially independent. I started contributing for the expenses in the family. They gradually started changing their attitude because they now realized I am capable of earning by myself. This changed how the society behaved. Now they don’t say mean things to us because we earn on the basis of our skills.”

The same sentiments find place in Rajiya’s tone when she recounts her days of struggle and how slowly but surely changes in the community with awareness and also with their empowerment. She says

“People used to say mean things to me. But instead of being afraid, I started telling people who is actually a Kinnar and how god has made us this way. We have no control over how we feel. It took time but gradually people started understanding us and accepted me as I am.”

This change of the community is reflective in Bitto’s life experience. She says,

“People never said mean things to me. Everybody here loves me. My brothers protect me from any kind of abuses. Even my neighbours talk to me very nicely. They say that my cheerful attitude is what they like about me. People are very caring and helpful towards me. However, this is my personal experience. I do not know about others.”

The challenges and constraints that the society poses can be broken with the right kind of attitude and the determination which brings the confidence these transwomen exudes making a perfect amalgamation of them, the society and their family. The realization that financial independence through a skill based profession is pivotal through which people will think before belittling them. However, the large burden of responsibilities inherited from family is actually a boon or bane needs to be analysed in this context.

3.3. Responsibilities: Due to financial constraints, most of the respondents had to take up responsibilities from a very young age. As a result, their coming out process was accelerated and they started earning on the basis of their identity by going in train and asking for money or going for badhai as it ensures a good earning. But when they wanted to create a name of their own and not earn just on the basis of identity they shifted to domestic work where their skills evolved and they could take up their responsibilities in the family. This also helped them own up
to their identity at work as all my respondents said that they never felt the need to hide their identity at work.

4. What constitutes a family?

Family is a social institution which restricts as well as gives a sense of freedom in pursuing one’s own individuality. The study population also has similar experience with their families. However, their definition of family is not restricted to their biological family alone as they belong to the transwomen family or ‘gharanas’ equally. It is interesting to analyse how they balance these aspects of their family in social fabric.

4.1. Biological Family: The family we are born in influences our growing up process and shape us. Instances were found where respondents share a very amicable relationship with their family and they believe that family played a major role in helping them lead such a comfortable life they can openly acclaim themselves as transwomen. When I asked what kind of relationship they share with their family members, Bittoo alias Maskaan smiled and replied to me that,

"Since childhood my parents used to dress me up like a girl. They lost many children before I was born. So I was always accepted by my parents just the way I am. Even now that I wear Salwar Kameez at home, they compliment me. They helped me remain a kinnar and not hide myself from being who I am just because society might say something."

Even Somiya, a pretty young transwoman has something similar to say. She says,

“My husband loves me just the way I am. He is not ashamed of me. Even if sometimes I make my mother feel uncomfortable with my identity, my husband has been there with me always. He gives me the strength to feel proud of myself. He makes me feel like a woman. He has no problem in domestic work that I do but he did not like when I used to earn money by begging in train because people there did not respect me.”

4.2. Gharana that adopts me: The Guru who adopts the transwoman in the form of transforming them to a female from a male has a huge influence in the life of the kinnar. Through this transformation process a transwoman becomes the ‘Chela’ of her Guru and the ‘Gharana’ or the house of the Guru becomes her home. Social stigma and childhood abuses resulted in some of my kinnar respondents to move out of their house and live with their Guru. This becomes evident when Rajiya says that

“I used to get so abused by my uncles because they felt ashamed of me for being a kinnar that I ran away from home and started living in the gharana. I got food, shelter, respect all together there. I even earned money by going for Badhai and also asking money in trains as per suggested by my Guru. I was happy there unlike my home who did not accept me. I did not feel alone there. There were so many kinnars just like me there. We used to talk. I felt free there after running away from home. I was fed up of being called a ‘Chhakka’ (eunuch) and other slang words in my slum.”

Just like Rajiya says, we find that under situations of extreme violence and with the hope of an understanding and loving environment, the Guru provides them shelter where they can own up to their identity and live a life free of abuse and ridicule by the society.

4.3. Friends: Friends as individuals within the community are a very important part of socialization. Each individual tends to build relationships of friendship to confide about some important matters concerning their life. This becomes necessary when an individual is in a confused state of mind. All respondents have said that since childhood they have a lot of female friends with whom they felt comfortable and shared many happy memories together. Natwar says

“I have only females and kinnars as my friend. Three female friends in my school days were the once who first educated me about kinnars. They are the ones who helped me get rid of my confusion that I used to have while growing up about my identity. Since childhood we eat together, bath together, sleep together. Even now, if we have to go out, we go out together. Kinnars and women in our community share a very close bond, like sisters. We share our clothes.”

4.4. Utopia: A perfect world without any discrimination is an ideal situation. Even the respondents have a dream of a utopian society where each section of the society can co-exist with each other. This was evident from what Rajiya said,

“When I was at home being a Kinnar, I was abused and felt humiliated. Then I went to my Guru’s place where I got love and respect. But there I was just a Kinnar. I had no identity as a person. I missed the love and attraction there as everyone there were Kinnars. So in search of a normal life, I came back to my slum. Here even though people sometimes might pass a comment, guys can appreciate when I look beautiful. Everybody likes attention. I get to roam around with my female friends when I stay in slum. I hope someday the gharanas can be inside the slum where the male, female and kinnars stay together.”

Even Rahul dreams of a perfect world where he can own up to his identity without his mother feeling shy. He says,

“My sister who has always supported me, passed away one year back. Since then my mother has become so sad that I cannot tell her I want to completely change myself to a Kinnar. I really wish if the guru gharana could be together with the other houses and anybody could come and go in each other’s houses, then my mother will no longer have the fear and will happily let me become a Kinnar. Now she worries what others will say and what if some people do not accept me.”

This brings in a very important angle into my study. What do we actually understand by family? Is it the family we are born in or the relationships we build in time? If Kinnars can dream of a utopian society then can the other members of the society echo their view? Family is an integral part that aids the coming out in the society as a transwomen. Even after going through struggles, these transwomen could own up to their identities because of the
support of families according to their understanding. It is because of these interactions in the community that they have the confidence to take up professions and be financially independent.

5. Domestic work as an inclusive space

5.1. Perception of employer: I have interviewed one family who has recruited a transwoman as a domestic helper to analyse the reasons behind such a decision and the consequences for the same. Sharing the same space needs both the employee and employer to be comfortable with each other and while interviewing I found out that the employment was not out of compulsion on part of the employer but because of the skill of the transwoman that landed her this opportunity. Just like the employer said

“She is extremely efficient. Many households or prior employers have recommended her to me when I newly shifted here. I do not have any prejudice against anyone, especially on the basis of identity. I am very much comfortable with her being my domestic helper because she looks after my house with such care. Her honesty was the main reason that immediately attracted me towards her. I am completely okay sharing the same household space with her. She is efficient, she takes care of the house like her own and that makes me happy. I have developed such a close bond with her that I can depend on her.”

But I also found out that there were certain inhibition within the employer towards a transwoman which were visible when she (employer) said that

“I would not be comfortable of giving her the responsibility to look after my daughter. Play with her, that is fine but changing my daughter, giving her a bath, I will not allow that. It is not because she is a transgender, but because I am extremely protective of my daughter because of the rise in cases of child sexual abuse. I will also not be comfortable to change my clothes in front of my employed transwomen. I might be able to do that in front of a woman domestic helper.”

A mother’s protective nature can be justifiable that she cares about her daughter but through this an important point is projected that the transwoman is recruited on the basis of her skills as an individual who is capable to meet the requirements of her employer.

5.2. Perception of Kinnars: The main motive of my study was to find out the reason behind the few transwomen choosing to work in informal sector as domestic helpers and to analyse their level of satisfaction from this work. Rajiya feels that even though the pay is less and she cannot adjust with the money, she can never quit the work because there are families that depend on her and it makes her happy helping them. Rajiya says,

“In some houses that we go for badhai, they treat us like animals. So just because of money I am not going to compromise with my dignity. I agree money is less in this work, but when you will see a family depending on you and when they are so loving, you cannot refuse to work for them. So no matter how busy I am, I do the domestic work because it makes me satisfied to keep those people happy. They scold me when I do something wrong, but they never demean me.”

Somiya has a different perspective as she feels that the older generation has slighter problem in sharing space with a transwomen than the new generation. While the younger generation readily made her a family member, the older generation likes to maintain an employer employee relationship where they treat their employees with respect. She says,

“I work in two houses. In one there is an aged couple and in the other there is a young couple. Both the houses treat me with so much respect. The thing I like the most about both the houses is that they do not see me as a kinnar. They see me as a person who is helping them with their work. I will not say both the houses are same. The aged couple loves me a lot but they do not behave like I am a family member. They take care of all my needs but they maintain a gap. On the other hand, the younger couple just adores me. Once I told the ‘Bhaiya’ that I like to eat jalebi so he went out and brought jalebi only for me.”

Might be with the evolution of society and the rising need to seek help with domestic work, the new society has fewer prejudices in case of employing a help. This is the reason why the new generations can so easily un-stigmatize a pattern on the basis of their needs. The interdependency between the employer and the employed where both sides value and treat each other with respect is what attracts these transwomen to work as a domestic help.

Bittoo thinks that domestic work is helping her become someone she wanted to be since she was a child- ‘a woman’. She remembers an incident when she talks to me. She says,

“One day some guests came over at the house I work in. Now I wear salwars suit when I go to work. When the guests saw me first they laughed and then in my absence told uncle questioned uncle decision to employ a hijra. Uncle loves me so much that he replied back angrily to his guests that she is our daughter and we will not hear anything bad about her. I was in tears. I feel like a woman in my work place. They love me as much as my parents love me. I keep my house clean and cook in my house. In the similar way that is my second house and I keep it clean in the similar way. There is nothing shameful about this work.”

Natwar has 16 years of work experience as a domestic helper. She has developed such an attachment with her work that even the minimal wage does not demotivate her to quit her work. Natwar says,

“Money is not everything. Getting love and respect and people trusting you with their house and money is a huge achievement. If I would have stuck to badhai I could not have gone places and I would always be in the shadow of the guru. But since I started working as a domestic helper, I told my employer I want to go to Siddhi Vinayak. So they took me to Mumbai once along with them because I wanted to visit the temple. Isn’t this a big thing?
That is why I cannot break their trust. They love me like their own and I respect it a lot.”

Thus we see that even though there are different perspectives of work, it is a unanimous opinion that the environment created by their employers make them feel inclusive as a result of which this occupation is rather a preferred choice from them than compulsion.

5.3. Changes in Public space: There has been a drastic shift in their public space since they started working as domestic helper. Their opportunities are increasing. This new found confidence and dignity helps in asserting their position in the community and cementing a trust that is much needed in the functioning of an inclusive society. The community is increasingly becoming more welcoming and comfortable with the participation of transwomen in different spheres as is reflective by my respondents’ experiences with their employers. This brings us to a point where we can confidently say that the society is moving towards a direction of inclusiveness, but yet there is a long way to go as these transwomen still faces a lot of challenges as of today. This is evident when Natwar says,

“At first we could only go for badhai or ask money in train. Now we do so many different works. We 5 work as domestic help in houses where we do not have to be someone else. We can be Kinnars in this work and they accept us just the way we are. This is also helping us to take up social services and raise our voices against any impartiality towards women and Kinnars. Now people are accepting us outside the work of badhai and such work. Our chances are increasing. The houses I work in are really giving me so much love and affection.”

6. Challenges

6.1. Financial: Facing the pathos of abuse and discrimination, the transwomen are entering domestic sphere with the hope to never look back, but the financial constraints force them to seek refuge of their identity occasionally. Like Rajiya says

“Working as domestic helper might give me love and respect but since I have responsibility to support my family I need money and thus I have to go for badhai to earn more money. Pay in domestic work is less compared to the expenses in Jamshedpur.”

Even Somiya has something similar to say

“At first I was in begging in train for money. But that did not give me any respect. Then I started working as domestic help and I got respect and also dignity. But sometimes my earning from this job is not sufficient. Then I have to go for badhai where we have to give our entire earning to our guru, which she later divides among the group members.”

This challenge in turn is also reducing their scope of public space as they are forced to go back to identity specific work and also work under their gurus who take commission from them for every badhai they visit. As a result of this their profits also get divided. So in turn this is overall impacting their financial independence as well as constricting their public space in the society.

6.2. Personal: To focus on the challenge they face in their personal life, Rahul says

“I have to hide that I am in a relationship because the people will not accept it. It is not because I am a Kinnar who is in love with a boy. This problem the society has even in cases where a woman falls in love with a man from different caste. A boy loving a girl, a girl loving a girl, a kinnar loving a boy and even a woman loving a man everything is a crime in their eyes. That is why I have to hide about my relationships as I cannot hurt my mother.”

By enjoying freedom in the before mentioned front, to not being able to project their personal life and intimate relationships curtails them from freedom in true sense. The society’s narrow nature of stigmatizing personal relationships does not let them be open about their choices even though they have owned up to their identity.

6.3. Access to services: This challenge stops them from leading a normal life as they have to struggle everyday to demand their basic rights and access to public services. They feel unsafe to go out on the streets because they usually get harassed and teased. Due to this, all my respondents said that they do not go out anywhere alone. They are always accompanied by their friends who make them feel safer. Rajiya says

“Just to make an identity card we have to struggle so much. The government offices harass us saying the process will take time come later. A bigger problem than this is the attitude of law towards us. One such instance has happened with me. I was being eve teased in front of some policemen. When some other people protested against it and asked the policemen to take some action they replied that only a hijra is being teased she is not a woman. Law and justice is everyone’s right. If employers don’t discriminate us, I fail to understand why the larger society cannot do the same. Then later they say that Kinnars have a foul mouth. Now if you openly discriminate us and not regard us to be human being, we will fight back.”

But all the respondents agreed on one point that they did not face any discrimination to avail medical services when they are sick. Though some of them practice home remedy to ailments, most of them visits any doctor nearby and they are diagnosed with proper care irrespective of their identity.

After analyzing all the variables that stood out during the interview, it has made me to sit up and view the community – transwomen interaction in a completely new light.
IV. CONCLUSION

The study is aimed to build an intersectional analysis of gender, work and inclusiveness among different tiers of the community in a plume. The exploratory design used in this research illustrates the different dynamics of development process where stigma manages to loosen its grip such that new avenues are opening up and helping the process of inclusion take its course.

This study presents the case of 5 transwomen of Jamshedpur industrial area who are breaking the confines of their identity and are taking up jobs as domestic helper in the urban households of the area. Though these transwomen have been initially involved in occupation that was specified by their identity as a transgender, they are gaining the confidence of venturing into jobs that are assuring them financial independence on the basis of their skills and individuality with dignity. This aspect of the community development is perpetuating them to aspire for a better living condition within the comfort of their skin, which was a distant dream before (see Chapter 1). But development is not a one way process. Therefore the need arose to see the other side of the story where I tried to find out what is bringing the inclusive behavioral change in the community towards the transwomen for a peaceful co-existence among the two.

This need propelled to analyse inclusive behaviour in the form of freedom, financial independence, and their idea of family in the sense of acceptance within the community. The perspective of the employers was regarded in the study to analyse the dimension of inclusion by understanding the linkage between gender and work. Comfort in workplace is a two way process where both the employer and the employee seemed to enhance their level of interaction by being dependent on each other. This interaction has enabled enlarging the public space of transgender where they gained confidence to venture into new avenues of development. Their involvement in social work for the entire community also throws light on the feeling of belongingness to the community where even the community seeks their help. This development is projected in their freedom to access public services overcoming challenges of financial burden and discrimination. The social transformation in urban space is visible within the community in the form of harmony and co-existence.

The peculiarity of this community comes from the nature of the process of inclusiveness and the cause and effect relationship of the same. Where in the global scenario, there is still struggle and atrocity existing in the society, this particular industrial area is evolving with a developmental framework. What is bringing the change in the attitude of these transwomen is the presence of role models within them. A few transwomen became activist through resilience without even being aware of it. They started giving priority to their passion and individuality by honing their skills and thus leading a life of dignity. This individual growth is having a positive impact on the other transwomen who are following the same path by identifying and refining their potential. This attitudinal change is also being reciprocated by the society. The cosmopolitan characteristic of the society is attention grabbing. The perspective of the employer shows that they do not carry the baggage of their own birth identity and instead values individuality and skills. Education and awareness at an individual level is causing this tectonic shift in community organisation and restructuring.

This study is limited to a small population and restricted to a particular location only, thus reducing its scope to become a general opinion. This study is focused mostly on the perspective of the transwomen working in a domestic workspace and their interaction with the community rather than the other way round. The equation of caste and gender is also overlooked leaving scope for future research.

This study stands out as to how a community functions for an inclusive growth. The striking feature here showcases individuals as agents of change. This model can be replicated by other communities by identifying individuals who has the potential to be the ‘agents of change’ and inducing awareness through them as to how to rise above identity and focus on skill and individuality. This will bring in growth of an inclusive characteristic in the community.

Original Contribution

This study presents a case of ‘inclusion’ of transgenders in current scenario where studies focusing on their ‘exclusion’ thrive. The study highlights that their ‘inclusion’ is multi-scalar: in domestic work, which was previously inaccessible to them, as well as into the society through the domestic work. Thus, the study contributes to the emerging studies on transgenders especially in context of intersectional analysis of gender and labour. The study also contributes to the gender and social work literature given the paucity of relevant literature in general about transgenders. In context of community development and empowerment of transgenders the study highlights the potential of focusing on strategic interventions.

Recommendation for Future Research

The study understood interaction in the process of constraints and opportunities. Further research can focus on understanding rivalry and competition between the transgender and women domestic workers from the area.

Gender has been isolated in this study from the perspective of life experiences and induction in domestic work sphere without indulging in understanding the caste dynamics. As mentioned above, the transgender belong to a Harijan Basti in Jamshedpur, future study can also be focused in analyzing the dynamics between caste and gender in this community.

A handful of 5 transwomen are involved in domestic work who interpret this profession as a process of inclusion. This can aid further analysis as to why the other transwomen of the community are not integrating themselves in domestic work in details.

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Impact of information systems quality for the performance of the public sector organizations in Western Province – Sri Lanka

G.K. Senevirathne

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Abstract - Since the widespread commercial availability of computing technologies, Information systems (IS) have been a dominant application era of computing. They are a best concept in information and communication technology (ICT) which helps to make life easier and increase efficiency. Organizations spend a large amount of money to implement IS. But organizations do not get the actual impacts from IS when compared with the investment cost that they use to implement IS. One reason for this is the quality of the IS. This research is carryout with the objective of recognize and analyze the system quality of information systems for the organization’s performance of public sector organizations in Western Province (WP) – Sri Lanka (SL) and to present a better solution for the problem.

Index Terms - Information systems, Performance, Public sector, Quality

I. INTRODUCTION

Architecture of IS can assist an organization in automating organization’s manual process. This automation can save money, time, and resources and also it enhances the organizational workflow. In present public-sector organizations also started to take the usage of IT based solutions rapidly along with the recent e-government initiatives. Public sector is a major contributor to the economic development of country. Various steps have been taken by the government to improve the quality and accountability of organizations in the public sector. They are trying their best to develop their manual system into a valuable computerized IS.

Providing e-solutions for the government by using ICT concepts like internet, telecommunications and computers with the purpose of providing convenient, economical and efficient government. E-government provides a more flexible and innovative framework to address the opportunities and challenges that exist in an increasingly networked world. By putting government services in IS, effectively managed systems reduce bureaucracy and enhances the quality of services in terms of time, content and accessibility. This results in high quality services to the citizens from government.

According to the survey findings gathered by Information & Communication Technology Agency of Sri Lanka (ICTA) they found that nearly 100% of the government organizations in Sri Lanka now use proprietary application software packages for organizations’ productivity. For general purposes 81% of the organizations use the ICTA promoted Computerized Integrated Government Accounting System (CIGAS) application package for accounting and finance and 76% use the Government Payroll System (GPS) for payroll. Most of the government organizations do not use a specific application package for human resource administration but a very small percentage used software for time and attendance. With regards to Sinhala and Tamil language packages over 90% preferred proprietary application software and also use the ICTA promoted Unicode Tool Kit (14%).

While much progress has been made by many governments, the full potential of digital government remains largely untapped. Many transactional and payment services are still not available end-to-end online. Service delivery in government institutions has not been effective for a long time. Customers have to wait for a long period of time at various departments counter which leads to a lot of time wastage. The functionality and user experience of IS designed and run by government leave a question whether IS makes best practices. Government organizations always try to deliver a good service to their citizen customers and they always try to make use of ICT for the purpose of enhancing good governance.

Organizations invest significant resources, huge amounts of money and countless hours in the adoption and implementation of different kinds of IS. But after implementing such systems still there is a question regarding the effective use of these systems. That means it is important to have a high-quality system to increase the performance.
There is empirical evidence that organizations are confronted with many IS management problems and issues such as little integration or coordination between IS (Menon, Lee & Eldenburg, 2012) and poor quality of information products including lack of consistency (Yang and Papazoglou, 2012), duplication (Basili and Caldiera, 2010), and out-of-date information (Bernstein et al., 2009).

By considering this new technological environment with the increased need for better IS, this study will seek to establish how the system quality of IS affects for the performance of the government organizations under the system quality dimension. System quality is the independent variable and organization performance was identified as the dependent variable. Following are the hypothesis between dependent variable and independent variable.

Hypotheses 1 (H1): There is a positive impact of System Quality of the IS on organization performance.
Hypotheses 2 (H0): There is no impact of System Quality of the IS on organization performance.

II. RESEARCH ELABORATIONS

As this research is to find the impact, quantitative methods of collecting data is used. The data collection survey is done using a structured questionnaire and distributed among government employees in Western Province. The questionnaire consists of nearly 10 questions. They are based on the quality issues of the IS such as user-friendly, reliability and speed. Questions were prepared in both Sinhala and English to avoid the inconvenience of understanding. Likert scale of 1-5 was use (Strongly Agree, Agree, Neutral, Disagree and Strongly Disagree) to get the response of the users.

Target Population of the research is 200 IS users in the Public-Sector organization in WP – SL. From that 180 was filtered according to the accuracy and the non-probability sampling method. The responses for the surveys is being collected within two weeks.

When distributing the questionnaire, the data was collected in two ways, which are by using paper-pencil questionnaires and internet-based questionnaires. Paper-pencil questionnaire data collection method was use to collect data from employees who didn’t had a proper knowledge to use the internet-based questionnaire because they were not familiar with the new internet techniques.

To analyze the data obtained from questionnaire, univariate and bivariate analysis were used. Data analysis software, statistical package for social sciences (SPSS) was used to analyze responses. The independent and dependent variable of this research model were measured by using questionnaire with five-point Likert scale ranging from “Strongly Agree” to “Strongly Disagree”. And as mentioned in below table points were allocated from 1 to 5 respectively for all positive questions in the questionnaire.

Table 1: Scale for Statements

<table>
<thead>
<tr>
<th>Variable</th>
<th>Levels of measurement</th>
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<tr>
<td>Strongly Agree</td>
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<tr>
<td>Agree</td>
<td>4</td>
</tr>
<tr>
<td>Neutral</td>
<td>3</td>
</tr>
<tr>
<td>Disagree</td>
<td>2</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>1</td>
</tr>
</tbody>
</table>

The mean value of the five-point scale was 03 (i.e. \((1+2+3+4+5)/5=3\)). Therefore, this mean value was taken as the deciding factor for the impact of the IS. So, the decision rules can be defined as below.

Information System
Let “X” be the average score of the respondents for impact of IS.
• If “X” >3, then the impact of Information System is High.
• If “X” =3, then the impact of Information System is Satisfactory.
• If “X” <3, then the impact of Information System is Low.
Organizational Performance

Let “Y” the average score of the respondents for Organizational Performance.

- If “Y” < 3, then the employee Organizational Performance is Poor.
- If “Y” = 3, then the employee Organizational Performance is Satisfactory.
- If “Y” > 3, then the employee Organizational Performance is Good.

III. RESULTS OR FINDINGS

Frequency Distribution Analysis for the System Quality

As indicated in the below table, the mean value of the distribution of system quality is 3.75. Since it is higher than 3, it can be said that system quality is “High” according to the decision rules. Therefore it can be identified as the performance of the public-sector organizations have high level of System Quality in their Information Systems. The skewness and Kurtosis of the distribution is -0.416 and 0.034 respectively, which indicates that the data recorded for the System Quality are approximately normally distributed.

<table>
<thead>
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<tr>
<td>Valid</td>
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<td>Kurtosis</td>
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<tr>
<td>Std. Error of Kurtosis</td>
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<tr>
<td>Maximum</td>
<td>5</td>
</tr>
</tbody>
</table>

Frequency Distribution Analysis for the Organizational Performance

As indicated in the below, the mean value of the distribution of Organizational Performance is 3.72. Since it is higher than 3, it can be said that Organizational Performance is “High” according to the decision rule. Therefore, it can be identified as public-sector organizations have high level of Organizational Performance by using Information Systems. The skewness and Kurtosis of the distribution is -0.509 and 0.147 respectively, which indicates that the data recorded for the Organizational Performance are approximately normally distributed.
Table 3: Frequency Distribution for the Dimensions of Organizational Performance

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<td>Minimum</td>
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</tr>
<tr>
<td>Maximum</td>
<td>5</td>
</tr>
</tbody>
</table>

Simple Regression between System Quality and Organizational Performance.

To perform bivariate analysis, correlation analysis and the simple regression analysis were used. These two types of bivariate analysis methods were used to identify whether there is any relationship between the Quality of the Information System and Organizational Performance.

Table 0: Model Summary of System Quality

<table>
<thead>
<tr>
<th>Model Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>1</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), System Quality

As Table 4, the analysis suggested that R square value was 0.539 express that 53.9% of the variance of the Organizational Performance explained by the System Quality.

Table 5: ANOVA of System Quality

<table>
<thead>
<tr>
<th>ANOVAa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
</tr>
<tr>
<td>--------</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

a. Dependent Variable: Organizational Performance
b. Predictors: (Constant), System Quality
As seen in the Table 5, the F value is 91.077, which is significant 5% (p=0.000), which suggests that System Quality have significantly explained 53% of the variance of Organizational Performance.

Table 6: Coefficients of System Quality

<table>
<thead>
<tr>
<th>Coefficients*</th>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>0.645</td>
<td>0.327</td>
<td>1.971</td>
<td>0.052</td>
</tr>
<tr>
<td></td>
<td>System Quality</td>
<td>0.821</td>
<td>0.086</td>
<td>0.734</td>
<td>9.543</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Organizational Performance

According to table 6 regression equation of System Quality and Organizational Performance in Public-Sector Organizations in WP, Sri Lanka is:
Organizational Performance = 0.645+ 0.821 (System Quality)

The b value of the equation, the gradient of the regression, is 0.821, which is significant at 1% (significant = 0.000). It indicates when the System Quality will increase by one unit, Organizational Performance will increase by 0.821.

According to above table, the results impact on System Quality and Organizational Performance in Public-Sector Organizations – WP, SL, the regression coefficient is 0.734, which is significant at 1% (p=0.000). Therefore, according to the results, hypothesis is accepted.

Hence the data support the hypothesis that there is a positive impact on System Quality and Organizational Performance in Public-Sector Organizations – WP, SL.

IV. CONCLUSIONS

Findings of this research proved that the system quality of the IS positively impacts on the organization performance. Even though public-sector organizations are considered to be low performing organizations it is clear that IS are a critical success factor to increase the performance of the public-sector organizations in Sri Lanka. According to the findings of the research, there is no negative impact of IS on organization performance. That means IS are better than manual or traditional data storing methods and IS are a significant element to improve the organizational performance. Based the research findings of the study, following recommendations will extremely useful when developing systems to public sector organizations in Sri Lanka. An organization can use IS to increase their performance if they consider these factors.

Moreover, these kinds of software need accounting knowledge otherwise it is difficult to understand. Hence, recommendation is to use customized software that is developed for organization purpose instead of using readymade systems. According to Pushpakumara et al. (2014) attempts aimed at improving the IS success at public sector organizations need to focus on developing a central ICT policy and adopting consistent and interoperable solutions rather than ad hoc locally.

In order to improve the system quality of an IS, software provider has the responsibility of making user-friendly systems with good user interfaces. If the user interface is eye-catching then the intention to use the system become high. Because most of the government employees are senior citizens, it is important to make interfaces in clear and understandable manner. For the system to be reliable, both the user and the vendor must have the understanding of requirements. Additionally, a common framework for software lifecycle process must be developed. It is recommended to involve top executives in the organization to ensure the system is with the preferred requirements (Hironishi 2008). According to Torkestani and Mazloomi (2014) recommendation for forming a task force of IT professionals to implement the system with the latest technological advances was mentioned in their research.
REFERENCES


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Comparison of Multiple Distances On Panel Data in Non-Hierarchical Clustering Method

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Abstract- Cluster analysis is a multivariate analysis that classifies objects based on their characteristics. Clustering analysis is generally used in cross-section data, that typically taken one point in time and unlike panel data that are taken at multi-times of several objects. This study explores methods for clustering analysis of panel data via distance measures. The objective of this research is to compare the Manhattan Distance, Euclidean Distance, Maximum Distance, Frechet Distance and Dynamic Time Warping (DTW) Distance for Clustering Analysis of Panel Data. The best of the distance measure was implemented empirically for Clustering of Indonesian’s Province that based on the Human Development Index (HDI), from 2010-2019. Results show that the Manhattan, Euclidean and Maximum provide distances with optimum performances, when the generated data between the clusters are not overlapping. However, when there were overlaps between clusters, the Manhattan distance was the most appropriate.

Index Terms: Clustering panel data, Manhattan Distance, Euclidean Distance, Maximum Distance, Frechet Distance, DTW Distance

I. INTRODUCTION

Cluster analysis is a multivariate analysis that aims to classify objects based on their characteristics (Matjik 2011). Methods for clustering analysis are generally divided into two types: non-hierarchical and hierarchical. The development of the clustering method can also be classified according to the size of the data, namely fewer objects (cluster 1 stage) usually using a hierarchical method and many objects (cluster 2 stages) that use non-hierarchical methods. In this research, the clustering analysis method used is the non-hierarchical via the K-means method.

The cluster method can also be distinguished based on the characteristics of the data. Clustering analysis is generally used in cross-section data. Unlike panel data, cross-section data pose main weakness of only taken at one point in time and thus ignoring the data trend overtime. This study uses a panel data that allow combination of time series data and cross-section data taken in several times on an object. Because the structure of the panel data is different from the cross-section data, the choice of distance measure must accommodate the panel data structure, that is dynamic following time of some object. The most basic of cluster analysis is "distance", generally measured using the Euclidean distance which is not appropriate for the panel data.

Several reports on clustering analysis with panel data employ several distance measures. Zheng et al (2014) used an “Euclidean distance timed and spaced”. Moreover, Genolini et al (2015), used the R packages to implement k-means designed to work specifically on trajectories (kml) or on joint trajectories (kml3d). They used the “Minkowski Distance” to calculate the distance for cluster analysis in which Manhattan distance was assigned when the rank of the distance formula is 1 and Euclidean distance was assigned when the rank is 2. The distance becomes maximum when it is heading to the infinite rankings (p → ∞). Later, Genolini et al (2016) assessed the longitudinal data hordes based on its data form and utilized the Frechet distance and the Dynamic Time Warping (DTW). The literature used different distance measure for cluster analysis on longitudinal and panel data. The used clustering methods were not based on a model, but rather the raw data. To our best knowledge, no report so far that compare various distance measure to cluster panel data.

The objective of this study is to compare the Manhattan, Euclidean, Maximum, Frechet and Dynamic Time Warping (DTW) Distance for Clustering Analysis of Panel Data. The best of the distance measure was implemented empirically on real data of Province of Indonesia based on the Human Development Index (HDI) variables, from 2010-2019. The data used for distance comparison were panel data with time of observation during ten years and the number of observation objects were 34 (number of provinces in Indonesia). The used variables were Life Expectancy, School Length Expectation, Average School Length, and Percentage Expenditures.

II. MATERIALS AND METHODS

2.1 Clustering Analysis in Panel Data

Clustering Analysis in Panel Data is different from cluster analysis in cross-section data, in this clustering the algorithm that used must be able to support the structure of panel data. K-Means method can be used in panel data clustering by modifying the size of the distance adjusted to the panel data structure. However, there are several approaches that can be used for clustering panel data. According to Liao (2005) there are three categories of approaches in panel data cluster analysis. First the raw data-based approach, how it works by calculating the distance between objects in a certain period of time using raw data. The results obtained are used for the clustering analysis. Frequently used distances are distances based on correlation values. Second, the approach based on features, by eliminating the influence of
noise data and reducing the dimensions of the data, after which the distance calculation is done and the clustering process is carried out. Third, the model-based approach that has been formed from raw data. In this research, the approach used for panel data clustering is raw data based approach to determine the distance in the clustering analysis process. Clusters analyzing with the K-Means method using raw data from generated data, with the following stages:

a. Partitioning the observation object into k-cluster randomly.

b. Calculating the cluster center of each k-cluster.

c. Calculating the observation object's distance to the cluster center by using several distance equation as follows: Manhattan Distance, Euclidean Distance, Maximum Distance, Frechet Distance and Dynamic Time Warping Distance

d. Inserting the observation object into a new cluster that has closest distance to the cluster center

e. Repeating stage b to d so there is no any observation object moving

2.2 Distances

Distance measure is used to measure the similarity of data in a cluster. The results of the clustering process will produce different results if the distance measure used is different. Used to clustering analysis with data panels (Johnson 1998).

2.1.1 Minkowski distance

The Minkowski distance between two joint variable-trajectories is given in Eq. 1 (Genolini et al, 2015):

\[
\text{Dist} (y_1, y_2) = \left( \sum_{j=1}^{T} \sum_{X=1}^{M} [y_{1,jX} - y_{2,jX}]^p \right)^{\frac{1}{p}}
\]  

(1)

The Euclidean distance is obtained by setting p = 2, it is defined as :

\[
\text{Dist} (y_1, y_2) = \sqrt{\sum_{j=1}^{T} \sum_{X=1}^{M} [y_{1,jX} - y_{2,jX}]^2}
\]  

(2)

The Manhattan distance by setting p = 1, the definition of the Manhattan distance is given by :

\[
\text{Dist} (y_1, y_2) = \sum_{j=1}^{T} \sum_{X=1}^{M} |y_{1,jX} - y_{2,jX}|
\]  

(3)

The Maximum distance is obtained by passing to the limit p \to +\infty, it takes the form :

\[
\text{Dist} (y_1, y_2) = \left( \sum_{j=1}^{T} \sum_{X=1}^{M} |y_{1,jX} - y_{2,jX}|^p \right)^{\frac{1}{p}} , p \to \infty
\]  

(4)

In practice, the kml3d package uses Euclidean distance as the default distance. But it also allows users to define their own distance. If the units of each variable are different. then the data must be standardized in advance (Genolini 2015).

2.1.2 Frechet distance

The Frechet distance between P and Q is the maximum for all reparameterization of \( \alpha \) and \( \beta \) from \([0, 1]\), thus the distance between objects P (\( \alpha (t) \)) and Q (\( \beta (t) \)) where object P is a function of time \( \alpha (t) \), and object Q is a function of time \( \beta (t) \), so it can be written as follows in (Eq.5) Genolini (2016):

\[
\text{DistFrechet} (P, Q) = \inf_{\alpha, \beta \in [0,1]} \max_{t \in [0,1]} \| P(\alpha(t)) - Q(\beta(t)) \|
\]  

(5)

2.1.3 Dynamic Time Warping (DTW) distance

The stages of the Dynamic Time Warping (DTW) distance are as follows (Muller 2007):

1. Calculating the local distance between elements from the two collections uses a different distance calculation technique, usually used is Euclidean Distance.

2. Determines the warping path, where the warping path is a path or path through a matrix that contains a minimum distance from the \( d_{\text{DTW}}(i,j) \) element to the \( d_{\text{DTW}}(N,M) \) element consisting of \( d_{\text{DTW}}(i,j) \) elements themselves.

- First Row

\[
d_{\text{DTW}}(1,j) = \sum_{k=1}^{l} d_{\text{Frechet}}(\alpha(k), \beta(j)) , j \in [1,M]
\]  

(6)

- First Column

\[
d_{\text{DTW}}(i, 1) = \sum_{k=1}^{l} d_{\text{Frechet}}(\alpha(i), \beta(k)) , i \in [1,N]
\]  

(7)

- The Other Elemen

\[
d_{\text{DTW}}(i,j) = d_{\text{Frechet}}(\alpha(i), \beta(j)) + \min \left( \begin{array}{c} d_{\text{DTW}}(i-1,j) \\ d_{\text{DTW}}(i,j-1) \\ d_{\text{DTW}}(i-1,j-1) \end{array} \right)
\]  

(8)

2.3 Data

The data used in this study are simulation data and real data. Simulation data obtained through data generation using statistical software, namely software R. The following is an explanation of the data used in this study:

1. Statistical simulation is done using the R programming language. The stages of the simulation data generation procedure are as follows:

   a. Setting the number of clusters is \( M = 3 \).

   b. Specifies the number of objects in each cluster equal to \( n \).

   c. Sets the number of series of times (\( t = 10 \)).

   d. Set a model for generating data :

\[
y_{ij}(k) = \beta_0(i) + \beta_1(i)t + \varepsilon_{ij}(k), \\
i = 1, 2, 3, \ldots, n \\
j = 1, 2, 3, \ldots, t \\
k = 1, 2, 3, \ldots, M
\]  

(9)
Where $\beta_{0i}$ and $\beta_{1i}$ are defined by the equation $\beta_{0i} = \beta_0 + u_{0i}$ and $\beta_{1i} = \beta_1 + u_{1i}$. Then, $u_{0i}$, $u_{1i}$ and $\epsilon_{ij}$ are random factors with normal distribution $(0, \sigma^2_{u0})$, $(0, \sigma^2_{u1})$, and $(0, \sigma^2)$. With $u_{0i}$, $u_{1i}$ and $\epsilon_{ij}$ are assumed to be mutually independent. In this study, there are 16 scenarios data generation which is consist of 4 different combinations of parameters there are $\beta_0$, $\beta_1$, $\sigma^2_{u0}$ and $\sigma^2_{u1}$.

2. The real data is used in this research is sourced of BPS Publication. The data used is the Human Development Index (HDI) variables in Indonesia, from 2010-2019. The variables that used are Life Expectancy, School Length Expectation, Average School Length, and Percentage Expenditures. Data is used in this research is panel data with time of observation during ten years and the number of observation objects were 34 Provinces of Indonesia.

2.4 The Procedure of Data Analysis

The stages of analysis which is conducted in this study are generally divided into two parts, namely the generation data and analysis of the real data with the following details:

1) Analysis of The Generation Data
   This stage is the simulation stage, the data used are generated data with 1000 replications. The purpose of this simulation is to see the accuracy of clustering between several measures of distance with the K-Means method in classifying objects in the form of panel data. The size of the distance used in the panel data clustering are the Distance of Manhattan, Euclidean, Maximum, Frechet and DTW. The first stage is data generation, the simulation uses generation panel data with 16 scenarios of data was generated. Dataset generation consist of 3 clusters with a different parameter values. The next step was clusters analyzing with the K-Means method using raw data from generated data with k value used is k = 3. The important thing was calculating the observation object's distance to the cluster center by using several distance equation as follows: Manhattan Distance (Equation 2), Euclidean Distance (Equation 3), Maximum Distance (Equation 4), Frechet Distance (Equation 5) and Dynamic Time Warping Distance (Equation 6). After that, evaluating the five distance of measurement. Those 5 evaluation of the distance are done by calculating incorrect classification or accuracy in classifying objects based one the initial cluster that is generated, with following formula (Kohavi 1998):

\[
\text{Accuracy} = \frac{TP+TN}{TP+TN+FP+FN} \quad (10)
\]

Thus, Determining the best distance measurement between distance of Manhattan, Euclidean, Maximum, Frechet and Dynamic Time Warping (DTW) by looking at the largest cluster accuracy based on the evaluation criteria in Equation 10.

2) Analysis of Real Data
   This stage is the stage of implementation the clustering method with the best distances of simulation results on real data. The first step in this section is data exploration was carried out on real data, that is human development index (HDI). The first thing to do is data imputation, the next is standardization and identified distribution of the data from each component of HDI variable. Analyzing clustering using the K-Means method based on the best distance measure obtained from the simulation results with the optimum number of clusters. Evaluated the K-Means clustering method using quality criteria of Calinski and Harabasz (Genolini, 2016) is given in:

\[
C(k) = \frac{\text{Trace}(B) n-k}{\text{Trace}(W) k-1} \quad (11)
\]

Determine the optimum number of groups based on the largest Calinski and Harabasz criteria value. Thus, draw a conclusion from the result of evaluated clustering with the best distance measurement.

III. RESULT

3.1 Evaluation of Distance Accuracy
   The accuracy of the Manhattan, Euclidean, Maximum, Frechet and Dynamic Time Warping (DTW) distances can be seen from the resulting of accuracy values. Which is the greater the accuracy value, then the better the distance size. Figure 1 presents a comparison of the distribution of accuracy for the five distances. In general based on the box plot, Manhattan Distance is superior compared to other distances, but in some data generation scenarios there is a distance that has a performance that is relatively similar to the Manhattan Distance, namely Euclidean Distance. From the simulation results, it can be seen that for Manhattan Distance and Euclidean Distance, there are relatively outliers in some scenarios, because the accuracy value only consists of 100% in every replication. Likewise for Maximum, Frechet, and DTW distances under these conditions, the results obtained are far different compared to the results of other scenario simulations.
In Figure 1, it can also be seen that the position of the boxplot at Manhattan and Euclidean distances is much higher and stable compared to the boxplot position for Maximum, Frechet and DTW distances. However, the position of the boxplot for each distance looks very different when the $\beta_0$ parameter condition is close while the $\beta_1$ value is both small and more enlarged. Under these conditions, it appears that the position of the boxplot is lower than the accuracy of the other scenarios. This shows that the accuracy value in the scenario is lower than the accuracy in the other scenario.

The results of the clustering accuracy for the simulation data are presented in Table 1. The results of the average accuracy for each of these distances were obtained from 1000 replications. In Table 1, there are 16 types of scenarios where entirety it can be seen that the average accuracy for five distances in several scenarios is relatively the same. When viewed based on changes in parameters, when the $\beta_0$ parameter between distant clusters while the values of $\beta_1$ as same between the clusters, with varians of $\beta_0$ and $\beta_1$ are small or only variance of $\beta_0$ is enlarged (Scenarios 1 and 9) has a relatively equal average accuracy. In that scenario, Manhattan and Euclidean distances have the same average accuracy, which is 100%. This shows that in these conditions Manhattan and Euclidean distances are the best distance measurements with the most optimum performance. Meanwhile, when only variance of $\beta_1$ is enlarged while variance of $\beta_0$ is small, Manhattan Distance is the distance that has the best performance with accuracy average is 99.43%. Likewise with the condition of variance $\beta_0$ and $\beta_1$ enlarged Manhattan Distance is also the distance that has the best performance with an average accuracy of 99.27%.

In Table 1, it can be seen that the average results for Scenarios 2, 6, 10, and 14 have much lower accuracy results compared to the results of the average accuracy of other scenarios. The results of that average accuracy, obtained when the parameter $\beta_0$ between close clusters while the value of $\beta_1$ between the clusters is the same. When data is generated under these conditions, the data between the resulting clusters overlap so that the size of these distances is very difficult to distinguish preliminary data between clusters. Under these conditions, both with small $\beta_0$ and $\beta_1$ variations or with enlarged variants of $\beta_0$ and $\beta_1$, Manhattan distances as a whole produce the greatest average accuracy, this shows that overall Manhattan Distance is a measure of distance with the best performance under these conditions. Then, when the $\beta_0$ parameter between the clusters are same and the values of the $\beta_1$ parameter between clusters have a far different difference with small $\beta_0$ and $\beta_1$ variance, shows that the Manhattan, Euclidean, and Maximum distances have the same average accuracy, which is 100%. Meanwhile, when the $\beta_0$ variance is small and $\beta_1$ variance is enlarged as well as the $\beta_0$ and $\beta_1$ variance conditions are equally enlarged, showing that Manhattan Distance is the best distance measurement with an average accuracy of 99.8%. Then, when variance of $\beta_0$ is enlarged while $\beta_1$ variance is small indicates that the Manhattan and Euclidean distances have the same average of accuracy, which is 100%.

Table 1: Results of Average accuracy on Manhattan Distance, Euclidean Distance, Maximum Distance, Frechet Distance, and DTW Distance for Each Scenario

<table>
<thead>
<tr>
<th>Accuracy</th>
<th>Manhattan</th>
<th>Euclidean</th>
<th>Maximum</th>
<th>Frechet</th>
<th>DTW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario 1</td>
<td>100</td>
<td>100</td>
<td>99.01</td>
<td>90.32</td>
<td>90.46</td>
</tr>
<tr>
<td>Scenario 2</td>
<td>49.83</td>
<td>48.81</td>
<td>47.59</td>
<td>45.58</td>
<td>45.82</td>
</tr>
<tr>
<td>Scenario 3</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>95.05</td>
<td>95.47</td>
</tr>
<tr>
<td>Scenario 4</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>91.96</td>
<td>91.98</td>
</tr>
<tr>
<td>Scenario 5</td>
<td>99.43</td>
<td>98.47</td>
<td>85.84</td>
<td>72.20</td>
<td>71.58</td>
</tr>
<tr>
<td>Scenario 6</td>
<td>45.61</td>
<td>45.18</td>
<td>45.11</td>
<td>44.55</td>
<td>44.56</td>
</tr>
<tr>
<td>Scenario 7</td>
<td>99.87</td>
<td>99.73</td>
<td>98.13</td>
<td>84.22</td>
<td>85.50</td>
</tr>
<tr>
<td>Scenario 8</td>
<td>100</td>
<td>100</td>
<td>99.85</td>
<td>93.53</td>
<td>93.90</td>
</tr>
<tr>
<td>Scenario 9</td>
<td>100</td>
<td>100</td>
<td>98.94</td>
<td>89.98</td>
<td>90.04</td>
</tr>
<tr>
<td>Scenario 10</td>
<td>48.72</td>
<td>48.08</td>
<td>47.12</td>
<td>45.77</td>
<td>45.73</td>
</tr>
<tr>
<td>Scenario 11</td>
<td>100</td>
<td>100</td>
<td>99.93</td>
<td>95.63</td>
<td>95.40</td>
</tr>
<tr>
<td>Scenario 12</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>91.67</td>
<td>92.51</td>
</tr>
<tr>
<td>Scenario 13</td>
<td>99.27</td>
<td>98.40</td>
<td>85.84</td>
<td>72.20</td>
<td>71.58</td>
</tr>
<tr>
<td>Scenario 14</td>
<td>45.45</td>
<td>45.14</td>
<td>44.98</td>
<td>44.59</td>
<td>44.89</td>
</tr>
<tr>
<td>Scenario 15</td>
<td>99.83</td>
<td>99.70</td>
<td>97.93</td>
<td>84.95</td>
<td>84.99</td>
</tr>
<tr>
<td>Scenario 16</td>
<td>100</td>
<td>100</td>
<td>99.82</td>
<td>92.56</td>
<td>93.38</td>
</tr>
</tbody>
</table>
When the parameter values of $\beta_0$ and $\beta_1$ between distant clusters with the variance of $\beta_0$ and $\beta_1$ are small or the $\beta_0$ variance is enlarged while the small $\beta_1$ variance shows the distance of Manhattan, Euclidean and Maximum has the same average accuracy, which is 100%.

Meanwhile, when the $\beta_0$ and $\beta_1$ variance are enlarged moreover the $\beta_0$ variance is small while the $\beta_1$ variance is enlarged showing the Manhattan and Euclidean Distances have the same average accuracy, which is equal to 100%. It showed that under these conditions Manhattan and Euclidean Distance have the best performance. Entirety, the Frechet Distance and DTW Distance are the distances that have the lowest average accuracy for all scenarios in this study. In general, the two distances are usually used for data generation that has a particular shape, so both distances will have optimum performance when the data generated has a certain shape.

Based on the evaluation for each scenario above, it can be seen that overall for each scenario show that the Manhattan, Euclidean and Maximum provide distances with optimum performances, when the generated data between the clusters are not overlapping. However, when there were overlapping data between clusters, the Manhattan was the most appropriate distance. Thus, based on the results of the evaluation of all these scenarios it can be concluded that the best distance for clustering panel data with the K-Means method is Manhattan Distance.

### 3.2 The Best Distance in The Panel Data

Panel data clustering with the K-Means method can be applied to clustering the Human Development Index (HDI) data. Where, the HDI data used in the form of panel data with a time of observation for 10 years from 2010 to 2019 and the object of observation is 34 provinces in Indonesia. Based on previous simulation results, the K-Means method with Manhattan Distance is able to provide the best results in clustering panel data. Thus, the K-Means method will be applied with this distance in clustering data with 4 components of HDI variables.

#### 3.2.1 Exploration of Panel Data

Data exploration is carried out at an early stage to find out the pattern of data distribution and the pattern of data trends over time. Panel data plots are carried out to see the pattern of each data in the Human Development Index (HDI) variable component in Indonesia from 2010 to 2019. HDI data plots in Indonesia are presented in Figure 2. Overall HDI data patterns for Life Expectancy (AHH) variables, Expectations of School Length (HLS), Average Length of School (RLS) and Expenditures per Capita are relatively linear.

#### 3.2.2 The Optimal Number of Clusters

K-Means method is a type of non-hierarchical clustering, where the method requires the determination of the number of clusters (k) at the beginning. The number of clusters tried was $k = 2$ to $k = 10$. The optimum number of clusters is obtained from the Calinski & Harabatz (CH) criterion value, the higher the CH value, the better the clustering results.

<table>
<thead>
<tr>
<th>Cluster Number (k)</th>
<th>Criteria Value of Calinski &amp; Harabatz</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>14.3267</td>
</tr>
<tr>
<td>3</td>
<td>14.4182</td>
</tr>
<tr>
<td>4</td>
<td>12.3539</td>
</tr>
<tr>
<td>5</td>
<td>14.5625</td>
</tr>
<tr>
<td>6</td>
<td>15.6631</td>
</tr>
<tr>
<td>7</td>
<td>11.2854</td>
</tr>
<tr>
<td>8</td>
<td>12.9051</td>
</tr>
<tr>
<td>9</td>
<td>10.0336</td>
</tr>
<tr>
<td>10</td>
<td>12.3361</td>
</tr>
</tbody>
</table>

![Figure 2: Plotting of Human Development Index (IPM) Data from 2010-2019](image)

![Figure 3: Comparison of Calinski & Harabatz Criteria for Each Cluster Number (k)](image)
Table 2 is a comparison of the value of the CH criteria for each number of clusters that have been tested in this study. Based on the table shows that the highest CH criterion value is obtained by \( k = 6 \), this can also be seen in Figure 3. In the figure it appears that the highest CH criterion value is obtained by cluster 6. Therefore the optimum cluster for HDI data clustering with Method K-Means and Manhattan Distance are \( k = 6 \).

3.2.3 The Optimum Member Of Clusters
In the previous stage, the optimum cluster produced was 6 clusters with the size of the Manhattan distance in the K-Means method, based on the Calinski & Harabatz criteria values. Table 3 presents members for each cluster. Provinces that are in one cluster have the same HDI movement pattern from year to year.

<table>
<thead>
<tr>
<th>Clusters</th>
<th>Number of Clusters</th>
<th>Member of Clusters</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>8</td>
<td>Aceh, Sumatera Utara, Sumatera Barat, Bengkulu, Sulawesi Tengah, Sulawesi Tenggara, Maluku, Maluku Utara.</td>
</tr>
<tr>
<td>C</td>
<td>6</td>
<td>Nusa Tenggara Barat, Nusa Tenggara Timur, Kalimantan Barat, Gorontalo, Sulawesi Barat, Papua Barat.</td>
</tr>
<tr>
<td>D</td>
<td>2</td>
<td>Kepulauan Riau, Jakarta.</td>
</tr>
<tr>
<td>E</td>
<td>2</td>
<td>Di Yogyakarta, Kalimantan Timur.</td>
</tr>
<tr>
<td>F</td>
<td>1</td>
<td>Papua</td>
</tr>
</tbody>
</table>

Table 4 presents the average HDI data based on the optimal clusters.

<table>
<thead>
<tr>
<th>Gerombol</th>
<th>AHH</th>
<th>HLS</th>
<th>RLS</th>
<th>PP</th>
<th>IPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>70.414</td>
<td>12.146</td>
<td>7.883</td>
<td>10270</td>
<td>68.990</td>
</tr>
<tr>
<td>B</td>
<td>68.048</td>
<td>13.013</td>
<td>8.512</td>
<td>8798</td>
<td>68.011</td>
</tr>
<tr>
<td>C</td>
<td>66.128</td>
<td>12.201</td>
<td>6.923</td>
<td>8225</td>
<td>63.662</td>
</tr>
<tr>
<td>D</td>
<td>70.744</td>
<td>12.398</td>
<td>10.176</td>
<td>15116</td>
<td>76.060</td>
</tr>
<tr>
<td>E</td>
<td>74.064</td>
<td>13.977</td>
<td>9.013</td>
<td>12090</td>
<td>75.719</td>
</tr>
<tr>
<td>F</td>
<td>64.933</td>
<td>9.872</td>
<td>6.000</td>
<td>6631</td>
<td>57.330</td>
</tr>
</tbody>
</table>

Table 4 presents the average HDI data based on the optimal cluster for 10 years (2010-2019). Table 4 shows that the largest average Life Expectancy (AHH) and School Old Expectancy (HLS) variables were obtained by Cluster E, consisting of DIY and East Kalimantan Provinces. Whereas, cluster D which consists of Riau Islands Province and Jakarta has the largest average in the variable Length of School (RLS) and Expenditures per Capita (PP) for the past 10 years. Based on the average HDI in Table 4 obtained from BPS publications for 10 years (2010-2019), it shows that the highest average HDI obtained by D cluster with a value of 76,060, this is influenced by the high average values of the RLS and PP variables in the D cluster every year. Meanwhile, cluster F which consists of Papua Province has the lowest average of 57,330. So it can be concluded that the Riau Islands Province and Jakarta are the Provinces that have the best Human Development Index for the past 10 years. Meanwhile, Papua Province has the lowest Human Development Index in Indonesia for the past 10 years.

IV. CONCLUSION
Manhattan, Euclidean and Maximum distances are both distances that have optimum performance, when the data between the clusters generated are not overlapping. However, when the resulting data overlaps between clusters, Manhattan Distance is the distance that has the most optimum performance compared to other distances. Meanwhile, Frechet Distance and DTW Distance are the distances that have the lowest average accuracy for all scenarios in this study. In general, the two distances are usually used for data generation that has a particular shape, so both distances will have optimum performance when the data generated has a certain shape. So, based on Scenarios 1 to 16, overall the distance that has the best performance with the highest accuracy value in each panel data generation is obtained by Manhattan Distance. So, the best distance for panel data clustering with the K-Means method is Manhattan Distance.

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The Role of Social Media in Learning English as a Second Language: A Study Based on the Students of National Apprentice & Industrial Training Authority (NAITA), Trincomalee, Sri Lanka

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Abstract- This study aimed to identify the role of social media in learning English as a second language among Sri Lankan English as Second Language learners. According to Sri Lankan English as Second Language curriculum, formal classroom language learning using traditional teaching methods seems to be failure. Therefore, this study investigated whether the use of social media help the learners of National Apprentice and Industrial Training Authority, Kinniya and how the social media help the learners to improve their language skills, pronunciation, grammar and vocabularies. In this study, 40 students from different courses have been randomly selected. This study was a survey research, and quantitative method was used to collect data. The instrument of this study was a close-ended questionnaire, which was used to collect respondents’ opinions concerning social media and their role for learning English. According to the analysis of the data, the findings show that most of the respondents like different kinds of social media, and they spend their large amount of time on social media which help them to learn English. Facebook and YouTube help the learners very much to learn grammar rule, to improve language skills, pronunciation, grammar and vocabularies and to communicate in English with multilingual people. Several useful pages on Facebook and YouTube help them to obtain new language materials. It is recommended that the English as Second Language teachers can implement online learning through using social media in the classroom, and the learners can be guided to use social media towards learning English. Moreover, the English as Second Language curriculum designers should implement online learning process through using social media in adult language classes at higher educational institutions to develop the English language proficiency in Sri Lanka.

Index Terms- National Apprentice and Industrial Training Authority, English as a Second Language, social media, English as Second Language curriculum

I. INTRODUCTION

We live in the modern era. Every task of human beings has become modernized and technology-based. The entire globe depends on technology, and social networking and social media play a vital role in the day-to-day life of human beings and communication. Social media such as Facebook, YouTube, Whatsapp, Twitter, etc. are widely used for entertainment, education, business, marketing and advertisement around the world. A large number of people utilize these kinds of social media for various purposes since they get several benefits. In this sense, many developed countries utilize them for education, called as online learning. On the contrary, according to the Education system of Sri Lanka, there is no such online learning system. The utilization of social media can help the students to explore more and learn on their own. Especially they help to learn a new language apart from the first language. In Sri Lanka, English Language is learned as a second language in educational institutions such as schools, colleges, universities and other vocational training institutions.

However, English as a Second Language (ESL) learning in Sri Lanka seems a failure. Especially, the learners are very poor in listening and speaking since very less emphasis has been given for listening and speaking in ESL classes. The reasons are formal classroom language learning and the use of traditional teaching methodologies in the ESL curriculum of Sri Lanka. Moreover, the students at National Apprentice and Industrial Training Authority (NAITA), Kinniya learn English as a second language. But the attitude towards learning English seems negative. They show their disinterest in learning English because they do not like formal classroom learning. However, the use of social media can help them to learn English if they are properly guided by the teachers. Since the ESL learners at NAITA are adults, most of them utilize social media only for entertainment. There are several useful English learning pages on Facebook and YouTube for easy online learning. These will help them to learn language skills such as listening, speaking, reading and writing and to improve grammar and vocabulary. Learning a second/foreign language through social media will bring a change among ESL/EFL learners since the young generation spends their time on social media to a great extent.

1.1 Study Questions
i. Do the social media help the ESL learners of NAITA for learning English?
II. RESEARCH ELABORATIONS

In this part, some relevant sources are presented based on the research questions to support the current study. First, the role of social media in ESL/EFL learning and their use for learning English are presented. Second, other relevant studies are presented are logical argument.

2.1 Role of social media in learning English

The use of social media helps the language learners to a great extent for second/foreign language development. Most of the ESL/EFL learners develop their language skills such as listening, speaking, reading and writing and vocabularies through social media. Formal classroom ESL learning seems to be failure in Sri Lanka. As a result, large amount of people have lack of English language proficiency. Several studies have been conducted on the role of social media in language development. In this sense, Khan et al (2016) say that English language vocabulary development is easy nowadays because, a learner may get help for online sources. According to the above statement, the ESL/EFL learners do not improve their vocabularies and communication in classroom; instead they get them on social net workings. Kern (2006) highlights that online blogs like social media is greatly support by constructivists approach as their use underscores learners’ interaction. Moreover, Ferdig (2007) mentions that social media are full of interaction in language learning process which are necessary and quite helpful for learners.

According their point of view, social media create social interaction and which help the learners to develop communication skills through connecting with multilingual people. Therefore, Irfan et al (2012) highlight “language is a source or tool of communication and plays an important role in all walks of life”. Further they mention that it is language which is used for transmission and communication among friends, family members, colleagues, and especially in teaching learning process. The social media are significant for language learners to apply the skills among the people around the world. Further, Khan et al (2016) conclude that the role of social media in English vocabulary development is like a bright day because social media facilitate the English learners to learn new words and phrases and to improve their vocabulary. Likewise, there are a number of useful online pages on Facebook and YouTube to learn English grammar and language skills.

2.2 Other relevant studies

Several studies with regard to the use of social media in learning English have been previously carried out. According to Mills (2011), he says that Facebook was used as a collaborating tool on which students could share resources that may help improve the various topics discussed in classrooms. As Mills (2011) stated, the use of Facebook assists the students to share learning materials among students and also helps to obtain new language learning materials such as grammar, vocabulary, reading and speaking.

Similarly, Li (2017) reports that students may use YouTube for the subject-related materials and also utilize the E-learning Blog, Forum or Wiki tools because of the need of subject requirements, or access Facebook and other social media tools for learners self- learning practices. According to Li (2017), though he suggests general learning ideas through social media, the above learning techniques using social networkings can help ESL learners to learn English. Moreover, the social networkings help the students to build social interaction and develop communication among multilingual people. According to Thorne (2010), he says that social media applications allow users to cross the boundaries of their countries, connect and express themselves on a global scale. Similarly, Slim and Hafedh (2014) says that applications such as Facebook, Twitter, YouTube, and WhatsApp have massively boosted social interaction and information sharing within student and teacher communities alike. Facebook plays a vital role in assisting the students to learn a second/foreign language. In various previous studies, Facebook has been investigated on how it assists the students to learn a new language apart from the first language. In this sense, Lee (2006) argues that the use of Facebook enhanced students’ oral proficiency, vocabulary acquisition, and syntactic complexity in the Korean language. Similarly, Derakshan & Hasanabbasi (2015) say that Facebook promotes students’ communication and language skills. Therefore, Facebook helps the ESL/EFL learners to develop four skills and vocabularies. And also, they build social diversity and
communicate with multilingual people. This communication will help them improve their oral and written communication.

A study was conducted by Zaidieh (2012) regarding the challenges and opportunities in the use of social media in education in Malaysia. He reports that similar students feel more comfortable and have less pressure with the time they have to answer questions because they do not have to respond to questions immediately as in the classroom setting. And also, the second advantage of Facebook in an ELL environment is that using Facebook helps enhance students’ critical thinking. Similarly, Yunus (2012) says that Facebook plays a significant role in promoting students’ creative thinking skills.

ESL/EFL learners should have creative thinking. Therefore, through the use of social media, the learners get creative thinking. Moreover, Shih (2011) points out that the advantages of social media in learning and improving the second language can be characterized as a unique and entertaining atmosphere, Facebook has been reported in some studies to lessen students’ stress levels and enhancing learners’ engagement and interactions. Social media help to improve not only listening and speaking but also reading and writings. In a study, White (2009) reports that social media highly assists the ESL/EFL learners to learn English, and develop their language skills and vocabularies as well as grammar.

III. FINDINGS

The questions were designed to find out the opinions concerning social media and their role towards learning English. In this sense, respondents’ answers to the questions are given below:

The first question was concerning the ways the respondents like to learn English. The analysis of the opinions shows that 56% of the respondents like online learning through social media and 30% of the respondents like classroom learning. On the other hand, only 14% of the respondents like self-learning.

The second question was concerning social media which are mostly liked by the respondents. According to the analysis of the opinions, the results show that 41% of the respondents like Facebook the most and 35% of the respondents like YouTube the most. On the other hand, only 16% of the respondents like WhatsApp. Likewise, just 8% of the respondents like Viber the most. Moreover, the third question was about frequent use of social media in a day. According to the analysis of the opinions, the results show that the frequent answer was: 56% of the respondents spend their several times on social media in a day whereas 28% of the respondents spend time to some extent on social media. However, 16% of the respondents responded ‘never’.

The following graph (figure 4.1) shows the opinions of the questions 1, 2 & 3

![Graph showing responses](image)

The fourth question was whether the use of social media such as Facebook and YouTube can help the learners to learn English easily. According to the analysis of the opinions, the results show that 91% of the respondents agreed with the above statement whereas 9% of the respondents disagreed with the statement. Further, the fifth question was whether English learning pages on Facebook help the learners to improve grammar and vocabulary. According to the analysis of the opinions, the results show that the frequent answer was: 90% of the respondents responded ‘Yes’ and only 10% of the respondents responded ‘No’.

In the questionnaire, the sixth question was whether the learners think that English videos on YouTube help them to improve their listening and speaking skills with pronunciation. The results of the opinions show that the frequent answer to the question was: 88% of the respondents responded ‘Yes’. On the other hand, 12% of the respondents responded ‘No’. And also the seventh question was whether social media help the learners to communicate in English with multilingual people around the world. According to the analysis of the opinions, the results show that 94% of the respondents agreed with the above statement. On the other hand, only 6% of the respondents disagreed with the statement. The last question was whether Facebook and YouTube assist the learners to obtain useful English learning materials. The results of the opinions show that 95% of the respondents responded ‘Yes’ and only 5% of the respondents responded ‘No’.
The following graph (figure 4.2) shows the opinions of the questions 4, 5, 6, 7 & 8.

![Graph showing opinions of questions 4, 5, 6, 7 & 8](image)

**Figure 2**

**IV. CONCLUSION**

This study aimed to explore the role of social media in learning English as a second language. In this study, ESL learners of NAITA, Kinniya were investigated that how the use of social media help them to learn English since the formal classroom language learning is failure in Sri Lanka. The findings of the study reveal that most of the sampled students use social media and they are interested in learning English through using social media to improve their English language proficiency. The traditional teaching methodologies and formal classroom learning make the ESL learners get bored. As a result, adult learners show their disinterest in learning English at higher educational setups. But social media can be significant tool for teaching language. They help the students to learn English since there are number useful English learning pages on Facebook and YouTube, and which help them to develop their language skills and vocabularies. And also they get opportunities to communicate in English with multilingual and multicultural people around the world.

Therefore, The ESL teachers in Sri Lanka should implement online learning process for adult learners. Therefore, the opportunities will be given to the learners for independent learning and application. Moreover, the use of social media helps the learners to explore and obtain various useful learning materials. The ESL curriculum designers in Sri Lanka should consider this issue and online learning process through social media such as Facebook and YouTube should be implemented as one of the tools for language teaching in higher educational institutions. And also the learners should be guided to use these kinds of social media for learning purposes.

**APPENDIX**

**Questionnaire**

This questionnaire has been designed to collect the opinions concerning social media and their role in learning English to research on How the use of social media help the ESL learners of NAITA to learn English. Therefore, I kindly request you to provide your support to achieve the aim of this study.

Select your opinions by placing a tick (✓) in the relevant bracket.

1. Which of the following ways do you like to learn English?
   a. Online learning through social media (✓)
   b. Classroom learning ()
   c. Self-learning ()

2. Which of the following social media do you like the most?
   a. Facebook (✓)
   b. YouTube (✓)
   c. Whatsapp ()
   d. Vibar ()

3. How often do you use social media in a day?
   a. Several times (✓)
   b. Some extent ()
   c. Never ()

4. The use of social media such as Facebook and YouTube can help you to learn English easily.
   a. Agree (✓)
   b. Disagree ()
5. Do English learning pages on Facebook help you to improve grammar and vocabularies?
   a. Yes ( )
   b. No ( )

6. Do you think that English videos on YouTube help you to improve your listening and speaking skills with pronunciation?
   a. Yes ( )
   b. No ( )

7. The social media help you to communicate in English with multilingual people around the world.
   a. Agree ( )
   b. Disagree ( )

8. Do Facebook and YouTube assist you to obtain useful English learning materials?
   a. Agree ( )
   b. Disagree ( )

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Evaluating netizens' social media collaborative problem solving efficacy on disaster response phase of disaster management, in Nigeria.

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Abstract: This paper presents findings and significant effects of social media collaborative problem solving possibility (SMCPS) on the three stages of disaster management i.e disaster preparedness (DPRE), disaster response (DRES) and disaster recovery (DREC) from a flood disaster occurrence in Nigeria. The study used a survey questionnaire and stratified random sampling technique to collect 384 primary data from flood disaster management agencies (OYSEMA, NiMET & Red-Cross Society) in Ibadan, Nigeria. The collected data were analyzed using Partial Least Square - Structural Equation Modeling (PLS-SEM). The study concludes that social media has become an important tool especially during emergency situation and disaster management. Hence, important implication of this study to the environmental regulatory policy makers and emergency response agencies is to create more awareness on the usability and organizational applicability of social media in providing credible information regarding disaster/ disaster management.

Index Terms: Social media collaborative problem solving possibility (SMCPS), Disaster preparedness (DPRE), Disaster response (DRES), Disaster recovery (DREC), Flood management.

1. INTRODUCTION

The advent of a plethora of social media including social network services, community contents, micro-blogs have changed the landscape of disaster management considerably over recent years with possibilities for social action now becoming realities (Zhang, C., Fan, C., Yao, W., Hu, X., & Mostafavi, A. 2019). With readily available software tools such as online discussion platforms and news aggregator, organizations, citizens and netizens can now disseminate, acquire and analyses information more efficiently and comprehensively (Fraustino, Liu & Jin, 2012; Bruns, A. & Stieglitz, S. 2012). The importance of social media in disaster is evident in the coordinating emergency services, offering support and disseminating medical related information by the emergency staff, military personnel and the general public (Toyosi, 2014; Houston, J. B., Hawthorne, J., Perreault, M. F., Park, E. H., Goldstein Hode, M., Halliwell, M. R., ... & Griffith, S. A. 2015). Social media has the ability to prevent a disaster from spiraling out of control. According to experts, disaster management can be categorized into three namely; disaster preparedness, disaster response and disaster recovery. Across these three stages, social media tools can be used for different purposes which include information dissemination, disaster planning and training, collaborative problem solving and information gathering etc (Zhang, C., Fan, C., Yao, W., Hu, X., & Mostafavi, A. 2019). These stages are coded (DPRE) (DRES) (DREC) respectively for the purpose of this study. Therefore, emergency and disaster management organizations involvement of the general public in disaster management is to ensure that the public gets accurate and complete information (Toyosi, 2014). Improving resident participation in disaster management is expected to increase the effectiveness of disaster management and reduce information gap. This is because the more engaged people are the more, they learn about how to prepare, respond and recover from disaster. In view of this, this study aims at examining the role of resident netizens’ participation and collaborative problem solving in disaster response phase of flood disaster management in Nigeria.

2. RESEARCH QUESTIONS

What is the effect of netizens social media collaborative problem solving on disaster response phase of flood disaster management in Nigeria?
3. RESEARCH OBJECTIVES

This study is exploratory with a major purpose of collecting primary data on netizens’ experience and participation via social media during flood disaster in Nigeria. Subsequently, the specific objectives of this study is ‘To investigate the effect of netizens social media collaborative problem solving on disaster response phase of flood management in Nigeria.

4. PROBLEM STATEMENT

The continued propensity of flood incidents in Nigeria necessitated the establishment of additional institutions from the late 1990s to assist in flood disaster management in Nigeria (Obeta 2014). Subsequently, the National and State Emergency Management Agency (NEMA), the Federal Environment Protection Agency (FEPA) and the Nigerian Metrological Agency (NIMET) were unveiled. The N.E.M.A South West Zone covers Six (6) States which are: Lagos, Oyo, Ogun, Ondo, Ekiti and Osun. With an Operational Office in Ekiti which covers Ondo, Osun and Ekiti. (Nema 2014). NEMA is saddled with the responsibilities of reducing the impact, loss and damage incurred from disaster that may occur (NEMA, 2012). This involves with the plans of putting in place the necessary methods of responding to emergency occurrence. This method can be in form of an Emergency Response Plan (ERP), Simulation Exercises (SIMEX), training as well as early warning system. Inter-agency collaboration for emergency responses at national, state and local levels including civil society organizations and communication plans with easily understandable terminology and methods are all parts of NEMA’s operational purview (Houston, J. B., Hawthorne, J., Perreault, M. F., Park, E. H., Goldstein Hode, M., Halliwell, M. R., ... & Griffith, S. A. 2015 & NEMA 2012). Conscious of prevailing vulnerability of local communities to weather and climate related hazards, the zone adopts various strategies in confronting these disasters namely; collaboration with State Emergency Management Agencies (SEMAs) and other critical stakeholders to intensify efforts in disaster management through comprehensive early warning messages, awareness creation, multi-stakeholder workshops and training and simulation drills (NEMA 2012).

However, NEMA is constantly faced with numerous types of challenges in course of implementing the aforementioned measures. As stated by (Obeta 2014 & Nema, 2012), the challenges faced by N.E.M.A in Nigeria are but not limited to: Information management, inadequate number of sustainable flood control strategies, Non adherence to safety standards, Absence of up-to-date flood control acts, Inadequate Funding & Logistics, Non conformity to Rules & Regulations, Crowd Control, Absence of prior planning that addresses issues which boost flood.

5. RESIDENT NETIZENS AND DISASTER’S MANAGEMENT: FUNCTIONALITY OF SOCIAL NETWORK SITES.

A disaster is a “serious disorder of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources” (National Science and Technology Council, 2005, p. 21). Disasters, however, can generate crises for organizations when the residents become concerned not simply about the disaster itself, but also about how well organizations managed the disaster (Kim, J. H., Kim, M. S., & Nam, Y. (2018). Disaster communication deals with (1) disaster information circulated to the residents by governments, disaster emergency management organizations often via conventional and social network sites; as well as (2) disaster information created and shared by journalists and affected members of the residents often through word-of-mouth communication and social network sites.

Disaster emergency management is a process of attending to negative circumstances by governments, humanitarian agencies and individuals working together to reduce the potential losses resulting from disaster situation by developing policies and plans that can mitigate the effects, prepare for disasters and outline the procedures involved in responding to the victims in order to ensure quick recovery from the impacts (Sreenivasan, 2010; Warfield, 2008). Against the above backdrop, four major basic steps are involved in the disaster management process. These include mitigation, preparedness, response and repair(Jamali, M., Nejat, A., Ghosh, S., Jin, F., & Cao, G. 2019). In disaster management, Social network sites interaction can be seen in three dimensions. The first dimension is the interaction between emergency service agencies. The second dimension is the interaction between an emergency service agency and the community. The third dimension is the interaction between the communities amongst themselves (Jamali, M., Nejat, A., Ghosh, S., Jin, F., & Cao, G. 2019). The focus of this study is narrowed to the interaction of
residents’ emergency service agency and the community, enabled through the functionality of the Social Networking sites as shown in Figure 1

Figure 1: Functionality of the Social Networking site

6. RESIDENT NETIZENS PARTICIPATION IN DISASTER’S MANAGEMENT IN SOME COUNTRIES ENABLED THROUGH THE FUNCTIONALITY OF SOCIAL NETWORKING SITES:

A: The infobanjir Malaysian App: This application provides location of information Centre of Evacuation Centre and Flood Level throughout Malaysia. The Infobanjir Malaysia app provides information such as the Disaster Relief Centers, Evacuation Centre and Flood Level nearby in every area, Road closed due to flooding. The system allows the public to obtain information relating to flood victims and location of evacuation centers using the App.
Figure 2: The infobanjir app Malaysia.
Source: Publicinforbanjir.water.gov.my.
Accessed on 9th August 2019

**B: Wildfires (Red Cross) – USA**: This app from the American Red Cross provides information about active wildfires in the US, as well as areas that are under official fire warnings. You can let others know you are OK with an “I’m Safe” alert.
Figure 3: Wildfires (Red Cross) – USA
Source: cnet.com

C: Real time Warning – Global: The Real Time Warning app includes alerts and details about disasters around the world. Select an event and you can see its location, damage caused, severity, and impact radius on a world map. Tap one, and you see more detailed information, as well as quick links to share the news on social networks.
7. THE ACTOR NETWORK THEORY IN THE CONTEXT OF DISASTER MANAGEMENT

The application of Actor Network Theory (ANT) in disaster management research explains the leadership organizations of disaster management (humanitarian) and organizational cooperation in managing and preparing for the unexpected occurrence of disaster (Ngamassi, L., Ramakrishnan, T., & Rahman, S. (2016). Actor network theory provides a sociologically based investigative tool with which to understand how disputes are resolved, new ideas become accepted; new tools and protocols are adopted and integrated by a group (Ngamassi, L., Ramakrishnan, T., & Rahman, S. (2016). Actor networks are comprised of technical and non-technical components. The observed performance of a sailing boat is a consequence to not only of its technological design features, but also the skills of its skipper and crew (Ngamassi, L., Ramakrishnan, T., & Rahman, S. (2016). This combination is also responsible for the boats behaviour. ANT acknowledges the heterogeneous nature of actor networks by linking the human and non-human, sociological and technological, thereby revealing issues at the socio-technical edge (Hanseth & Montero, 2004). In essence, actor networks entail elements that make other elements dependent upon them, and translate the will
of others to accept its own language. Practically speaking, these elements or "actors" can include humans, groups of humans, organizations, texts, images, and technical artefacts: the term "actant" is often used, in order to avoid differentiating between human and non-human actors. Importantly, all actants are deemed to have their own interests, leading them to desire the alignment of the interests of other actants in the network to their own. If they are successful in this endeavour they will have created an actor network around them, which can be defined as "a heterogeneous network of aligned interests" (Ngamassi, L., Ramakrishnan, T., & Rahman, S. (2016).

In disaster management context, the basic idea of ANT is that, in order to achieve a goal, a network of faithful alliances needs to be created to carry the network builders’ intentions and materialize their goals (Ngamassi, L., Ramakrishnan, T., & Rahman, S. (2016). The theory holds a distinctive view of society as a network of humans and non-humans that interact and cooperate to pursue a certain goal. It therefore maintains that any network building would involve the recruitment of human and non-humans (Ngamassi, L., Ramakrishnan, T., & Rahman, S. (2016). ANT assumes that social and technical factors are inextricable. This means that people and artefacts are too closely linked to be separated and have to be analyzed within the same framework and context (Latour, 1987). The symbolic boundary between people and technologies is in a constant state of flux across a wide spectrum of contemporary work and leisure activities, and actor network theory offers one way to research the issues and dilemmas in this new globe.

In actor-network theory as articulated by Latour (1987; 1991, 1997b), technological innovation is viewed as an attempt to build and stabilize a diffuse system of allies composed of both human and non-human entities. This corresponds to a breakdown of the clear division between science and society, and it argues that there is no such thing as a social problem that does not have technological components, nor is there a technological problem that does not have social components. No project is purely technical, nor is it purely social. Actor network theory proposes the use of networks of interrelated human and non-human actors who shape the way things are, as ‘actor-networks’”. Hence, the theoretical perspectives of ANT are relevant to this study as the elements of ANT can be related to how the public, disaster management agencies and social media can form both human and non-human network to manage flood disaster.

8. HYPOTHESES DEVELOPMENT: NETIZENS PARTICIPATIONS AND SOCIAL MEDIA COLLABORATIVE PROBLEM SOLVING IN FLOOD MANAGEMENT

Research attention regarding public or popular use of social media in disasters has examined the kinds of content contained in messages that residents communicate. Some extant studies have also occurred in relation to the co-production of information in social media between members of the public and emergency management services during disaster events. Similarly, research by Chatfield, Scholl and Brajawidagda (2013) investigated residents’ involvement in co-producing critical public information via social media. These studies have revealed that social media has been serving as a form of Social Media Information Dissemination, Social Media Disaster Planning and Training, Social Media Collaborative Problem Solving as form of residents netizens participation in disaster management. Hence, this study hypothesized that social media collaborative problem solving significantly influence netizens’ participation in flood management. The following is the sub-hypothesis of this study:

H₃: Social media collaborative problem solving(SMCPS) significantly influence netizens’ participation in flood disaster preparedness(DPRE)

9. METHODOLOGY

This study employed a quantitative research approach where a survey research design was used through which questionnaires was employed for data collection (Robinson, O. C. (2014). The research was conducted in a cross-sectional design in which data was gathered at a specific point in time for the achievement of the study objectives(Robinson, O. C. (2014). The target population of this study is the resident institution responsible for disaster management of flood in Ibadan, Nigeria, i.e the Oyo State Emergency Management Agencies (OYSEMA), Nigerian Meteorological Agency (NIMET), Red Cross Association, Oyo branch and the Department of Communication in the University of Ibadan, Oyo State. The Red Cross society Nigeria has about 350,000 volunteers throughout the 36 states in Nigeria with the Oyo State having about 3722 volunteers. Nigerian Meteorological Agency (NIMET) has a staff strength of about 500, while the Oyo State Emergency Management Agencies (OYSEMA) has about 150
employees. Hence, the total population of this study amounts to 4372. Table 2 presents the population distribution of the study and the percentage contributed by each agency.

<table>
<thead>
<tr>
<th>AGENCIES</th>
<th>Population</th>
<th>Percentage (%)</th>
<th>Proportion Questionnaire distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>OYSEMA</td>
<td>150</td>
<td>3.43</td>
<td>12</td>
</tr>
<tr>
<td>NiMET</td>
<td>500</td>
<td>13.43</td>
<td>49</td>
</tr>
<tr>
<td>Red Cross</td>
<td>3722</td>
<td>85.13</td>
<td>314</td>
</tr>
<tr>
<td>Total</td>
<td>4372</td>
<td>100</td>
<td>370</td>
</tr>
</tbody>
</table>

Population distribution of the study

The sample size of this study was determined based on the total population of the study using the formula provided by Dillman (2000) and Weaver (2006)

\[
n = \frac{N(p)(1-p)}{(N-1)\left(\frac{B}{C}\right)^2 + p(1-p)}
\]

\[N = \text{population size}, \quad P = 0.5, \quad B = 0.05, \quad C = 1.96\]

Note: \(n\) = calculated sample size required for the desired level of precision

\(N\) = size of the population,

\(P\) = the proportion of the population expected to be chosen

\(B\) = the acceptable amount of precision or sampling error

\(C\) = is the K value associated with the confidence level.

The simplified sample size table provided by Krejcie and Morgan (1970) and research procedure by Robinson, O. C. (2014) gave that for a population size of 4000, a sample size of 364 is required for analysis at +/- 5% error level while a population of 5000 requires a sample size of 370 respondents. Therefore, a sample size of 370 is regarded as appropriate for a population of 4372 in this study and hence, used for the data analysis in the study. As such, the unit of analysis in this study is the individual member of staff of the agency of the Oyo State Emergency Management Agencies (OYSEMA), Nigerian Meteorological Agency (NiMET), and the Red Cross Society of Nigeria (Oyo State Chapter). These individuals were chosen because they are responsible for the flood disaster management in Ibadan. From the total sample size of 370, a total of 12 questionnaires was given to the OYSEMA, 49 to NiMET while 314 questionnaires were distributed to the Red cross society of Nigeria based on the proportional contribution of the agencies to the total population. The distribution of the questionnaire is presented in Table 2 above. The primary data collected in this study was analyzed using both the descriptive and the inferential statistics. The main data analysis was done using the partial least square – structural equation modelling (PLS-SEM). However, a number of preliminary activities (data screening) were conducted using the Statistical Package for Social Sciences (SPSS) version 25 software prior to the main data analysis. The essence of this was to ascertain the suitability of the collected data for the main data analysis.
10. TEST FOR HYPOTHESES AND FINDINGS

The result of the test of hypotheses and the structural model of the study are presented in this section. In achieving this, PLS path modeling multiple regression approach was used to test the effects of the exogenous variables on the endogenous variables using the bootstrapping technique in PLS to analyze the path modeling using 384 cases and 5000 bootstrapped samples to ensure that all the model parameters have empirical sampling distribution and standard errors were obtained. The path coefficients were estimated using t-statistics. According to Churchill (1979) and Sharma (2000), in a situation where a one-tailed statistical test is conducted, the significance level of t-value of 1% is greater than or equal to 2.326, at 5% is greater or equal to 1.645 while at 10% is greater or equal to 1.282, any t-value lesser than the stated are regarded as not significant.

The hypothesis of this study between social media collaborative problem solving (SMCPS) and resident netizens’ participation in flood disaster management hypothesizes that

\[ H_0: \text{Social media collaborative problem solving significantly influence netizens’ participation in flood disaster preparedness} \]

The findings of the study as shown in Table 4 revealed the standard path coefficients (\( \beta \)), standard error, t-value and the decision taken in this study. The findings shows that the stated hypothesis (SMCPS \( \rightarrow \) DPRE; \( \beta = 0.133, t = 1.581, P < 0.10 \)) shows a significant relationship between social media collaborative problem solving and resident netizens flood disaster management,

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>Path Coefficient</th>
<th>Beta</th>
<th>Std.Err</th>
<th>T-Statistics</th>
<th>Decisions</th>
</tr>
</thead>
<tbody>
<tr>
<td>( H_0 )</td>
<td>SMCPS ( \rightarrow ) DPRE</td>
<td>0.135</td>
<td>0.087</td>
<td>1.581</td>
<td>Significant</td>
</tr>
</tbody>
</table>

11. SUMMARY OF THE FINDINGS AND RECOMMENDATIONS

The objective of this study investigated the effect of social media collaborative problem solving (SMCPS) and resident netizens’ participation in flood disaster management. The study found a significant influence of social media collaborative problem solving (SMCPS) on residents’ flood disaster preparedness (DPRE). These finding implies that improvement in netizens social media use in collaboration to solving problems will improve the preparedness to flood disaster management in Ibadan, Nigeria and vice versa. The standardized beta value of the path co-efficient indicates that social media collaborative problem solving will improve flood disaster preparedness by 13.5%. The descriptive analysis of disaster response revealed that managing recovery operation in an organized and effective manner has a mean value of 2.85 indicating that the residents of flood prone area in Ibadan are undecided regarding the use of social media during flood disaster. Therefore, this study recommends that governments and disaster managements should encourage the use of social media information gathering, dissemination and collaborative problem solving (SMCPS) among the residents through policy making, awareness creation to promote the ways by which disasters are being managed especially in flood disaster preparedness stage.

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Modelling and Development of Flexible Blade Windmill

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Abstract - Wind energy continues to be one among the fastest-growing power generation sectors. In this paper, a small wind turbine was designed innovatively having different structure than the current windmill structure. The blade is an important part of a turbine and has a crucial role in the working of windmill. The objective of this windmill is to utilize the natural resource in a sustainable manner and design a windmill such that its blades will expand and contract based on the action of centrifugal force. If a windmill is designed and constructed in such a way that it can harvest more power over its life period, then it is a sustainable solution to our energy demand.

Keywords: Wind Energy, Wind mill, Power, power density, stress, Torque, Deflection.

1. Introduction
Renewable Energy Sources are those energy sources which are replenished over the period and cannot be rooted out when their energy is utilized. Technology is the main key to utilize natural phenomenon, such as sun-light, wind, tide waves. A lot of development in the technology has taken place over the time period for utilization of energy from the wind.

Gases flow on large scale is called wind, basically it is relative motion of air with respect to earth. The motioned air arises from a pressure gradient.

Over hundreds of years power has been extracted from the wind with historic designs, known as Windmills. No device, however is well-designed that can harvest all of the winds energy as the wind would have to brought to rest and this would hamper the transit of further air across the rotor. [1]

Wind turbines are generally classified as vertical axis wind turbine (VAWT) or horizontal axis wind turbine (HAWT) depending upon the axis orientation of their rotors. A wind turbine operates by slowing down the wind extracting a part of its energy in the process. For horizontal axis wind turbine, the axis of rotor remain horizontal and aligned parallel to the direction of wind stream. [2,3]

Wind being one of resource of renewable energy. Wind mills needs to be set up on specific regions such as on top the hill, deserts etc.

A. Literature survey
India shows interest in this field nearly at end decade of fifties and starting decade of sixties. For some months we imported the design and then we developed our own but this was not sustained for long time. In very recent years development works in various initiatives'. one of the important reason behind this less interest. An important reason for this lack interest in wind energy can be that, wind in regions of India are relatively low and very appreciably with the seasons. In India wind speed value lies between range 5km/hr. to 15-20km/hr. [3].

Recently, the increasing demand of renewable energy is very well noticed. According to a report by the International Energy Agency, the rise in amount of electricity extracted from renewable energy resources increased from just over 13% in 2012 to 22% the following year.

From early civilisation times wind was used for sailing the boats and for grinding the grains etc. The concept of using wind energy can be found in 4000BC when Egyptians used to sail the boats with the help of wind. By the 10th century Afghan and Iraqui peoples started windmills for grinding the grains.

Wind machines becomes popular because the energy can be used in various of ways. In 1854 Daniel Halladay in US introduced wind pump. Windmills were used for various types of works such as extracting oil from seed, sawing timber, raising water from wells etc. In 1880 for first time windmills was used as a source of electricity. The stimulus for the development of wind energy in1973 was due to rising prices of oil and main component responsible to drive attension for use of windmill for electricity was very less emission CO2. In Year 1974, NASA constructed and operated a wind generator having 100 kW capacity. This success encouraged the US firm to manufacture 2.5MW generator vin1987. [4,5,6].

Wind energy is important and crucial source of energy of all the sources. The concept of wind energy is transforming the kinetic energy of wind into mechanical energy. This energy drives blades that turn generators that produce electricity. Our project is fitting with wind energy source.

The aim of this project is to design efficient Small Horizontal Axis Wind Turbine (HAWT).

2. System Design
The requirement of hardware and software for designing of system is as follows:-

- 3 Big wooden blades
- 3 small wooden blades
- 2 circular plates
- Stand
- Nut & Bolts
Mechanical drawing mainly consists of stand, blades and bearings and specification of parts is as follows:-

- Diameter of plates= 24 cm
- Big blade= 60 * 8 * 2 cm
- Small blades= 35 * 5 * 2 cm
- Swept Area= 0.4417 sq. m
- Effective radius= 0.75 m

System design in CATIA is given as follows:

**Fig – 1: CAD Model of windmill**

### 3. Analysis and Calculation

With the use of fundamental beam bending equation anyone is able to calculate material stresses and local deflection at any point along the beam.

**Calculation:** Properties of material are taken same as that of properties of oak timber which have similar characteristics.

\[ \text{Rho } (\rho) = 750 \text{ kg/m}^3 \]
Fig 2: A blade model uniformly distributed aerodynamic load [2]

\[ F_D = 2.05 \times 0.5 \times 1.2 \times 20^2 \times 0.0655 = 32.226 \text{ N} \]

Since blade is modelled as cantilever

\[ I = \frac{bh^3}{12} = \frac{8 \times 2^2}{12} = 5.333 \]

\[ Z = \frac{bh^2}{2} = \frac{8 \times 2 \times 2}{12} = 2.667 \]

Maximum Deflection:

\[ \delta = \frac{wl^4}{8EI} = \frac{33 \times 75^4}{8 \times 19.7 \times 10^3 \times 5.333} = 1.243 \times 10^{-3} \text{m} \]

Stress at support \( \sigma = \frac{wl}{2Z} = \frac{33 \times 0.75}{2 \times 2.667} = 4.21875 \text{ MPa} \)

4.218 MPa is the stress occurred at root of the blade.

Since the MOR is 180 MPa, the blade will easily bear the applied loading (wind speed @20 m/sec).

Wind power generated: (@6m/s Wind speed)

\[ P = 0.5 \times \rho \times A \times U^3 \]
\[ P = 0.5 \times 1.21 \times 0.15 \times 6^3 \]
\[ P = 19.602 \text{ W} \]

Power Density: Unit Power over unit area.

\[ P = 0.6 \times V^3 \text{ watts per m}^2 \]

\[ \text{Table 1: Power Density and Wind speed} \]

<table>
<thead>
<tr>
<th>Wind Speed (km per h)</th>
<th>Wind Speed (m per sec)</th>
<th>Power Density (W per m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.278</td>
<td>0.013</td>
</tr>
<tr>
<td>10</td>
<td>2.778</td>
<td>12.86</td>
</tr>
<tr>
<td>25</td>
<td>6.994</td>
<td>200.939</td>
</tr>
<tr>
<td>50</td>
<td>13.889</td>
<td>1607.510</td>
</tr>
<tr>
<td>75</td>
<td>20.833</td>
<td>5425.347</td>
</tr>
<tr>
<td>100</td>
<td>27.778</td>
<td>12860.082</td>
</tr>
</tbody>
</table>

Torque produced by the turbine:

\[ T = 0.5 \times \rho \times A1 \times U^2 \times r \]

Where,
\( \rho = \text{density} \)
\( A1 = \text{Swept area} \)
\( U = \text{wind speed} \)
\( R = \text{radius} \)

\[ T = 0.5 \times 1.21 \times 0.4417 \times 36 \times 0.75 \]
\[ = 7.21 \text{ Nm (Wind speed @6m/s)} \]

By calculations and design validation we constructed a small wind turbine which will maintain its efficiency in low wind speed as well as in high wind speed. The above design is creative and more efficient than the regular small windmill.

4. Implementation and working

In this small windmill, as the wind speed increases the blades get expanded because the centrifugal force drives the blade outwards and when the wind speed is reasonably low the blades will contract and will fall inside. As the blades gets expanded it will increase the tip speed which will indirectly will increase the efficiency of the windmill.

Actual model after calculations and design validation shown as follows:-

Fig 3: Fabricated blades of windmill
Compared to the today's small windmill design, if the length of the blade is increased then there are chances of failure of blade but we have designed a small windmill in such a way that there will be two blade fixed at the ends and linked with spring so the blades will be expandable and contractible depending on wind speed. So there will be less chances of failure of windmill blades.

Blades: Many of the wind turbines have two blades or three blades. Wind flowing over the blade tends to lift the blades.

Theoretical Maximum Efficiency: For increased wind energy extraction, high rotor efficiency is desirable and should be increased within the range of economical production.

\[ P = 0.5 \times \rho \times A \times V^3 \]

Where,
- \( P \) = Energy (W)
- \( \rho \) = Density (kg/cubic m)
- \( A \) = Cross sectional area (sq. m)
- \( V \) = Wind velocity (m/sec)

Tip Speed Ratio (TSR): The rotor's rotational speed in relation to the undisturbed wind speed which plays a crucial role for efficiency of turbine. This is called the tip speed ratio, calculated [8] with following formula:

\[ \lambda = \frac{\Omega r}{V} \]

Where,
- \( \Omega \) = Rotational speed (rad/s)
- \( \lambda \) = TSR
- \( r \) = Radius (m)
- \( V \) = Wind speed (m/sec)

5. CONCLUSION

For the reason of noise, efficiency and aesthetics, the horizontal axis three blade design has an edge over VAWT in the modern wind turbine market for its capacity to work under variable load conditions.

The existing windmills have a fixed blade length. The range of wind speed they work efficiently is very small. Windmills are not capable rotate on their own in weak winds in contrary they shatter or break in the presence of very strong winds. Thus hindering electricity production.

For small wind turbine we tried to design a windmill which can expand and contract according to the wind speed and compared it with the regular one. Also it will maintain its efficiency in low wind speed as well as high wind speed.

Torque produced by the designed wind mill (7.21Nm) is more than the regular wind mill (6.15Nm), considering the wind speed of 6m/s. So it will be directly reflected in performance of the wind mill efficiency.

Small scale wind energy transformation systems are an efficient, environmentally friendly power source for hospitals, households and many more applications. This wind turbine design is able to withstand variable loading conditions like wind load, centrifugal load and gravity loads.

References


Peace Committees and Peacebuilding in Kenya: A case of Trans Mara Sub-County

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Abstract- The Peace Committees program in Kenya was rolled out in all districts in 2009 following the 2007/2008 post election violence to aid in peacebuilding and conflict management. However, the program did not made major breakthroughs in peace sustenance which therefore called for its evaluation. This paper is based on a study that was carried out to: determine the effectiveness of peace committees in peace building and conflict management in Trans Mara Sub-County, investigate involvement of women and youth in peace building initiatives in Trans Mara Sub-County, and to determine local measures in place to prevent recurrence of ethnic conflict in Trans Mara Sub-County that disrupt education and development. Systematic sampling was used to select households in each division from where respondents were derived. A total of 120 respondents (local residents) were sampled for the study. The researchers purposively sampled DCs, DOs, OCSs and OCPDs. Simple random sampling was used to select 10 representatives from 5 organizations (Civil Society and Faith-based Organizations) working for peace in Trans Mara Sub-County. The study findings established that the majority of the people involved in ethnic conflict were aged between 18 and 30. This research also established that the main cause of conflict in the region was ethnic/clan animosity which accounted for 61.1%. It was also established that peace campaigns yielded much in peace building. It was further concluded that the reason behind the provincial administration being the first to respond during times of conflict is because they lived among the community and they had the logistical capacity required to reach the scenes of crimes and assist the individuals affected. These findings are important since peace affects all spheres of life including achievement in education.

I. INTRODUCTION

1.0 Background to the study

In pursuit of sustainable peace, the international community through the United Nations (UN), has constantly employed political tools of diplomacy and mediation to help nations prevent and resolve conflicts peacefully to avert the suffering and destruction of war (Annan, 2005). Though conflicts are sometimes viewed normal and part of life as espoused by many scholars of conflict management including Dahrendorf (1969), Achoka (2010) and Okoth (2010), its effects on society often rises to abnormal proportions which therefore calls for rigorous peace building aimed at sustaining peaceful co-existence. According to Allchin (2011), Burma’s National Parliament approved the creation of a ‘peace committee’ to attempt to solve the country’s ongoing and seemingly intractable ethnic conflicts. In Bangladesh, peace committee was majorly established to restore normalcy and confidence among the citizens during times of conflict (Chandan, 1971).

The committee model has come to be the preferred peacebuilding and peacemaking initiative for many nations facing recurrence of conflicts or those immediately coming out of conflict. According to Odendaal et al (2006), peace committee is defined as a generic name for committees, or structures formed at the level of district, town or village with the aim of encouraging and facilitating joint and inclusive peacemaking and peacebuilding processes within its own context. The context in this case is determined by the circumstances and conditions leading to formation of local peace committees. For instance, Cartwright & Jenneker (2005) while undertaking a study on peace committee in South Africa, noted that peace committee was designed to enable people manage their own affairs while giving priority to disputes. It engaged in among other things: mediating and resolving disputes, promoting tolerance within ethnically diverse society and also educating citizens on alternatives to violence (Ball, 1998).

In Nepal, local peace committees demonstrated the capacity to reduce levels of violence especially when there is sufficient early warning. Odendaal et al (2006) argue that it proved beneficial when the country was experiencing transition from one constitutional dispensation to another. Peace committees helped in problem solving and community building by facilitating a common forum where disputants could meet and have issues addressed. This helped to restore community confidence and thus contributed to peace building.

Peace committees are by no means perfect institution guaranteed of success. They are mechanisms to build peace at local level under trying moments. In Uganda for instance, the Mercy Corps through the Pader Peace Program (PPP), successfully addressed the gaps in peace building and conflict mitigation through its trained peace committees at sub-county and parish levels and also on monthly radio broadcasts (USAID, 2009). The Mercy Corps who operated in Pader district of Northern Uganda where there had been long standing conflict of nearly 20 years between the Lords’ Resistance Army (LRA) and the Uganda government, observed that peace committees earned trust and respect from the communities that other government
institutions such as courts could not due to corruption, high fees and lengthy bureaucratic processes (USAID, 2009).

Until very recently, security in Kenya was a preserve of government with stakeholders not given a chance to be part of the process (Modogashe Declaration, 2005). Local peace committees, therefore, had their roots in the failure of the state to provide security and justice to its citizens. The community members in return took the initiative to manage their own conflicts since they could not access the formal judicial system for lack of trust in government-led conflict prevention interventions (Adan & Pkalya, 2006).

However, in the recent years, broader and holistic approach has been developed through the national steering committee (NSC) which became functional in 2003. This testified the government commitment to enhance and inculcate participatory approach in all realms of life. Former provincial commissioner of North Eastern, John Nandasaba, was quoted saying, “It is true that the government can indeed enforce peace. However, it is the responsibility of the community to create peace” (Modagash Declaration, 2005). It is in this context that peace committees have been established at various levels, including National, District, Divisional, Locational and Sub Locational levels (GOK, 2009). Since the inception of peace committees in Kenya, the committees have however performed with minimal success which therefore calls for evaluation of its effectiveness in peace building especially in Trans Mara district which has faced sporadic ethnic clashes in the recent past.

II. LITERATURE REVIEW

Research question: Are women and youth sufficiently involved in peace building initiatives in Trans Mara district?

For a long time, women and youth form majority of those affected by conflict yet according to Adan&Pkalya (2006), the existing peace building mechanisms including peace committees have remained insensitive to incorporate gender and age in peace building initiatives. The semblance of peace building that has been witnessed in the recent past has been largely urban-centric and one-time event with much pre-occupation in media campaigns and youth exchanges (Kloppet al, 2010). This therefore has neglected the rural folk together with the peace building mechanisms in those localities.

Peace building initiatives involves a collection of strategies used to reverse the destructive processes that accompany violence. It encompasses economic, social, political and cultural issues (Mc Donald, 1997). For a long time; women and youth involvement in peace initiatives has been largely neglected. For instance, the 1995 UN Fourth World Conference of Women in Beijing called for inclusion of women in conflict resolution at decision making levels. In fact, it was a major step in recognizing and legitimizing the role of women in conflict resolution and peacemaking at grassroot levels (UN, 1995:61).

Since then, women involvement and participation in conflict management and peace building has been receiving special attention because they represent a vital resource for sustaining peace efforts at all levels (UNESCO, 1999:4). In South Africa for instance, it was observed that 59% of participants in peace gatherings were women while youth formed 17% (Cartwright &Jenneker, 2005). Studies portraying women as principal drivers of peace initiatives, and participants in the rituals of peace, often preclude their full participation in that when peace negotiations and rebuilding destroyed economies are formalized, women often fade into the background (Sorensen, 1998, Henderson 1994, Achieng 1998).

In Kenya, Kilgoris women workshop (2012) revealed that the women in that district had been left behind in essential committees like peace committees mostly because of the culture that hardly recognizes them in the area. The plenary noted that women had marginally been sidelined in participating in conflict resolution on conflicts which mostly affected them. The negative culture affected women in the sense that they were not allowed to talk before men or even engage in decision making process in the presence of men (Kilgoris women workshop, 2012). Kathina (2000) observed that conventional methods of peace building do not capture the full range of informal efforts and processes that contribute to nurturing and sustaining peace. Some of these informal efforts are contributed largely by women.

Waki (2008) noted that during the post-election violence of 2007/2008 for instance, the youth were mobilized for violence for as little as two hundred shillings and with a bottle of alcohol. They also engaged in actual raids especially to acquire cattle to be used to settle bride price and for heroism purposes. He however postulates that the youth on the other hand is an asset bringing billions of shillings through music, modeling, arts and sports. Active Citizens (2011) also noted that politicians generally mobilize the youth for political assignments. They are called Jeshis/Mitha (literally, ‘army’). These groups are easily mobilized and very difficult to demobilize. Peace Net (2009) proposed engagement of the youth in productive activities such as Kazi kwa vijana projects (Work for the youth) and sports, in an effort to lessen tension and facilitate reconciliation between Trans Mara and its neighbouring Sub-Counties of Kuria, Gucha and Migori. Indeed the government created youth projects yet ethnic clashes in Trans Mara persisted. This called for more in-depth assessment into involvement of youth in peace building initiatives.

III. RESEARCH METHODOLOGY

According to Kothari (2003), research design refers to the way a study is planned and conducted as well as procedures and techniques used to address the research problem. This study adopted both descriptive and historical research designs. Since the study was majorly concerned with describing such things as attitudes, values and behavior, descriptive and historical designs were found adequate for the study. The researchers employed both quantitative and qualitative approaches to data collection, analysis and presentation. Historical design assisted in exploring, explaining and understanding the past about the subject from data already available. The aim was to collect relevant information that provided baseline data upon which the situation in post peace committee peace building was compared.

Trans Mara Sub-County is located in the south western part of Rift Valley in Narok County. It consists of five administrative divisions namely: Kilgoris, Pirrar, Lolgorian, Keyian and Kirindon. In total it covers an area of approximately 2900Km². The Sh-County lies between latitudes 00 50’ South & 10 50’ North and Longitudes 34 35’ East & 350 14’ West. It borders the Republic of Tanzania to the South, Migori and Kuria
Sub-Counties to the West; Gucha, Nyamira and Bomet Sub-Counties to the North and Narok Sub-County to the East (Trans Mara district annual report, 2009).

According to Nachmias & Nachmias (1996), a population is an aggregate of all cases that conform to certain characteristics which are of interest to the researcher. The study population specifically comprised of the Provincial administration officers (DC’s, DO’s, and Chiefs), Civic leaders, senior security personnel (OCS, OCPD), representatives of Civil Society Organizations and Faith-based groups and local residents.

Sampling refers to the process of selecting a portion of the population that conforms to a designated set of specifications to be studied. Kendall & Kendall (2005) observe that sampling is advantageous for it allows the researcher to draw generalization and reduce bias. According to Nachmias & Nachmias (1996), sampling is necessary because it is extremely expensive and nearly impossible to collect data from all members of the study population. The study employed both probability and non-probability sampling procedures.

Simple random sampling was used to get 10 representatives from about 5 organizations (Civil Society and Faith-based organizations) working for peace in Trans Mara Sub-County of Narok County. The organizations that were sampled included Trans Mara Peace Net, Pro Mara, Catholic Justice and Peace Commission (CJPC), National Council of Churches of Kenya (NCCCK) and Trans Mara Human Rights Network. The selection of 10 representatives was stratified to ensure equal number of males and females. Civic leaders and chiefs were also selected using simple random sampling whereby out of the 18 civic wards and 32 locations, 9 civic leaders and 16 location chiefs were sampled for the study.

Sample Size for local residents per Division using Available Sampling Procedure

<table>
<thead>
<tr>
<th>Administrative Division</th>
<th>Sample Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Keiyan</td>
</tr>
<tr>
<td>2</td>
<td>Kilgoris</td>
</tr>
<tr>
<td>3</td>
<td>Kirindoni</td>
</tr>
<tr>
<td>4</td>
<td>Lolgorian</td>
</tr>
<tr>
<td>5</td>
<td>Pirrar</td>
</tr>
<tr>
<td>TOTAL</td>
<td>120</td>
</tr>
</tbody>
</table>

Source: Researchers (2013)

The study utilized questionnaires, interviews, Focus Group Discussion and content analysis as the main means of collecting data. The sources of data were primary and secondary. Primary data was collected using questionnaires, focus group discussions and interview schedules. Secondary data was derived from books, journals, internet and other publications by employing content analysis.

The study gathered quantitative data from 120 local residents through use of self-administered questionnaires. The selection of the tool had been guided by the nature of data to be collected and the time available for the study. According to Kothari (2003), a questionnaire is a useful data collection instrument since it allows large amount of data to be collected within a shorter time and on a wider geographical area. Since the study was mainly concerned with views, opinions and perceptions, such information could best be collected through the use of questionnaires (Touliatos, 1988).

Purposive sampling ensures that only participants who are knowledgeable about an issue in question are selected (Brink, 1996). The researchers therefore purposively sampled DC’s, DO’s, OCS and OCPD. The greater Trans Mara Sub-County had five administrative divisions each under a DO, 2 Police Stations each headed by OCS, 1 Police division headed by OCPD and 2 DC’s one representing the newly created Dikir (Trans Mara West) and the other Trans Mara East. These administrative units were used as samples in the study.

Systematic sampling was used to select households in each division from where respondents were derived. In the 5 administrative divisions, a total of 120 respondents (local residents) were sampled for the study. The start number was derived using simple random sampling of 5 pieces of paper numbered 1-5, folded and placed in a container and shaken well to mix. 1 piece was picked to reveal the start number upon which other numbers were determined at an interval of 5. Linear features such as roads, power lines were a guide in maintaining direction. To ensure representativeness of the sample, the researchers employed stratified sampling method so as to ensure that each of the 5 divisions of Trans Mara district had a fair share of participating in the study. Simple disproportionate sampling, however, was equally used alongside the strata (divisions) to allow stratum with greater variation in terms of population and ethnic orientation a fairly higher number of representatives in the study. The researchers utilized available sampling procedure to get a sample totaling to 165 respondents comprising of 120 local residents, 23 provincial administration officers, 3 senior security officers, 9 civic leaders and 10 representatives of the civil society and Faith-based organizations.

The study utilized questionnaires, interviews, Focus Group Discussion and content analysis as the main means of collecting data. The sources of data were primary and secondary. Primary data was collected using questionnaires, focus group discussions and interview schedules. Secondary data was derived from books, journals, internet and other publications by employing content analysis.

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The study utilized questionnaires, interviews, Focus Group Discussion and content analysis as the main means of collecting data. The sources of data were primary and secondary. Primary data was collected using questionnaires, focus group discussions and interview schedules. Secondary data was derived from books, journals, internet and other publications by employing content analysis.
FGD’s and interviews was analyzed by coding common themes and presenting them in form of generalized statements. Quantitative data from questionnaires was analyzed using descriptive and inferential statistics. Measures of distribution, percentages and frequencies were applied in analyzing the data with the aid of Statistical Package for Social Sciences (SPSS) version 20.

IV. DATA ANALYSIS, INTERPRETATION AND PRESENTATION

This section presents the analysis of data findings on peace committees in peace building and conflict management in Trans Mara Sub County in Kenya. The research targeted Provincial administration officers (DC’s, DO’s, and Chiefs), Civic leaders, senior security personnel (OCS, OCPD), representatives of Civil Society Organization and Faith- based groups and local residents. The commendable response rate was achievable after the researcher administered the questionnaires personally and made personal visits and phone calls to remind the respondents to fill-in and return the questionnaires. Descriptive statistics and content analysis were used to analyze the data. In the descriptive statistics, relative frequencies were used in some questions and others were analyzed using mean scores with the help of Likert scale ratings in the analysis. Content analysis was used to analyze opinion of the respondents in the open ended questions.

General Information

**Figure 1: Percentage of respondents by gender**

<table>
<thead>
<tr>
<th>Gender</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>60.3%</td>
</tr>
<tr>
<td>Female</td>
<td>39.7%</td>
</tr>
</tbody>
</table>

From the findings on the gender of the respondents the study found that 60.3% of the respondents were male whereas 39.7% of the respondents were female. This shows that both genders in this region were fairly represented.

**Figure 1: Respondents age bracket**

<table>
<thead>
<tr>
<th>Age Bracket</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-20</td>
<td>1.4%</td>
</tr>
<tr>
<td>21-30</td>
<td>44.6%</td>
</tr>
<tr>
<td>31-40</td>
<td>31.7%</td>
</tr>
<tr>
<td>41-50</td>
<td>15.8%</td>
</tr>
<tr>
<td>51-60</td>
<td>5.9%</td>
</tr>
<tr>
<td>Above 60</td>
<td>0.7%</td>
</tr>
</tbody>
</table>

On the respondent age, the study found out that 44.6% of the respondents indicated that they were aged between 21 to 30 years, 31.7% of the respondent indicated that they were aged between 31 to 40 years, 15.8% of the respondent indicated that
they were between 41 to 50 years, 5.9% of the respondent were between 51 and 60 years, 1.4% indicated to be between 18 to 20 years and finally 0.7% indicated to be above 60 years. Majority of the respondents were in their youthful age and this was the best group to interview since they play the huge role in conflict scenarios.

On the level of education on the respondents in this study, the study found out that majority of the respondents had reached primary level as shown by 47.9%. 22.6% of the respondents indicated that they had reached secondary level, 17% indicated to had reached university level while as only 12% indicated to had reached college level as their highest level of academic qualifications. This shows that majority of these respondents were not learned and from the knowledge acquired from schools they were not very clear on how to figure out the main causes and how to tackle this ethic conflict menace in their society.

On Peace Building and Conflict Management

The study was keen to investigate the likely cause of conflict in Trans Mara sub county, from the study, majority of the respondents indicated that the main cause of conflict in the region was ethnic animosity as shown by 61.1%, 33.6% stated that the cause of conflict was resource based causes and finally 4.8% stated that crime has also been a source of conflict in the region. This indicates that ethnicity had contributed much to the conflict witnessed in the area. These findings concurs with the findings of Adan&Pkalya (2006) who observed that in most communities especially pastoralist communities where scarcity of resources was the main cause of conflict, resource management agreement helped to do reduce tensions among the many ethnic communities co existing together.

<table>
<thead>
<tr>
<th>Immediate institution</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provincial administration</td>
<td>65</td>
<td>44.5</td>
</tr>
<tr>
<td>Religious leaders</td>
<td>21</td>
<td>14.4</td>
</tr>
<tr>
<td>Council of elders</td>
<td>42</td>
<td>28.8</td>
</tr>
<tr>
<td>Peace committee representatives</td>
<td>18</td>
<td>12.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>146</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

The study also wanted to establish the most immediate institution that responded to resolve conflict whenever it occurred, from the study, majority of the respondents indicated that provincial administration played significant role in conflict resolution as shown by 44.5%, 28% of the respondents indicated that council of elders were always involved calm down the occurrences as shown by 28.8%, 14.4% indicated religious leaders and finally 12.3% indicated peace committee and representatives. This shows that all representatives in the community were in involved in resolving conflict but the government played the significant role since it had resources and man power to bring volatile situations back to normalcy.
Table 2: First responders in times of conflict

<table>
<thead>
<tr>
<th>First responders</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>They live among the community</td>
<td>83</td>
<td>56.8</td>
</tr>
<tr>
<td>They have the required logistical capacity</td>
<td>54</td>
<td>37.0</td>
</tr>
<tr>
<td>Not aware</td>
<td>9</td>
<td>6.2</td>
</tr>
<tr>
<td>Total</td>
<td>146</td>
<td>100.0</td>
</tr>
</tbody>
</table>

The research also wanted to establish the reason behind the institution mentioned in the previous question being the first to respond in times of conflict, from the study majority of the respondents indicated that the reason behind the provincial administration being the first to respond during these calling times is because they lived among the community as shown by 56.8%, 37% of the respondents indicated that it was because they had the logistical capacity required to reach the scene of crimes and assist the individuals affected. Others indicated that they were not aware as shown by 6.2%. This is a clear indication that much more is desired from the government. The government should increase the number of police posts and fully equip the police officers will all required equipments be it guns, vehicles, surveillance machines and high powered communication gadgets. This would assist in earlier detection of the few that may decide to cause conflict and deal with them appropriately rather act when it’s too late.

Table 3: Peace committee representatives

<table>
<thead>
<tr>
<th>Peace committee representatives</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>25</td>
<td>17.1</td>
</tr>
<tr>
<td>Second</td>
<td>33</td>
<td>22.6</td>
</tr>
<tr>
<td>Third</td>
<td>40</td>
<td>27.4</td>
</tr>
<tr>
<td>Fourth</td>
<td>48</td>
<td>32.9</td>
</tr>
<tr>
<td>Total</td>
<td>146</td>
<td>100.0</td>
</tr>
</tbody>
</table>

On assigning the position of Peace committee representatives in terms of their speed of response to conflict situation whenever it occurred in Trans Mara, the study found out that majority of the respondents assigned peace committee representatives fourth as shown by 32.9%, 27.4% assigned it third, 22.6% assigned it second whereas only 17.1% assigned first. This shows that Peace committee representatives come at the far end in times of conflict resolution in the community.

Table 4: Council of elders

<table>
<thead>
<tr>
<th>Council of elders</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>first</td>
<td>20</td>
<td>13.7</td>
</tr>
<tr>
<td>Second</td>
<td>39</td>
<td>26.7</td>
</tr>
<tr>
<td>third</td>
<td>46</td>
<td>31.5</td>
</tr>
<tr>
<td>fourth</td>
<td>41</td>
<td>28.1</td>
</tr>
<tr>
<td>Total</td>
<td>146</td>
<td>100.0</td>
</tr>
</tbody>
</table>

On assigning the position of Council of elders in terms of their speed of response to conflict situation whenever it occurred in Trans Mara, the study found out that majority of the respondents assigned Council of elders third as shown by 31.5%, 28.1% assigned it fourth, 26.7% assigned it second whereas only 13.7% assigned first. This shows that Council of elders also comes among the last options conflict resolution in the community.

Table 5: Provincial administration

<table>
<thead>
<tr>
<th>Provincial administration</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>first</td>
<td>52</td>
<td>35.6</td>
</tr>
<tr>
<td>Second</td>
<td>45</td>
<td>30.8</td>
</tr>
<tr>
<td>third</td>
<td>20</td>
<td>13.7</td>
</tr>
<tr>
<td>fourth</td>
<td>29</td>
<td>19.9</td>
</tr>
<tr>
<td>Total</td>
<td>146</td>
<td>100.0</td>
</tr>
</tbody>
</table>
On assigning the position of Provincial administration in terms of their speed of response to conflict situation whenever it occurred in Trans Mara, the study found out that majority of the respondents assigned Provincial administration first as shown by 35.6%, 30.8% assigned it second, 19.9% assigned it fourth whereas only 13.7% assigned third. This shows that Provincial administration used to be the first in case of conflict in the region.

Table 6: Peace building programs

<table>
<thead>
<tr>
<th>Peace building programs</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>96</td>
<td>65.8</td>
</tr>
<tr>
<td>No</td>
<td>31</td>
<td>21.2</td>
</tr>
<tr>
<td>Don't know</td>
<td>19</td>
<td>13.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>146</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

The researcher wanted to determine whether there was peace building programs being carried out to promote peaceful coexistence among communities in Trans Mara district, from the study majority of the respondents indicated that there were peace building programs being carried out to promote peaceful coexistence as shown by 65.8%, 21.2% indicated that there no such initiative whereas only 13% of the respondents who indicated that they did not know. This is a clear indication that the individuals in the region have realized the importance of peace initiatives programmes and have also realized that no peaceful coexistence could be achieved until all parties are brought to the same platform and be made to understand the importance of peace.

Table 7: Peace committees in Trans Mara sub county

<table>
<thead>
<tr>
<th>Peace committees</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>93</td>
<td>63.7</td>
</tr>
<tr>
<td>No</td>
<td>53</td>
<td>36.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>146</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

On whether the respondents were aware of peace committees in Trans Mara district, the study established that majority of the respondents indicated that there existed peace committees in the sub county as shown by 63.7% whereas only 36.3% who indicated that at no anytime there existed peace committees in the district.

Table 8: Existence of peace committee in Trans Mara Sub County

<table>
<thead>
<tr>
<th>Aware of the existence of peace committee</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Through a friend</td>
<td>44</td>
<td>30.1</td>
</tr>
<tr>
<td>Over the radio</td>
<td>9</td>
<td>6.2</td>
</tr>
<tr>
<td>In a public baraza</td>
<td>66</td>
<td>45.2</td>
</tr>
<tr>
<td>Other</td>
<td>27</td>
<td>18.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>146</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

On how the respondents became aware of the existence of peace committee in Trans Mara district, the study found out that majority of the respondents indicated that they became aware of these committees in public baraza, as shown by 45.2%, 30.1% indicated that they learned of existence through friends, 18.5% indicated that they heard of the committees from other sources and finally 6.2% indicated that they became aware of the peace committees over the radio. This is an indication that provincial administration which should conduct as much as possible barazas in the district so that they can preach peace and let the people know that its only with peaceful coexistence they will be able to exploit the economical resources they have and live a good life.

Table 9: Civil society education to the community

<table>
<thead>
<tr>
<th>Civil society</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>73</td>
<td>50.0</td>
</tr>
<tr>
<td>No</td>
<td>73</td>
<td>50.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>146</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>
On the respondents' opinion whether the civil society was doing enough to educate the community on the need for peace, the study established that 50% of the respondents indicated yes and 50% indicated no. This shows that the civil society is there but much impact not been felt in preaching peace and propagating for peaceful coexistence.

Among the reasons which made the respondents feel that the civil society has been doing a good job is because they prepared workshop for youth, women and men. They also encouraged people to live together and they educated people to trade together and live together. The civil societies have even taken these campaigns even in churches. They have continued to mobilize the various stakeholders, provincial administrations, local community leaders towards peace initiatives.

Table 10: Respondent’s level of agreement

<table>
<thead>
<tr>
<th>Attributes</th>
<th>N</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peace committee are effective approach to peace building and</td>
<td>146</td>
<td>5.00</td>
<td>2.12</td>
<td>0.19</td>
</tr>
<tr>
<td>conflict management</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Women and youth have been adequately involved in peace building</td>
<td>146</td>
<td>5.00</td>
<td>2.99</td>
<td>0.32</td>
</tr>
<tr>
<td>initiatives</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peace committee resolutions often result in peaceful co-</td>
<td>146</td>
<td>5.00</td>
<td>2.39</td>
<td>0.16</td>
</tr>
<tr>
<td>existence</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Women are critical to be involved in decision making levels</td>
<td>146</td>
<td>5.00</td>
<td>2.36</td>
<td>0.41</td>
</tr>
<tr>
<td>for peace building and conflict management</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Government provides adequate support to peace committees in</td>
<td>146</td>
<td>5.00</td>
<td>2.59</td>
<td>0.33</td>
</tr>
<tr>
<td>Trans-Mara</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peace campaigns yield much in peace building</td>
<td>146</td>
<td>5.00</td>
<td>1.93</td>
<td>0.11</td>
</tr>
</tbody>
</table>

The study also wanted to establish the respondent’s level of agreement on the above statements, from the study majority of the respondents agreed that peace campaigns yield much in peace building as shown by a mean of 1.93, they further agreed that peace committee are effective approach to peace building and conflict management and that women are critical to be involved in decision making levels for peace building and conflict management as shown by a mean of 2.36. It was further established that Peace committee resolutions often result in peaceful coexistence and the government provides adequate support to peace committees in Trans-Mara.

Table 11: Age group participation

<table>
<thead>
<tr>
<th>Age group participation</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-20</td>
<td>15</td>
<td>10.3</td>
</tr>
<tr>
<td>21-30</td>
<td>89</td>
<td>61.0</td>
</tr>
<tr>
<td>31-40</td>
<td>35</td>
<td>24.0</td>
</tr>
<tr>
<td>41-50</td>
<td>2</td>
<td>1.4</td>
</tr>
<tr>
<td>51-60</td>
<td>5</td>
<td>3.4</td>
</tr>
<tr>
<td>Total</td>
<td>146</td>
<td>100.0</td>
</tr>
</tbody>
</table>

The study also wanted to establish the age groups that participated in most of the ethnic conflict, from the study, it was revealed that majority of the people involved in ethnic conflict were aged between 21 and 30, as shown by 61%, others stated 31 to 40 as shown by 24%, 10.3% indicated 18 to 20 years, 3.4% indicated 51 to 60 and finally 1.4% indicated 41 to 50. This is an indication that the youths who are in their early adult hood are the most prone to participation in ethnic conflict. This has been brought about by poor education system making majority of them drop out of school and recruited in very dangerous gangs that carries out the raids. Low level of employment also plays a role in this. Incase these young adults are fully absorbed into the labour markets there will no one to conduct these inhumane actions.
The study also wanted to establish whether the respondent’s community was still relying on traditional measures of conflict resolution, from the findings majority of the respondents indicated that they were still relying on traditional measures of conflict resolution as shown by 85.6% whereas 14.4% indicated that they did not rely on the reliance on traditional measures of conflict resolution.

On the most traditional conflict resolution measure being practiced in Trans Mara, the study established that council of elders was the most used practice as shown by 63%. 18.5% of the respondents indicated intermarriages, 17.8% of the respondents indicated resource management agreement and finally 0.7% indicated others. This shows that traditional conflict resolution practices are still being practiced in the district.

V. SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

From the analysis and data collected, the following discussions, conclusion and recommendations were made. The responses were based on the objectives of the study. The purpose this study was to analyze the effectiveness of peace committee in peace building and conflict management in Trans Mara district, to investigate involvement of women and youth in peace building initiatives in Trans Mara district, to determine local measures in place to prevent recurrence of ethnic conflict in Trans Mara district among the community and they had the logistical capacity required to reach the scene of crimes and assist the individuals affected. This is a clear indication that much more is desired from the government.

The research further established that there were peace building programs being carried out to promote peaceful coexistence. This is a clear indication that the individuals in the region have realized the importance of peace initiatives programmes and have also realized that no peaceful coexistence could be achieved until all parties are brought to the same platform and be made to understand the importance of peace. It was also revealed that that provincial administration should conduct as much as possible barazas in the district so that they can preach peace and let the people know that it’s only with peaceful coexistence that will enable their children go to school and complete their education. This will enable them exploit the economic resources they have and live a good life.

It also came to the researchers attention that peace campaigns yield much in peace building and this was represented by a mean of 1.93. Peace committee are effective approach to peace building and conflict management and that women are critical to be involved in decision making levels for peace building and conflict management and Peace committee resolutions often result in peaceful co-existence and the government provides adequate support to peace committees in Trans-Mara.

The research also established that majority of the people involved in ethnic conflict were aged between 21 and 30. This is an indication that the youths who are in their early adult hood are the most prone to participation in ethnic conflict. This has been brought about by poor education system making majority of them drop out of school and recruited in very dangerous gangs that carries out the raids. Low level of employment also plays a role in this. Incase these young adults are fully absorbed in the labour markets there will no one to conduct these inhumane acts. It also revealed that the community was still relying on traditional

<table>
<thead>
<tr>
<th>Traditional measures</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
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<tbody>
<tr>
<td>Yes</td>
<td>125</td>
<td>85.6</td>
</tr>
<tr>
<td>No</td>
<td>21</td>
<td>14.4</td>
</tr>
<tr>
<td>Total</td>
<td>146</td>
<td>100.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Traditional conflict resolution</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Council of elders</td>
<td>92</td>
<td>63.0</td>
</tr>
<tr>
<td>Resource management agreement</td>
<td>26</td>
<td>17.8</td>
</tr>
<tr>
<td>Intermarriages</td>
<td>27</td>
<td>18.5</td>
</tr>
<tr>
<td>Others</td>
<td>1</td>
<td>0.7</td>
</tr>
<tr>
<td>Total</td>
<td>146</td>
<td>100.0</td>
</tr>
</tbody>
</table>

The research also established that the main cause of conflict in the region was ethnic animosity which was represented by 61.1%. These findings concur with the findings of Adan & Pkalya (2006) who observed that in most communities, especially pastoralist ones, scarcity of resources was the main cause of conflict. Resource management agreement helped to do reduce tensions among the many ethnic communities co-existing together. It was further established that provincial administration played significant role in conflict resolution. This shows that all representatives in the community were involved in resolving conflict but the government played the significant role since it had resources and man power to bring volatile situations back to normalcy.

The reason behind the provincial administration being the first to respond during these calling times is because they lived...
measures of conflict resolution and that council of elders was the most practiced.

Conclusion

The study concludes that main cause of conflict in the region was ethnic animosity and that provincial administration played significant role in conflict resolution. It further concludes that the reason behind the provincial administration being the first to respond during these calling times is because they lived among the community and they had the logistical capacity required to reach the scene of crimes and assist the individuals affected.

This research also concludes that there were peace building programs being carried out to promote peaceful coexistence. This is a clear indication that the individuals in the region have realized the importance of peace initiatives programmes and have also realized that no peaceful coexistence could be achieved until all parties are brought to the same platform and be made to understand the importance of peace.

The study also concludes that peace campaigns yield much in peace building and peace committee are effective approach to peace building and conflict management and that women are critical to be involved in decision making levels for peace building and conflict management.

The study finally concludes that majority of the people involved in ethnic conflict are aged between 21 and 30. This has been brought about by poor education system making majority of them drop out of school and recruited in very dangerous gangs that carries out the raids. Low level of employment also plays a role in this. Incase these young adults are fully absorbed in the labour markets there will no one to conduct these inhumane actions.

Recommendations

This study therefore recommends that peace resolution initiate such as meeting people in churches, schools and launching peace campaigns should be adopted in the peace preaching process. This would play a significant role in creating awareness of peace initiatives. Organisations should use vehicles such as trailers and even hold public meetings and renew the committee’s mode of doing things.

Training of youths and women should also be given more priority. This would empower them with more knowledge on what bring conflicts among communities and how to resolve it amicably. Formal education should also be encouraged among the youths which will finally promote and enhance development among other communities.

The county government should emphasize much on having local barazas whereby all the stakeholders in the district can fully participate giving their opinion in regard to peace process and train everyone to be a peacemakers. Continuous monthly meetings and barazas by chiefs and assistant chiefs so that mwananchi could know that there is a government which is responsible. There should also be equal distribution of wealth and resources and a lot of transparency in sharing the resources despite ethnicity especially at this time of devolution in the county.

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Performance of Civil Aparature (ASN) In The Government Institute In North Sulawesi Campus

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Abstract: This study aims to find out how the performance of employees at the North Sulawesi Campus of State Administration Institute, by analyzing various factors related to the improving employee performance. This research is a qualitative study where data is taken through interviews, observations and documentation. The results showed that the performance of the State Civil Apparatus in the North Sulawesi Campus IPDN environment was considered to be still not optimal. This is because there are still some employees who are often late or do not participate in the morning and evening roll call events as well as the flag ceremony activities. Besides these, the level of performance provided by the apparatus at IPDN North Sulawesi Campus is strongly influenced by several factors including, the condition of supporting facilities and infrastructure, leadership factors, and team work which will then become a driver or inhibitor in the performance results. Therefore efforts to reform must continue to be carried out in order to improve the quality of the performance of the apparatus in the North Sulawesi Campus IPDN in particular, and the effectiveness and efficiency of achieving the overall objectives of IPDN can be achieved.

Keywords: performance, performance appraisal system, achievement of organizational goals.

PRELIMINARY

One aspect that has a big role in improving government bureaucracy is Human Resources. This resource has a strategic position and is important in organizational development as a thinker, planner, mobilizer, and implementer in making effectiveness and maximizing the achievement of organizational goals. Besides that, this resource also manage other resources; In other words, without these resources, other resources will not be able to be utilized and maximized effectively for the achievement of organizational goals because they are passive.

Human Resources in question is the government government aparature or referred to as ASN as the main factor in the administration, especially in the framework of achieving national goals as mandated in the IV paragraph of the 1945 Constitution. This means that the smooth implementation of existing tasks and development will greatly depend to the perfection of the human resources that is reflected by the ASN figure who is able to play its role well, and competent figure as indicated by a high discipline, loyalty to the nation, proper moral and mental value, professional and aware of its responsibilities as public steward. In other words, the quality of self is manifested through the performance and achievement oriented actions.
The Domestic Government Institute or IPDN as one of the official agencies under the auspices of the Ministry of the Interior has contributed in realizing the goals of the country mentioned above. This is in accordance with the Vision of IPDN, namely: "Becoming a reliable civil service Higher Education in producing competent, character and personality cadres of government". In line with this vision, IPDN is placed in an important position for national development because it will produce graduates who will work and serve as State Civil Apparatus (ASN) both at the central and regional levels.

Graduates of IPDN as competent, character and personality cadres of the government will not be able to be produced optimally if the state apparatus whose given the task and mandate to educate, guide and foster Praja (a term for IPDN students), including other supporting aspects not able to carry out their duties and responsibilities as in accordance with the Main Duty and Function (TUPOKSI). In other words, this is in accordance with the previous explanation which is related to the performance aspects that provided for maximizing the achievement of the objectives of IPDN in general, and IPDN of the North Sulawesi Campus in particular as a unity that is inseparable from the central IPDN.

In fact, the performance given by the apparatus in the North Sulawesi Campus IPDN environment is still relatively low. This is because there are some employees who are still indifferent to the responsibilities and rules that apply. One of them is shown through the delay in office hours, which then results in the absence of employees in the implementation of the morning roll call and the flag ceremony as an activity that starts all main duties and functions of employees. In addition, another problem lies in the availability of supporting facilities and infrastructure that are still inadequate, causing disruption of work implementation with the main tasks and functions of each apparatus within the IPDN environment of North Sulawesi Campus.

All of the initial problems that have been described ultimately affect the performance given and produced by the apparatus itself. And impacting indirectly the performance of each State Civil Apparatus in the North Sulawesi Campus IPDN will determine the maximum achievement of IPDN vision.

Research purposes

Based on the problems mentioned above, then the purpose of this study is to describe and analyze the performance of the State Civil Apparatus (ASN) at IPDN North Sulawesi Campus.

LITERATURE REVIEW

a. Definition of Performance
Performance comes from the word performance in English, which means the results of work or work performance. The concept of performance itself is a real behavior that is displayed every person as a work achievement generated by employees in accordance with their role in the company (Rivai, 2005: 309), and therefore performance is a form of active behavior from an employee in an organization. However, it should be understood that the performance itself is not just the result of work or work performance, but also includes how the work process takes place (Wibowo, 2009: 5). Therefore it can be concluded that performance is one of the determinants of success or failure of organizational goals that are set so that efforts need to be improved.

b. Factors that Influence Performance Achievement

In simple terms the factors that affect performance according to Mathis and Jackson (2001: 82), namely their individual abilities, motivation, support, the existence of the work they do, and their relationship with the organization. Furthermore Armstrong and Baron (2005) explain that there are several factors which then affect performance, including:

1. **Personal Factors**, indicated by the level of skills, competencies possessed, motivations, and individual commitments.
2. **Leadership Factors**, is determined by the quality of encouragement, guidance, and support by managers and team leaders.
3. **Team factors**, demonstrated by the quality of support provided by co-workers.
4. **System factors**, indicated by the work system and facilities provided by the organization.
5. **Contextual / situational factors**, shown by the high level of pressure and changes in the internal and external environment.

c. Performance Indicator

Performance indicators are defined as certain values or characteristics that are used to measure the output or outcome of an activity or measuring tool used to determine the degree of success of an organization in achieving its goals (Moeheriono, 2012: 108). It is important to measure employee performance by public service agencies. This is because by knowing the weaknesses and strengths, obstacles and encouragement, or various success factors for the performance of employees and institutions, the way is opened for professionalism, namely correcting the mistakes made so far (Keban in Pasolong, 2010: 184).

d. Performance assessment

From the point of performance it is explained that for individuals, performance appraisal serves as feedback about various things such as abilities, fatigue, deficiencies and potential, which in turn is useful to determine the goals, flow, plans and career development (Siagian, 2008: 223- 224). As for organizations, the results of performance research are very important in relation to decision making on various matters such as identifying the needs of education and training programs, recruitment, selection, program
introduction, placement, promotion, remuneration systems, as well as various other aspects in the process of Human Resource management.

e. Definition of Performance of the State Civil Apparatus

The concept of performance can basically be seen from two sides, namely employee performance (which in this case is the individual concerned) and the performance of the organization where the individual works. Previously, several definitions of performance have been explained according to the opinions and views of several experts, which then concluded that performance is a general picture of the level of achievement and tasks within an organization, in an effort to realize the goals, objectives, mission and vision. Furthermore, the state apparatus which is the employee itself is a person who does work in return for services, namely in the form of salaries and benefits from the government.

Based on the Law of the Republic of Indonesia Number 5 of 2014 concerning State Civil Apparatuses (ASN), especially in Article 1 paragraph (1) it is stated that the State Civil Apparatus, hereinafter abbreviated to ASN is a profession for Civil Servants (PNS) and Government Employees with Work Agreements (PPPK) who works for government agencies. State Civil Apparatus (ASN) produced through ASN management as explained in paragraph (5) are ASN employees who are professional, have basic values, professional ethics, are free from political intervention, free from corrupt practices, collusion and nepotism. As one of the efforts to realize ASN as part of bureaucratic reform, it is necessary to establish ASN as a profession that has the obligation to manage and develop itself and must be responsible for its performance.

RESEARCH METHODS

a. Research Approach

This research was conducted using a qualitative approach, which through this method will obtain rich data and in-depth information about the issues or problems raised and want to be solved, using data collection techniques in the form of interviews, observations and relevant documents. Researchers not only want to know how the level of performance of the State Civil Apparatus in the North Sulawesi Campus IPDN, but also to how the performance was formed and the factors that affect performance. And this certainly can be achieved through a qualitative approach because a work process and complex social interactions, sometimes the expression or behavior shown is different with the result.
b. Research focus

The focus of the research relates to the performance of educational staff and administrative staff in charge of carrying out administrative management and technical services within the IPDN environment of North Sulawesi Campus, especially in the General Administration Section which has the task of carrying out the preparation of administration materials, programs and reporting, finance and assets, personnel affairs, public relations and protocols. Or in other words, this section handles all matters relating to staffing administration.

c. Research sites

The location chosen by researchers in conducting this research is IPDN North Sulawesi Campus located in Tampusu Village, Remboken District, Minahasa Regency. The reason for choosing this location is based on the fact that IPDN as one of the higher education institutions in the Ministry of Internal Affairs of the Republic of Indonesia was formed with the aim of preparing government cadres, both at the regional and central levels.

Therefore, based on this and related to the title of the research that concerns aspects of ASN performance, and then IPDN Praja as the focus and object of all implementation activities in the IPDN environment which will also become part of the government apparatus, must be really served and fostered by ASN that has quality performance so that later the cadets produced will also be of good quality, both in terms of knowledge, skills and attitude, and then in the end not only the performance of ASN in the IPDN North Sulawesi campus of quality, but also an IPDN Praja who would later become an ASN had a high performance in carrying out his duties later in the field.

d. Data source

Data sources are subjects from which data can be obtained (Zuldafril 2012: 46). The data sources in this study are divided into two: humans (human) and not human. In this case the key informants (key informants) is the Head of the General Administration Section in charge of and taking care of staffing affairs, some educators, and administrative staff (ASN who are tasked with carrying out administrative management and technical services). While non-human data sources in the form of documents relevant to research will be examined as a secondary data source.
e. Data collection technique

Data collection techniques are the most strategic step in research, because the main purpose of research is to obtain data. Therefore, in this study researchers used data collection techniques such as observation, interviews and documentation.

a. Interview

The informants who want to be interviewed in this study are the Head of the relevant Section or Subdivision (mainly the General Administration Section which oversees the Personnel Subdivision) and several ASN employees in the North Sulawesi Campus IPDN environment. Through these informants, researchers can get more in-depth information related to the focus of the research they want to study.

b. Documentation

In this study, documentation is needed for data collection by recording or viewing data in any form from the available documents that are closely related to the object of research. The documents or data referred to in this study are closely related to the object of research, including data on the number of employees, attendance of employees during working hours, and employee work recapitulation.

c. Observation

Some information obtained from observations are pace (place), actors, activities, objects, actions, events, time and feelings. In this study, researchers used unstructured observation techniques, which are observation techniques that do not use observation guidelines or in other words unstructured observations are observations that are not prepared systematically about what will be observed (Sugiyono, 2017: 109), so researchers only develop observations based on developments that occur in the field. Researchers make spontaneous observations of the symptoms observed.

f. Data analysis

Data analysis in qualitative research, carried out since before entering the field, during the field, and after completion in the field (Sugiyono, 2017: 131). In this study the researchers used Miles and Huberman Model data analysis, namely Data Reduction, Data Display, and Conclusion Drawing / verification.

RESULTS AND DISCUSSION

The Institute of Domestic Administration (IPDN) is a Civil Service Higher Education within the Ministry of Home Affairs whose aim is to prepare superior government cadres, both at the regional and central levels. This is in accordance with the Vision of IPDN, namely: "Becoming a reliable Civil Service Higher Education in producing competent, character and personality cadres of
government. This education besides being held at the Jatinangor Central IPDN Campus and IPDN Campus in Cilandak Jakarta, was also held at Regional Campuses in several provinces in Indonesia as an inseparable unit, one of which was the IPDN North Sulawesi Campus in the Minahasa Regency of North Sulawesi Province.

North Sulawesi Campus IPDN as an integral part of the central IPDN must also strive to achieve that vision. One aspect that will determine the achievement of the overall IPDN vision is the performance produced by the apparatus in it. Furthermore, in seeing how well the performance produced by ASN in IPDN North Sulawesi Campus the researchers used 5 indicators according to Mangkunegara (2005: 75), namely: Quality of work, quantity of work, responsibility, cooperation, and initiative.

a. Work quality

A quality work of course starts from an understanding between what must be done and what really must be done. This can be interpreted as understanding and mastery of the Main Tasks and Functions (TUPOKSI) of each employee at IPDN of North Sulawesi Campus. Quality cannot be achieved if previously employees did not understand their duties and functions. Based on the results of the study most of the main employees of PNS have understood the main tasks and functions of each because in inputting performance through the performance appraisal system which is referred to as SIKERJA has been adjusted to the job description of each employee in accordance with the responsibilities held. Likewise, most of the Government Employees of Non-Civil Servants already understand their respective duties and functions. However, there are still groups of employees who do not understand correctly what must be done with their respective duties and functions. This then more or less will affect the quality of work achieved by employees.

b. Work quantity

Quantity of work related to the amount produced in a given period for civil servants can be seen in the SIKERJA based on productivity and the realization of work minutes, so that for civil servants for the aspect of the quantity produced can be seen and measured through the SIKERJA (Performance Assessment System) input in the period of 1 month and checked by the direct supervisor before the change of the month (maximum on the last date of the month being inspected). Application SIKERJA itself is very much influenced by the quality of work, where the quality of a job can be observed through the high production output. The higher the achievement of output, the higher the quality of work produced by an employee. The achievement of this output itself is related to the amount of quantity produced by employees. Based on the data obtained, each civil servant always reaches the target of 100%, which means that the target number of work that has been determined can be achieved by every civil servant in the North Sulawesi Campus IPDN.

c. Responsible

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Viewed from the aspect of responsibility, most of the employees at IPDN North Sulawesi Campus still do not have a high sense of responsibility for their work. This is indicated by delays in office hours which also results in delays and the absence of the employees concerned in the implementation of morning roll call activities and attendance of employees at the implementation of flag ceremony activities that are still minimal compared to the total number of employees. Besides that, most employees will show high performance if monitored by their leaders. So the independent work culture does not exist in the employee.

d. Cooperation

Related to the aspect of cooperation, the employees in North Sulawesi Campus IPDN showed good cooperation attitude. This was demonstrated through the teams, including the Internal Security Post team, Electric team, Water team, and Care team which requires good cooperation between the teams in maximizing existing tasks, and can be carried out properly.

e. Initiative

Relating to aspects of the initiative which can be interpreted as an initiative from within the employee to carry out work or overcome problems at work without waiting for orders from superiors to be considered still lacking. This is because there are indeed some employees who already have innovation and a high sensitivity to the work to be done, or which are the priorities to be completed. However, most employees must still be ordered first before they can complete the work given by leader. Including the sensitivity of work priorities that must be increased.

Based on the results by studying performance of employees that have been presented previously, the factors in the research will be presented using data collection techniques in the form of interviews, observations and documentation that affect the performance of the apparatus at work, namely:

1. The location of the North Sulawesi Campus IPDN is located in Tampusu Village, Remboken District.

   Tampusu Village as the location of the North Sulawesi Campus IPDN is located at an altitude of approximately 700 meters above sea level (above sea level) with average temperatures ranging from 15ºC to 23 ºC, coupled with average rainfall ranging from 90-130 days per year. This condition affects the level of employee discipline during office hours, especially in the implementation of morning roll call activities, flag ceremonies, including large number of facilities and infrastructure damaged due to bad weather.

2. Conditions of Work Supporting Facilities and Infrastructure.

   Work facilities and infrastructure is one of the factors that can be considered a major factor in supporting the work done. Even though the existing work might be completed, in terms of efficiency and effectiveness of work it would be better if there were supporting facilities and infrastructure. Conditions of Facilities and Infrastructure at IPDN North Sulawesi Campus are not...
all in decent condition. There are some buildings that were damaged due to bad weather. In addition, the condition of infrastructure is also not in the proper condition. This is still an obstacle in the maximum performance of employees, such as the availability of adequate work space,

3. Leadership and Teamwork

In addition to these problems, researchers explore more deeply about the factors that affect employees in this case staff as executors related to the performance. The researcher then found that apart from the factors previously explained, there were other things that also contributed to employee performance, namely leadership and teamwork. Both of these have a big contribution to the performance. The leadership will affect its relation to the reward and punishment system for employees, the technical implementation of employee duties in accordance with the employee's job description, motivation and work enthusiasm.

CONCLUSIONS AND RECOMMENDATIONS

a. Conclusion

Based on the results of research and discussion that have been presented previously, then some conclusions can be drawn as follows:

1. In seeing how well the performance produced by ASN at IPDN North Sulawesi Campus, researchers used 5 indicators: Quality of work, quantity of work, responsibility, cooperation, and initiative. The results showed that in several aspects including the quality of work, responsibility and initiative of some ASNs were considered not good enough, which was shown through employee indiscipline in the applicable provisions, such as the implementation of morning roll call, events and flag ceremonies.

2. The factors that influence the performance of ASN in IPDN North Sulawesi Campus are as follows:
   a. The location of the North Sulawesi Campus IPDN is located in Tampusu Village, Remboken District.
   b. Conditions of Work Supporting Facilities and Infrastructure inadequate.
   c. Leadership Factors and Teamwork

3. The efforts made in terms of improving employee performance:
   a. Accelerate the process of asset write-off through the Assets and Financial Subdivision so that the procurement of office facilities and infrastructure can be carried out immediately;
   b. Mental guidance and attitude of ASN by the authorities through the implementation of meetings and in forums and ceremonies;
   c. Increase employees salary of Government Employees Non-Civil Servants in 2019.
b. Suggestion

North Sulawesi Campus IPDN as a service agency that will later produce government cadres (both at central and regional levels) must continue to improve itself in order to improve the quality and quality of achieving the goals set. There are several important things to note,

1. Improve communication and good coordination between leaders and employees and among fellow employees so as to create a family relationship that will affect the quality of problem solving (solve problem).
2. Repairing facilities and infrastructure to support the work of employees.

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Guide on how to adapt air transport to international transport of passengers in the time of COVID-19.

Dr Zygmunt Dudzicz

Abstract- The article presents the current state of knowledge about the SARS-CoV-2 virus and COVID-19 disease in such a way as to provide the basis for the modernization of the flight and airport management system in such a way as to maximally protect passengers and crew from infection and transport of sick people from one country to another. To this end, a method of organizational flight preparation, methods of diagnosing passengers, methods of securing passengers in the field of distance by means of various several different personal protective equipment was developed in order to limit contacts of neighboring passengers in terms of time of exposure to the virus. Several methods of passenger protection and isolation on board were presented for simultaneous use. Innovative measuring and control equipment, personal protective equipment and test methods before, during and after the flight were presented, and practical solutions in crisis situations were proposed. The article contains the state of research and a practical guide on how to accomplish subsequent tasks to achieve flight goals in terms of COVID-19 safety.

Index Terms- SARS-CoV-2, COVID-19, physical and medical properties of the virus, methods of infection, mandatory distance, mandatory masks, passenger isolation, virus transport, testing methods, RT-PCR, screening tests, serological tests, cassette tests, aerosol particle size distribution, symptomatic infections, asymptomatic infections, COVID-19 health card, infection by asymptomatic patients, flight organization, compulsory passenger tests, mass infections, lockdown, quarantine.

I. INTRODUCTION

In accordance with the principles of good teaching and learning, both sentences "Repetitio est mater studi" (repetition is the mother of knowledge) and "Simplicitas est mater scientiam" (simplicity is the mother of science) are present in this article, so it is not surprising, that sentences on the same subject, written in a different context, also supported by other footnotes, appear for the first time in the descriptive part and then in the next sections of the practical guide. Understanding the essence of the virus and creating a shortened distance requires this method of description, because the virus is new, completely unknown, and the result is the death and unnecessary illness of thousands of people.

The presented article has to meet two functions, to convey the current state of scientific knowledge, practical knowledge, knowledge of the author's literature research necessary to learn about the SARS-CoV-2 virus in such a way that it is possible to protect passengers from infection and the second goal for aircraft and airline manufacturers, airports so that they could prepare organizationally, medically to implement effective substitute distance and secure flight conditions, so as not to carry mass infected people from country to country. Because the article discusses each fragment of the text in great detail, which can be checked in the literature, the more so because the given links refer to a dozen or so different articles that you can read more thoroughly. The more we know about the virus, the better our chances are to protect ourselves against the disease. The big problem is the fact that the majority of web-based messages were created so, that the authors receive remuneration every day, and not to provide reliable knowledge, which is why a critical assessment of the Internet materials that was made in this article is needed. The article deals primarily with aviation, but its conclusions can be applied to all forms of gathering people on the streets, in stadiums, in schools, in the halls, but also at home in the family. Article is written in a simple form to be understandable to all people, regardless of education and occupation. This article will fulfill its purpose, if it reduces the number of deaths and the number of people infected with COVID-19 disease.

The restoration of passenger air transport is one of the most important tasks to restore the state of the economy, as far as possible, to the previous state, as close as possible to the state before the pandemic. Air transport is one of the most important sectors of the economy, hence its restoration is a priority. However, one has to accept the fact that air transport must be adapted to completely new conditions. The previous state cannot be reproduced due to the SARS-CoV-2 virus and the tight closing of state borders in fear of a pandemic. It is necessary to organize air transport so that the epidemiological status due to the SARS-CoV-2 virus and COVID-19 disease of the composition of people embarking on the plane was identical after delivery to the destination airport. If during the flight there is a change in the epidemiological status of passengers and crew, it is necessary to immediately detect infected people, their isolation from the rest of the passengers and separate service at the destination port. This does not have to be caused by carrier and crew errors, and may be due to the specific properties of the very high infectivity of this virus. This virus is a great unknown to us but a very negative unknown, and in order to avoid its harmful activity, we must act very strictly. We need to be aware that in adverse circumstances one sick person, even asymptomatic, can infect a hundred or more people during a flight of several hours. Countries that have mastered a pandemic, are very careful that there are no outbreaks in their area and therefore have introduced very strict controls on arriving people to protect themselves against the arrival of infected people. In China, during the last month of April 15-15 May, not a single person died of COVID-19 disease. Despite this, small
individual outbreaks of plague break out, even a dozen or so infected, then the cities are closed and infected people are caught until the last person. Let's imagine that if one plane brings 300 infected people to Wuhan, Milan or New York, without their control and catching the sick at the airport, they will spread peacefully all over the country, we wait quietly a month or two, then the state of epidemic can no longer be master. After controlling the pandemic, after completely suppressing it, it is necessary to constantly maintain the state of readiness to fight the virus causing the disease and strictly control people entering the country. When we have a population of 1.4 billion people, any mistake can turn into a tragedy. Countries that have already fought the MERS and SARS-CoV-1 viruses were better prepared to fight the SARS-CoV-2 virus. It is necessary to use the experience of these countries from South Asia, because sometimes it is enough to successfully adopt their methods. SARS-CoV-1 and SARS-CoV-2 viruses have 85% identical genome, but completely different infectivity. The main thing is that for the human body, this virus is completely new, that is, man is vulnerable to its action. SARS-CoV-2 virus and its subsequent mutations and subsequent types of viruses even more contagious than this, may appear even several times a year or every few years. The more that the list of viruses that can cause epidemics is quite long, most of these diseases we can not treat effectively, we only treat symptomatically, as there are no medicines or vaccines for them. We have to be prepared for the worst. Every day, around 2,290 people die at dawn on COVID-19, about 22,836 people for all infectious diseases, about 857 people for seasonal flu, about 1,732 people for cancer, and about 2,677 for AIDS. It is therefore necessary to increase public hygiene from the constant habit of washing hands. But it is also necessary to increase epidemiological safety during air transport, for which aircraft manufacturers and airlines will be responsible. The point is that during the flight the passenger does not received illness as a gift or pass it on to other fellow passengers. The Chinese National Health Committee announced on May 11 that only 14 new infections were reported, including 11 in the city of Shulan, which were immediately blocked [1]. Only one case was found in Wuhan, but it was enough to issue an order, test the entire 11 million Wuhan residents for 10 days. To my knowledge, there is no country in the world where 14 infectious hospitals were built from the beginning in 14 days, or 11 million people were tested in 10 days. The state of scientific research on the virus and COVID-19 is the most advanced in China, because they have a large database for comparative studies [2]. The evidence that China has completely mastered the pandemic is the information that they are already dismantling last 14 infectious hospital in Wuhan, because they no longer need it. We are not fully aware of the virus's ability to mass infect people, in the absence of adequate distance between people and the occurrence of exposure to this virus from a few hours to several minutes, which also results from my literature research. In the office and residential tower in Seoul, 18 floors, 216 people worked on the 11th floor together, including 94 infected with COVID-19, which means the virus incidence rate was 43.5%. The success of the Korean authorities' response strategy to the virus resulted from mass testing, contact tracking and the use of digital surveillance tools. There are no restrictions on the movement of residents in Korea. This study shows how easily SARS-CoV-2 virus travels from one person to another [3]. After controlling the pandemic in Korea again on May 2, 2020, according to the Korean Control Center, the plague returned in Daegu, over 100 people infected by one 29-year-old man who visited gay clubs and bars in city Itaewon shopping and entertainment district in Seoul [4]. The arrangement of people in the call center and on the plane is quite similar. As shown by my analysis of published literature, the possibility of infection depends on the amount of virus and the time it is exposed. There must be a virus, i.e. the right amount of it, and it must affect the person for a longer period, in the analyzed cases from half an hour to 8 hours. We must avoid contact with the virus and reduce the maximum exposure time, i.e. the impact of the virus on humans. The above study was based on the generalization of many research results and experience of teams, proposes practical solutions adapted to the conditions we have on the plane. To implement effective international air transport, it is still necessary to meet stringent passenger control requirements applicable to arrivals in China, Hong Kong, South Korea, Taiwan, Japan and Singapore and other countries. We do not yet know the conditions of transport to most countries, e.g. USA, Canada, Australia, which are still closed. It should be remembered that these rules are changed by these countries flexibly, depending on the current epidemiological situation. You must have the consent of two countries to fly and meet all their requirements for COVID-19. Currently, for example, Raynar operates only 1% of flights from the pre-pandemic schedule.

Passenger transport almost froze, decreased by 90% compared to pre-virus times. Air traffic due to lockdown and closing of borders almost completely froze. As stated in the press about the proposals for the use of Airbus A380 and Boeing 747 aircraft belonging to British Airways, which can be used as temporary intensive care units in the fight against a coronavirus pandemic, according to The Times, I think that was probably not such was the purpose of their design and building. Also, the "Caircraft Project" as a joint idea of a group of leaders and experts from the aviation, medical and technological industries, i.e. the conversion of a Berlin airport into a huge hospital has similar characteristics. The idea has already received the support of the Civil Aviation Authority and is now waiting for the government's approval of this idea [5]. The modern and gigantic Berlin Brandenburg airport, which is being built in Berlin, was to be one of the best in the world and is to turn into a giant flat hospital. It's probably another idea type of science fiction. Airport change with an area of 220 thousand m² on "Covid-19 Superhospital BER" in a situation where Germany is dealing with COVID-19 disease very well, taking into account their economic and population potential is probably a bad idea [6, 7]. Maybe it is better to try to adapt most of the planes to transport people during a pandemic, in such a way as not to transmit plague foci from one country to another with people, because this is probably a better solution. The more that in my opinion, the adaptation of existing large aircraft, it is possible to transport ordinary passengers after modification, and as needed, to transport sick people from one country to another for treatment, to transport tourists to resorts and holiday resorts.

Due to the fact that I carry out literature research on SARS-CoV-2 and COVID-19 disease, I have become acquainted with them thoroughly and with its properties for infection and masking. The RNA virus defies a simple classification of the living body
and the dead body because it is physically and biologically present in these two conditions. This virus requires a host to be human or animal to cause infection, otherwise its infectious nature will not be revealed. This virus, ejected from the body of an infected person, has unprecedented ability to survive beyond the host, until it is effectively killed, rendered harmless, and successfully disinfected. You do not need to use a weapon to kill him or deactivate it; thoroughly wash your hands with soap and water, disinfect any surface where it can be, warm it with lighter fire, iron, dryer, microwave or washing things at 60°C C. I have prepared thorough literature research in this area, presenting research from many centers, scientists and physicians practitioners. In the context of this, I became acquainted with China's efforts to overcome this pandemic for a population of about 60 million people and other countries also, which have significant successes in overcoming the pandemic, as; Hong Kong, South Korea, Taiwan, Japan, Singapore, Thailand. Based on the course of the COVID-19 pandemic and its fight, ruthlessly using all possible means, in China it was controlled and suppressed. In China, the state's struggle against the virus lasted from January 24, the blockade day of the Huabei province until March 15, 2020. The total blockade of 11 million Wuhan ended after 76 days. Articles describing how coronavirus has become Chinese Chernobyl, are also mobilizing the Chinese authorities to be constantly ready to fight the virus [8, 9, 10]. Despite the end of the pandemic in China, there is a constant fight against local outbreaks. Fear and terror are also generated by the media, press and the Internet. There is constant fear of a pandemic recurrence that 100 million Chinese may be waiting for repetition of blockades and restrictions. All services in China are ready to immediately combat the pandemic [1, 2, 11]. The highly developed countries of the EU and the US mistakenly thought that China is far away and that it does not concern them. Instead of taking the time to prepare for a pandemic in their own countries, a pandemic was underestimated. The development of a pandemic in Italy, Spain, France was caused by several months of delay caused by its hidden development of the disease. As the pandemic landed in Europe and the US, pale fear fell upon governments. The only reaction always delayed by several months was panic, closing schools, of trade and the entire economy on a massive scale. Blocking people in apartments, lockdown has been going on for 3-4 months and the end cannot be seen. The later we take on radical solutions in a form such as was done in China, South Korea, Taiwan, and Japan, the longer the pandemic will be indefinitely. If we got to it too late, ineptly, it may take years and the SARS-CoV-2 virus will stay with us permanently. Of course, the pandemic will also expire without doing anything, such is its nature, as there are no candidates for further infection because everyone were already sick. On TOK FM radio, Professor Johan Giesecke, adviser to the Swedish Public Health Agency and WHO, criticized the so-called lockdown in Europe. "These were political and not scientific decisions, including a lot of unnecessary ones," he said in an interview. According to Giesecke, it is not yet fully clear whether COVID-19 treatment gives virus resistance, whether this resistance is permanent and whether it affects everyone. He said the very important sentence "If COVID-19 immunity does not provide immunity, we have no chance to create a vaccine," he emphasized. According to a WHO report, 70 teams are working on a COVID-19 vaccine [12]. What connects the coronavirus from Wuhan and SARS is that there is no effective vaccination against both viruses and 17 years have passed since the SARS pandemic, which unfortunately, in my opinion, bodes badly for opportunities to develop an effective vaccine [59]. The key to understanding the principle of SARS-CoV-2 coronavirus causing COVID-19 disease, the course of this disease in several different stages, the limited possibilities of testing the state of the disease by RT PCR and serological tests is the following text of the instruction of the PCR automaton. The instructions for the Xpert®Xpress SARS-CoV-2 PCR testing machine state clearly warns that: "A negative result does not mean the absence of SARS-CoV-2 infection and should not be the only basis for treatment or other decisions related to patient care. .... Positive results indicate the presence of SARS-CoV-2 RNA. Positive results do not exclude bacterial infection or superinfection with other viruses. The pathogen detected may not be the definitive cause of the disease. ". pp 1 [60]. The research presented in the article is to help understand this text above, understand the essence and methods of the virus, its transport in the air, stages of the course of the disease and why you should follow the instructions described in this the article to recreate passenger aviation.

2. Suspicion of depriving citizens of citizens' rights

At the current stage of the pandemic and legal status of states, i.e. the state of total chaos and ad hoc action of states, in order to effectively launch air passenger transport, it is necessary to temporarily, partially limit the citizens' rights of passengers, preferably with their written conditional consent, with a note ("for the purposes of COVID -19") with the possibility of an appeal to court. The second method is to abuse the right to privacy of citizens by using a state of emergency or by using an announcement of the state of epidemic disaster.

There is always a suspicion that the collected personal data of citizens for the purposes of COVID-19 will be used to deprive citizens of citizenship rights, to track citizens for political purposes. No declarations by politicians or officers are worth anything, since lying, deception, lack of responsibility are a common norm for most politicians. The American magazine "Vice" included also 30 worst countries in its classification. Unfortunately with Poland, this is not a reason to be proud. We found ourselves in a group of countries that are using a coronavirus pandemic to increase repression against their citizens and to carry out suspicious corrupt purchases. Special laws have been passed on impunity for politicians for violations of law and fraud during pandemic service, of course, everything for the benefit of citizens, so that corruption activities would be under special protection [47].

This problem will not be solved without introducing criminal and financial liability for politicians and officers for unauthorized disclosure of data located in state institutions, or corruption scandals when purchasing protection measures. Even a database of people with COVID-19, a passenger list may be subject to illegal trade. Only the introduction of criminal liability of officers and politicians, with simultaneous strict institutional control of citizens, guarantees the security of the citizens concerned. The solutions given in this study are a temporary prosthesis used to reconcile security conditions and standards of data use in Asian
countries and Europe, where they are completely different. Depending on the country, different forms of citizen data availability are used and should be adapted periodically or with the consent of citizens to fight a pandemic.

In South Korea, Taiwan, which are currently democratic, there is supposedly a citizen's trust in the state in terms of consent to share his personal data, contact details, telephone data for treatment purposes, which is guaranteed by the procedures operated by the state, but it is a myth that prevails in Europe, because there the law is already adapted to fight the virus. After the MERS epidemic in 2015, a provision was introduced in Korea that in such situations allows to ignore strict privacy protection principles [4]. In most cases of these countries, the state covers all medical costs, quarantine costs, and testing costs, and fully protects personal protective equipment, its distribution and support protection against speculation. The state permanently provides full knowledge to the public about the need to share and how to use this data. This citizen's trust in the state is also a myth, because in Taiwan the disease was included in the highest infectious category. Thanks to this, people with infection symptoms could be forced to quarantine, mass production of masks with the participation of the army was launched. The Epidemiological Management Center organized daily press conferences, with an accurate presentation of the status of the epidemic, and coordinated the fight against the pandemic. People with a history of respiratory failure who did not have the flu were tested for the presence of other SARS-CoV-2, SARS and MERS viruses. For this purpose, location tracking of mobile phones, QR codes, airport control with full computerization, artificial intelligence and all kinds of cameras were used [13, 14, 15].

In European countries, such responsible mechanisms on the part of the state and citizens do not function, because they have not been worked out, and the European Union during the pandemic failed completely as a body uniting nation-states. Every EU country was left entirely to their fate, at a time when Italy and Spain needed and asked for help, were abandoned to fight the pandemic alone, and a few months earlier they incurred the greatest costs, of wild migration created at the EU's request, because it did not solve any problem, and now migrants are fleeing from Europe, back to Africa and Asia.

For example, Korea after the MERS respiratory failure epidemic in 2015 introduced a provision that gives authorities the right to ignore the protection principle in the event of an epidemic threat. privacy [16, 4]. What prevents such a statutory provision from applying in other countries? This would allow for the development of strategies for precise testing and aggressive reproduction of the contact chain of infected people who have little contact with other people who are identified as to where to stay. Every citizen is required to install a government tracking application that works in the wanted geolocation system. The first maps of infected and quarantined locations in Korea were developed by amateur IT specialists who gave them to the state and they were further expanded and integrated with databases of state. The Korean strategy is based on tracking people, revealing infected locations on the map, mass testing and treatment. This system was implemented, as Hyelim Lee reports, disclosing on the map the place of residence of infected people, date of infection, people in quarantine, sending alerts and warnings to people residing in the area, which greatly facilitates the search for sick and suspected people [17, 18]. A similar system of infected people, their location and infected contacts operates in Taiwan, coordinated by the rapidly created Central Epidemiological Command Center. Instant reflexes of the authorities prevented the virus from even spreading, because the control tests were started on December 31, 2019, as it was in Vietnam, thanks to which schools closed for only two weeks. These countries; China, Taiwan, Vietnam, South Korea emerged victorious from a pandemic. Pandemic is important for the existence of the whole society, hence the public interest in virus protection has become more important than violating the basic privacy standards of infected people [14, 15].

3. Impact of SARS-CoV-2 virus on the blocking of economic activity by governments.

In the fight against SARS-CoV-2 coronavirus, it is only the efficient actions of governments that decide, and no medical reasons. Efficient management of the state includes management in times of war, natural disasters and a pandemic. It depends only on the efficiency of the state authorities at what time and at what cost the pandemic will be overcome. Medical considerations are well known and are limited to mass testing and symptomatic treatment in hospital or referring the patient to quarantine. The virus is only much more contagious than those previously known to us viruses and it is completely new to us, which means that it has virtually no research. On the other hand, the organization of infectious hospitals, material supply, searching for the sick and people contacting the sick, organizing mass testing of the population is the task of the state and its ministries or appointed government bodies. The state is obliged to ensure places in infectious hospitals, doctors and medical staff equipped with personal protective equipment, personal protective equipment for citizens, medicines and cleaning products for all citizens as well as an efficient COVID-19 disease testing system. The state is obliged to immediately order and enforce the obligation to distance with a very clear explanation to the public why it does it, how long it will last, what will be the costs - if we do not do it as soon as its possible. All restrictions on civil liberties, the obligation to remain in quarantine at home, movement restrictions must be guaranteed during which period they apply and the restrictions introduced will be canceled after the pandemic, which should be guaranteed by law. A team of specialists for crisis management, persons known by name and qualification should be appointed to help the Minister of Health and the Prime Minister. They determine the effectiveness: quick identification of a zero patient, immediate introduction of strict lockdown for a month, two, strict social distance, testing infected with COVID-19 and searching for contacts of infected people. Even stopping the entire industry for a month or even two is possible if the state of the pandemic requires it and the state cannot control the pandemic without stopping everything. States and governments are guilty of stopping all economic activities, including airlines, since they have stopped them, they should now pay damages or subsidies, or relieve the tax burden. Swapping airports for hospitals and planes for ICUs, exchanging planes for respirator rooms are probably ghostly and bad ideas. As it results from the activities of several countries, a lockdown is needed, but for a period of one month, up to two, the time necessary to prepare the state organs for effective...
fight against a pandemic. The most important tool of the state is to master digital IT surveillance tools including tracking patients and their contacts, and the use of owned databases for COVID-19 purposes, because only this allows you to limit the lockdown time for industry, trade and services. Nobody predicted that politicians would destroy the economy so easily and be completely unpunished, as we can see in some countries. China is a different scale of the problem, due to its urbanization and population potential, and the fact that it was the first country affected. By contrast, countries such as; South Korea, Taiwan, Singapore, Japan did not stop the economy and trade, they defeated SARS-CoV-2 without stopping the economy and trade. These countries, after mastering the pandemic at home in an exemplary manner - quickly received a ricochet attack from countries that were unable to fight COVID-19 within at least 2 months, i.e. mainly EU and US countries. These countries closed their borders too late, they did not introduce an immediate strictly enforced rule of distancing, staying forced at home, i.e. lockdown and stopping industry, trade in services, education, instead of preparing to fight the SARS-CoV-2 virus. We received a new version of the Iron Curtain from politicians in all developed countries, but without the possibility of raising it. The basis of the state's activity is to support and develop industry and trade, not its mindless destruction.

4. Methods of collecting swabs called "drive-thru" and "walk-thru" and performing tests for passengers useful at airports

Test methods for SARS-CoV-2 virus and COVID-19 disease state require collection from a suspected swab to be taken and tests performed. Methods developed in South Korea "Drive-thru" [45] and walk-thru [46, 18] are suitable for direct use at airports as part of the organization of the flight. Within the organization of the flight, persons who should have tests, type of tests and the method of collecting swabs for testing will be selected. At the airport, swabs are prepared and tests are carried out immediately. Passengers arrive at the airport check-in in advance and samples for testing, can be taken in the car of the passenger who drives to the appropriate position, as he arrived by car or samples are taken for testing at the pedestrian stand. Therefore, both methods are discussed in more detail below. The download stand can be prepared in the form of a download module, similar to the one set up at the University of Gdańsk in Gdańsk, as shown in Fig. 1. The people appointed for testing will be first verified in the survey and a list of those selected or all, for testing from choosing the type of test will be given to passengers in advance.

In Korea, two methods of swab collection were developed from a person suspected of having COVID-19 disease called "drive-thru" and "walk-thru" depending on whether the subject is passing a car and the swab is taken through the window or the subject comes to the point of collection on foot. In South Korea testing is carried out on a massive scale, hence portable research points and travelling laboratories were established. “Drive-thru” and “walk-thru” tests are also extremely popular. In the "drive-thru" method, the patient sits in the car, opens the window, and the diagnostician in a full suit and protective suit, mask, glasses takes a swab, describes and the patient leaves. The advantage of these methods is that employees performing material sampling do not need to disinfect rooms after each test. [19, 20]. There are several variations of these methods as to the very way the swab is taken in a non-contact, with full protection of the diagnostician himself. I discuss this method on the example of the photo shown as Fig. 1, because it has some elements in common with the distance for possible use in an airplane. The picture shows the very moment of taking the swab by the diagnostician, but this picture does not explain this problem. In Poland, the first module of several zonal stands for collecting swabs from pedestrians was launched in Gdańsk. Here we see. that the diagnostician only has a cap, he is only wearing a incomplete cap with a visor shield and has an exposed upper part of the head, although he has a full suit from the neck down and gloves secured with an elastic bandage. This photo requires a detailed description, as it suggests that we can equip our passenger in the plane with such a cap with a plastic cover, a mask and he will have full protection. Only this position in the picture is misleading, because it presents only one section of the self-sufficient test unit module. The module with several sections does not need an external media source, it is equipped with autonomous sanitary facilities, which ensures the safety of medical personnel and the patient. The module design provides several zones and sluices for material collection, has a high quality mechanical ventilation system with a dedicated system of division into negative pressure and overpressure zones with HEPA filters [20]. Now there are only some similarities to the plane, if we solve the distance between the seats, dress the passengers in protective clothing, overalls, masks, such as full caps with covers in the photo, or we use plastic curtains on the joints and the aircraft ventilation system will work under vacuum with a vertical flow direction then we only have a safe system due to COVID-19. The plane has a HEPA filter at the end of the air conditioning system to catch viruses from the air. No individual elements in the form; masks, visor covers, plastic drop-down covers, google, gloves will not protect a person against the virus. You have to use several elements at the same time and still verify them practically on the plane, preferably with a simulation similar to that shown by NHK Japanese TV. The NHK Japanese broadcasting station in cooperation with infectious disease experts from St. Marianna University School of Medicine in Kawasaki showed how coronavirus is transmitted between people. For this purpose, they simulated the behavior of 10 people for 30 minutes in a restaurant during a meal. One of the people simulated an "infected" person because he had fluorescent paint on his hand, as if after coughing in his hand. Then they turned on the UV lamps to check where the fluorescent paint was, which "infected" spread, everyone had it, almost everywhere also on the face [22]. The rule is that passengers buy their own masks, as WizzAir and IATA intends to do, does not solve anything. In domestic internal communication, we can use various simulated protection models, but this will not work in international transport.
recommendations. Only tests allow you to control and stop the development of infection.

In the case of tests, their verification is necessary because there are a large number of incorrect test results, both positive and negative. Re-verification should be repeated in another laboratory or in the same laboratory, but with a different method. In the case of a very efficient laboratory for testing at airports, the so-called pooling of biological material for screening, in which we expect many people with negative results. This method is also well suited for testing for asymptomatic people, since one test is performed for 10 people, but perfect purity and diagnostic technique are required here [26, 60]. South Korea developed rapid blood serological tests, e.g. GenBody COVID-19 IgM / IgG, of which 6.2 million were exported to 15 countries in March 2020. The test requires 1-2 drops of blood, is 10 minutes, suitable for testing asymptomatic people, gives 96% accuracy for antibodies. In Korea, 34 companies were authorized to export diagnostic agents and polymerase chain reaction (PCR) equipment, including 19 companies to export reverse transcription PCR kits (RT-PCR) [61, 62].

The fastest test results are delivered in China - less than a waiting day in 73% of cases, and 8% of doctors receive results within an hour. For example, the Academic Sinica research team in Taiwan has developed a rapid molecular nucleic genetic test that shortens the standard 4-hour test to 15-20 minutes. There has also been the automation of manual performance of RT PCR molecular genetic tests, which are largely performed by automates. For example, the GeneXpert Real Time PCR device for 4, 8, 16 samples performs tests by the American company Cepheid, automatically in 45 minutes. The instruction manual is so trivial that a laboratory technician can handle the operation. We pipette 200 microliters of peripheral blood onto a special cartridge, then add some buffers, insert the cassette into the machine, and the machine does without further interference isolating RNA, RT and real-time PCR. After an hour, we have made as many samples as the apparatus performs 4, 8, 16, i.e. a 16-station apparatus replaces at least 80 hours of hard work of diagnosticians, it is suitable for use in the professional testing laboratory SARS-Cov-2 at the airport [27, 60,]. Roche equipment offers better equipment in the form of a cobas 8800 camera, providing 96 results in 8 hours [27, 28, 29]. The only way to escape from a total crisis is to enter innovative technologies, new materials, new measuring instruments, computer and ICT identification of human contacts in 5G technology, which is already working in China, even on the street, in the form of drones with cameras monitoring fever in 200 people at the same time. Only such a development of technology and adaptation to closing borders, limiting uncontrolled globalization will allow return to flying again. If we can do 11 million tests in 10 days, it is enough to adopt the testing model used in May in Wuhan. After examining 6.5 million people, only 200 infections were detected, which is nothing. There is no SARS-CoV-2 virus in Wuhan! I estimate that 80% of the world's production of tests and personal protective equipment is made by China and Korea.

5. Introducing innovations to passenger control in the time of COVID-19 as a way out of the crisis of aircraft and airline manufacturers.
The introduction of innovations in passenger control during and after COVID-19 is used to implement international transport in such a way as not to transport infected people with overt symptoms, as well as even asymptomatic patients from one country to another. The advanced system for diagnosing SARS-CoV-2 virus and COVID-19 disease is an instant running distance, disease detection, testing and system tracking contacts of the sick or suspected person with other people. An integrated IT and telecommunications system coupled with GPS, databases is the basis for effective tracking of contacts of infected persons with and without symptoms, with other persons and their identification. All activities related to diagnosing a patient and his contacts by means of a location system should be limited to the necessary activities of the carrier, who is not obliged to replace the tasks of the state [13, 14, 56]. The introduction of innovations should include an integrated flight management system designated COVID-19, which integrates the following elements with each other:

• **Organizational system for preparing passengers for the flight**

  The organizational system of preparing the composition of passengers including: passenger health card for COVID-19 disease, prepared on the basis of a survey containing the written consent of the passenger, for making available; his personal data, your health data, access to COVID-19 medical examinations. The passenger’s consent also applies to tracking his contacts and the persons he has contacted, using digital tools including telephones, geolocation using GPS to the extent necessary to secure the health of passengers. Data collected during organizational work will be placed on the server for use on return flights or subsequent flights. In the future, an interactive application will be developed, charged from the flight organizer’s website, which will allow the passenger to prepare the required data for the online survey. Only necessary information is collected.

  The implemented integrated control system for the mobility of citizens should be organized at the level of a given country, but in most countries it does not exist, hence aircraft manufacturers and airlines together need to start building such a system, relieving of governments based on obtained in writing the consent of passengers to provide conditional sharing of their private data. Such an integrated system of citizens' mobility control covering telephones, GPS, health cards, biometric data, healthcare databases and passengers allows to fight the SARS-CoV-2 virus increases the safety of passengers in the COVID-19 range. Of course, the mobility control system will be implemented to the extent possible, because the purpose is only to prepare the composition of passengers. Such a system is implemented practically in China, South Korea and Taiwan, is thoroughly described and can be used in your company. An integrated information technology called in Korea "smart city" has been developed in Korea, which uses information technology and cellular network technology together with GPS together with software to track people's position, search people, inform and warn of the threat to other residents. Monitoring citizens' mobile phones using a special application with a GPS system allows the history of locations infected with COVID-19 to be viewed on a publicly available map. The country’s authorities collect data from payment cards, city monitoring, and medical interviews with patients. Only such integrated databases allow you to effectively track a suspected or ill person with COVID-19 and people who have been in contact with her in the last 14 days. The idea “smart city” as a time-space cartographer in COVID-19 control: the South Korean strategy and democratic control of surveillance technology were described by J.W. Sonn, K. Lee [30, 14, 4].

• **Preparation of stands for taking swabs for tests and performing PCR tests**

  Preparation of stands for taking swabs for tests and performing PCR test for persons who must have such tests. The passenger may carry out the test earlier with the knowledge and consent of the flight organizer. Stands for the rapid collection of swabs, their practical organization, efficient, organized at airports as separate stands have been discussed along with the examples in the previous section. This solution allows you to download materials for testing on site, quickly, without the need for disinfection and waiting time. How to choose test methods for swab samples, what automatic devices to use for this, what PCR and rapid serological tests to use, when what problems to choose for practical solution, because innovative devices and tests appear all the time and a very optimal selection should be made due to price, time of completion and reliability of the measurement all these decision must be made after careful market analysis. When purchasing tests, they should be bought with a written guarantee of their confirmed effectiveness, which the manufacturer provides in the form of a written guarantee and on-site measurement service if there are problems with the tests [20, 26, 61, 62].

• **Taking passengers temperature measurements, fever measurement, other ordered measurements**

  Taking passengers temperature measurements, fever measurement, other ordered measurements given in the survey before boarding the aircraft, during the flight and seating passengers in places according to the virus optimization system. Laser thermometers for single measurements have the disadvantage that they are distanced 10-20 cm from the head and the measurement lasts 2-5 seconds, i.e. the measuring person must be in full suit. Thermal imaging cameras for measuring the simultaneous body temperature, more precisely the state of fever for up to 30 people simultaneously from a large distance of 1-9 m, i.e. they can be portable, for use on board the aircraft and at the airport, in the transition to sleeves, etc. These cameras measure head temperature with an accuracy of 0.3 °C, have the ability to search 30 people in the image, identify faces, check the mask on, inform passengers, and voice alert staff about the person's infection. There are several types of thermal imaging cameras from Hikvision and others. There are thermal imaging cameras for measurements of up to 200 people simultaneously and in China they are installed on drones. Measurement of temperature and fever does not apply to people with COVID-19 in an asymptomatic manner and they constitute 80% of all patients! [30, 51,53, 57].

  AI Rokid glasses can check at a distance whether someone has a fever. In two minutes, the Chinese can measure the temperature even for several hundred people. Thus, temperature and fever measurements are solved using the presented innovative measuring instruments [31]. However, we still have no way to
measure and detect asymptomatic patients. It cannot be excluded that measurements of body temperature and other parameters of arriving and departing passengers will become a new element of air travel around the world. New airports in Asia, such as Beijing-Daxing Airport, are already equipped with thermal imaging gates that automate and speed up the check-in process [53].

Ways of obtaining substitute passenger spacing instead of actual requirements using personal protective equipment and other innovative methods.

Passenger spacing, i.e. keeping the actual distance on an aircraft between two passengers, sitting in rows or columns, is not possible on the plane. This distance, according to various teams of researchers that I analyzed, should be even; 7-8 m, 4.5 m, 2 m, does WHO give at least 1m. Research in the USA is supported by the registration of cough outbreak experimentally [23, 24, 25]. According to Chinese cameras confirmed by cameras, the virus traveled on the bus over a distance of 4.5 m, remained suspended in the air for over 30 minutes and infected 7 people [58]. Secure other passengers so that this required distance is 10-20 cm and meets safety requirements. If for example, between two passengers we will set a sealed wall in the form of a plexiglass plate from ceiling to floor, we will reduce the distance to the thickness of the plate. Therefore, with a fixed distance between passengers, the actual distance is 10-20 cm and it should be increased theoretically by the optimal selection of personal protective equipment and other methods. It is not possible to change the aircraft deck into a honeycomb, which is why I suggest using several other solutions at the same time, which will allow to reduce the distance required to 10-20 cm, without fencing or reconstruction of the deck. The measures taken must ensure safety in terms of COVID-19 for all passengers and staff [23, 24, 25]. As it results from Fig. 1, it is possible to safely take a swab from a patient, but the protection measures shown are not enough there, because it takes place in a special extraction chamber with fans, which is not visible in the photo and it was described in detail in the previous point and this is related to ventilation and air conditioning in aircraft [19, 20].

Personal protection equipment has been provided to passengers in the form of overalls and masks, using innovative materials of filter cloths can be very convenient to use and safe. The same innovative masks are already on the market, with carbon fiber inserts that will better meet the conditions of virus filtration than FFP3 and HEPA and will have low flow resistance. Remember to protect your eyes. In the field of masks, these innovative tools have been developed [33].

In South Korea passengers at Incheon Airport wear full lightweight protective suits, look like interlining, and wear full coveralls used in infectious hospitals by medical personnel [34]. Protective clothing should be loose enough to read, drink from a bottle and eat ready-made sandwiches. All protective clothing, personal protection accessories, disinfectant materials must be provided by the organizer and uniform for everyone [21, 35].

In my experience, and I have been working with aerosols in the laboratory for several dozen years, simplifying protective clothing for the mask will not work. It is impossible to achieve tightness of such a 100% amateur mask, i.e. it is a cheap, easily accessible but uncertain protective measure. The IATA air traffic organization claims that the controlled ventilation system of the aircraft promotes the creation of vertical chimneys of air migration, which should impede virus infection by neighbours. This can also support the required distance of 2 m, which on the plane must be brought using personal protective equipment to 10-20 cm. The actual spacing in large stores, in open spaces, to be completely safe should be from 4-8 m, because fine particles of aerosol travel over large distances, smallpox virus up to 50 m. On the other hand, air exhaust filters on decks should be equipped with filters type HEPA and the filter cartridge should be disinfected or replaced after each flight.

In Korea, the obligation to wear masks is enforced by security personnel, and for airports in Europe, signs are put up with requests to wear masks. In large towns, many areas are marked as protected, and masks are mandatory. It is also possible to carry out full body disinfection on arrival. This can also support the required distance of 2 m, which on the plane must be brought using personal protective equipment to 10-20 cm. The actual spacing in large stores, in open spaces, to be completely safe should be from 4-8 m, because fine particles of aerosol travel over large distances, smallpox virus up to 50 m. On the other hand, air exhaust filters on decks should be equipped with filters type HEPA and the filter cartridge should be disinfected or replaced after each flight.

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Professor Eckard Nagel who managed the German-Chinese hospital in Wuhan during the epidemic of the virus crown in that city made five conclusions from his work in China. In turn, they are: 1. Consistent and quick response, then 14 days after a radical reduction of social and economic life, the number of new infections begins to decrease, but the intersection of infection chains requires twice as much time. 2. Medical personnel can work only 6 hours a day, because then the number of infections and deaths decreases. 3. Concentration of patients for treatment in selected infectious hospitals. 4. The need for mass testing. The patient is released from the hospital only if he has two negative tests within three days and after release the patient still needs 14 days of quarantine and should be monitored electronically. 5. Introduction of the obligation to wear a mask for everyone in public places. Masks are a key means to prevent new infections [34]. Professor Gao Director-General Chinese Center for Disease Control said in an interview with Science that; “Everyone who leaves the house must wear masks,” and "Those infected with
coronavirus, even if they have no symptoms, should be isolated." Masks are not intended to protect those who wear them in public. They are to protect others from potential infected SARS-CoV-2. The biggest mistake that the US and Europe make is that people in the public area do not wear masks. Whenever a person says if they are breathing, small droplets appear outside the body [34, 35, 54].

- **Appropriate selection of passenger and other supportive restrictions**

The masks should be chosen very carefully, because we have several dozen types of masks for painting, welding, atmosphere and poison vapors, anti-smog masks and surgical masks. The mask should protect the person who wears it from being infected with SARS-CoV-2 virus even if the person next to her will cough, sneeze, throw a drop spray or simply breathe. The mask should also protect other people next to us in the event that we are infected with a virus and sow it around us. So the mask has two protective functions, it protects us against infection from other sick people and protects us against infection from me. Masks used for protection against the SARS-CoV-2 virus, particle diameter 60-140 nm, should be selected so that they do not let the virus particles in any direction but they must be tightly fitted to the face and cannot be touched by hands. Masks are mechanical methods of influenza prophylaxis, therefore they are generally less effective than vaccinations. HEPA filters are the common name for the material, which is used in ventilation systems and devices such as vacuum cleaners, retain particles larger than 10 nm, i.e. fungal cells, bacteria, protozoa and many viruses. Only some masks meet the HEPA standard, marked as Type IIR, FFP3, FFP2 (US equivalent N95), FFP1. Reusable FFP3 double-sided masks should be chosen because they retain viruses, bacteria and fungi according to the instructions. Many people undergo crown infection with no symptoms, which means they should be treated as sick and wear face masks, but they don't, because they don't even know about their illness. The selection of masks for aircraft passengers should be carefully selected FFP3 and tested before use. An OHS expert tells you how to choose and properly use a face mask to protect yourself from the crown with a virus [32, 33, 35, 54].

- **Upon arrival at the destination airport, staff participates in passenger health control together with the airport staff**

Upon arrival at the destination airport, staff participates in passenger health control together with the airport staff, in the case of persons verified as healthy on COVID-19 they go to the airport check-in. On arrival at the airport, passengers suspected of being infected with COVID-19 are transferred to quarantine and hospital treatment if required and take care of the services of the destination country. Aircraft staff attend the airport's passenger reception and provide information necessary for treatment and quarantine, and help passengers with organizational matters such as payments, insurance, and deportees.

Most countries block their borders for patients suffering from COVID-19. "Dragged" by planes from abroad. For every passenger who has successfully passed all the control procedures before boarding the aircraft, the onset of illness only during the flight and at the destination airport will be a surprise because he faces a large increase in costs, associated with a quarantine of 14 days or the cost of treatment in a foreign country. Most countries that have mastered the virus prohibit entry who, if they refuse quarantine, are immediately deported. If they agree to a 14-day quarantine, in closed hotels, in single rooms, they pay for the hotel and maintenance themselves, while their treatment depends on the destination country. Therefore, the transport organizer will offer the passenger already in the survey in exchange for voluntary consent to; disclosure and use of his personal data, medical data, blood test results, his cooperation in the field of COVID-19, placing his health card and survey on the server, providing telephone data to track passenger contacts with other persons over the last 14 days, geolocation, GPS, location of wanted people, it will be offered cheap insurance of these events or even covering part of these passenger costs. The problem of contact tracking may only become apparent at the destination airport, hence the flight organizer should have passenger data regarding COVID-19. Close cooperation between the air services of both countries of departure and arrival is needed. Return flights are carried out using the same procedures. Air transport has contributed to the mass spread of COVID-19 disease worldwide. Now the same airlines will help countries to maintain and eliminate the state of emergency of this disease.

My proposal is precisely this can be done, that by increasing the administrative work of staff in the organization of flights, better instrumentation of airports, instrumentation of planes, optimization of passenger distribution on board, introduction of methods for innovative passenger measurement, introduction of techniques for tracking control contacts electronic people infected, control the outbreak of the disease or keep a suspicious passenger on board the aircraft.

- **Measuring instruments and innovative devices for use with COVID-19.**

Aircraft manufacturers and airlines must look for innovative measuring instrument solutions that are useful for rapid deployment to passenger air transport, and a significant number are already on the market or at the testing stage, and other problem solutions should be directed to research teams to develop. The article discusses most of the available innovative apparatus useful for diagnosing passengers.

However, we will discuss a few more innovations to apply. For example, Al Rokid glasses detect people at risk of coronavirus if they have a fever. The Chinese startup Rokid has developed glasses that use thermal imaging technology to check if someone has a fever from a distance of up to 1 meter. The equipment is used by guards at the recently opened Hongyuan Park in Hangzhou. Thanks to the device, it was possible to reduce the waiting time to enter, because according to the South China Morning Post it can measure the temperature of even several hundred people in two minutes. If the glasses register someone with a high fever, the staff is automatically notified and the face recognition system saves the person's biometrics in their database. The disadvantage of technology is that it does not detect cases in the early stages of the disease or those with no symptoms [31]. The group of innovative devices also includes pulse oximeters for measuring saturation, blood oxygenation and pulse measurement, because they are additional measuring instruments. Dr. Richard Levitan, a respiratory specialist at Bellevue Hospital in NY, said that with a pulse oximeter and thermometer, Americans can be
diagnosed and treated for COVID-19 before they develop severe symptoms. All people with cough and fever should monitor their health with a pulse oximeter, even if they have not been tested for coronavirus. Levitans focuses on monitoring the level of blood oxygenation using a pulse oximeter. The device is attached to the finger and after a few moments you receive information about the level of oxygen saturation. The normal value is between 95-98 percent. For people over 70, the norm is considered to be between 94 and 98 percent. The pulse oximeter works by measuring the absorption of red blood cells in the capillaries with radiation of two different lengths. The signal measured by the pulse oximeter consists of two components: constant and variable (pulsating). The variable component describes the absorbance of pulsating arterial blood. Based on the measurement, the oxygen saturation (SpO2) is calculated. The pulse oximeter may also be able to measure your heart rate. A pulse oximeter test is also performed on patients to counteract respiratory failure. This is important, especially when monitoring the patient's condition during general anesthesia, during oxygen therapy and in the event of a patient's severe condition.

At the airport in Hong Kong, the CLeanTech cab has been built, whose task is to fully disinfect passengers. The device, which looks like a telephone booth, is being tested. According to a message issued by the airport, the system used in the booth is able to remove all impurities from the skin and clothes. Cleaning takes 40 seconds and uses a disinfectant spray - reports Business Insider [37]. Urgent is needed developing new measuring instruments for non-electric quantities using electrical and computer methods.

- Modernization of the existing on-board entertainment installation and adaptation to new tasks of cooperation with the Internet, databases on the server and with passengers in 5G technology.

The airlines have recently given up due to costs and license fees for the use of in-flight movie display with on-board entertainment systems, which will take the passenger during a long flight. Entertainment costs per chair are large and amount to approx. 35 thousand. PLN (7900 Euro) for one flight seat. In addition, throwing monitors reduces the weight of the aircraft, which reduces fuel costs. I propose to thoroughly modernize the existing entertainment installation in such a way as to adapt it to support the increasing organizational tasks facing airlines in connection with COVID-19 and the economic crisis. I propose to change the entertainment system into a system of individual internet service for each passenger separately. Each passenger has full high-level internet service and support for airline databases, ticket sales system, database system, kept on airline servers or in the cloud. The passenger should be supported and kept thoroughly informed as they do in Taiwan and Korea in the form of press conferences to eliminate stress, fears, distrust of the passenger and that he is not surprised by the lack of complete information. The system can be used, first of all, to inform passengers about new transport rules, rules of conduct during a flight, during a stay in a foreign country, including the possibility of browsing the database, booking flights, etc. The system can be used to deliberately prepare professional training related to with COVID-19 flights, which a passenger can also download from the company's server before booking a flight, which will significantly shorten the continuous repetition of the same content for each passenger separately by company and airport personnel.

Possibilities of developing such an Internet system for passenger service, education, and viewing nature films in free forms. For example, even websites provide thousands of magazines, books in free writing and in the form of audio-books. The system will also limit the use of the smartphone during the flight, which will improve safety, because the same can be done using the on-board system. Playing music from youtube will probably be possible without fees? The system will allow subsequent modernizations of the flight management system, which is its most important function. A wisely organized on-board entertainment system will allow you to inform, deliver press, music from YouTube, educate and gain customer trust. The system should also be used to communicate with Skype using a flight passenger. The possibilities of using such an existing system, which only needs to be modernized, are limitless, even to read newspapers in electronic form, analyzing maps of the area where we are going or describing the country where we are going [64, 65].

- New rules for the reception and service of foreign passengers at airports in China and countries that have mastered the pandemic by innovative methods.

It was possible to completely close the borders for air, road, rail and sea traffic, but for a short period, e.g. a month, until methods of extinguishing and suppressing a pandemic were developed. Further blocking is to the detriment of countries and nations, because we are pushing ourselves into recession and a long-standing crisis. Generating such an industry, trade, services, education blockade causes huge unimaginable economic losses that are impossible to make up, e.g. one day of Lufthansa aircraft parking is a loss of EUR 1 million.

At present, China has completely overcome the epidemic and the only problem is the virus "dragged" by airplanes from Europe and the USA. The Chinese government is aware of the dangers of receiving people from abroad, hence new provisions have been introduced to regulate international arrivals of passengers from abroad. Therefore, from March 23, 2020, a new restrictive directive came into force, regarding all foreign arrivals to the Chinese capital of Beijing. Planes that were directed to Beijing are first directed to 12 other cities, called "the first place of arrival". Thus, all passengers on foreign flights who land in one of the twelve cities are directed to sanitary inspection and baggage collection at a given intermediate airport. If they pass the check, they are allowed to continue their journey to Beijing. All who arrive must undergo an inspection, and if there is a suspicion that they may be carriers of the coronavirus, they are directed to a 14-day forced quarantine at the hotel at their own expense in the intermediate city. The bus transports passengers from the intermediate airport to the hotel, you can choose the type of hotel. In the marriage hotel, families are separated, because everyone has a single room, no way out, and food is delivered to the room. After quarantine and after checking with a medical test that you are definitely not a carrier of the virus, you can return to your permanent residence in the city. There remains phone contact with other people. People who have passed the sanitary inspection from the intermediate city are flying to Beijing, where only the inspection is carried out to check whether the person is at risk and not a medical test confirming the state of health. It is not known.
for how long this condition will last, but it must be stated that the responsibility for the condition of passengers is borne by aircraft manufacturers and airlines that organize flights. In the case of quarantine, the cost of flight for a passenger and the desirability of arriving increases significantly, since he was going to a 3-day conference and ended up in a 14-day his flight quarantine [52, 53, 1, 2, 11, 51].

Taiwan had only 300 infected people by February 31, 2020, same to Vietnam. Taiwan certainly deserves first place on the epidemiological podium. Although located less than 150 kilometers from mainland China, and the flow of people between countries is very intense, by the end of March on the 24-million island of coronavirus infected only 300 people. Epidemiologists point out that, just like in Vietnam, security checks have already begun on December 31. A "command center" for communication with citizens was also rapidly established. Interestingly, the authorities' reflexes prevented the coronavirus from spreading, leaving schools closed for only two weeks. Epidemic Command Center [13, 15].

- First signs of reviving domestic air traffic in China and other Asian countries after COVID-19

It is necessary to carry out very precise preparatory work to launch such transports using the Airbus 380 -860, because you have to reckon with a dynamic change in the decisions of Asian countries, which adapt very intelligently to the changing situation. Countries that have overcome their illness with great effort and resources, do not want to let it come back, hence the stringent rules introduced during the pandemic still apply. In the first place, I am considering the destination country for large passenger aircraft China, because it is a market three times larger than the entire EU and five times larger than the US, which is crucial for large aircraft manufacturers and large airlines. The article, based on literature research, discusses how aircraft manufacturers and airlines are to prepare themselves to deal effectively with the problem. Based on these literature studies, the largest aircraft have the greatest chance of resuming flights, as the unit costs of organizing the flight and the costs of passenger service increase significantly. Secondly, the restoration of priority priority aircraft, i.e. the most economical ones for aviation for mass transport before a pandemic, e.g. Airbus 320neo and Boeing 737 MAX, which can already be restored to flights in countries with large areas, i.e. the USA, Canada, should be considered China, Australia, Brazil, Russia. In these countries, you can start domestic flights after introducing and checking personal protective equipment to limit the spread of this virus. China is already implementing flights to China based on the solutions provided in the article, which should be adapted to the tasks of aircraft and airline manufacturers. China has successfully mastered the pandemic and will immediately develop the restoration of air transport because it performs most of the transport of medical supplies in the world. China has a handicap in the form of ending a pandemic, as Europe and the US are still struggling with a pandemic. It should be remembered that the loss of a year may change the situation on the market of competitiveness of air passenger transport. The Chinese company COMAC launches the production of the competitive Comac C919 aircraft, which is to be a competitor for the Airbus 320neo and Boeing 737 MAX. For now, orders have been placed by 3 Chinese airlines, an American investment company, but Ryanair is also trying. The time it takes for practical solutions that work out can be critical [41,42, 43].

The article has the form of a guide with a list of tasks and problems to solve and gives information on how to solve a given problem at the current stage based on the state of the art of scientists and experience in the field of measuring apparatus. The proposed solutions concern how the distance between two people from 2 m can be shortened to 10-20 cm by means of passenger's personal protection and flight organization. Next, it was discussed what preparations, tests and measurements should be carried out, before the flight, during the flight and after arrival at the destination port. It also discusses the handling and handling of passengers to minimize COVID-19, just before flight, during the flight itself, and how to deal with infected people. The work concerns the preparation of aircraft for transporting people during the COVID-19 pandemic, but the procedures and procedures also apply to diseases caused by other viruses. If airlines want to return to regular flights as soon as possible, they must restore passenger confidence and reduce the risk of COVID-19 infection. The first forms of state aid should be to help airlines organize domestic internal flights in order to restore passenger confidence and test new COVID-19 news and innovations. The first domestic test flights can take place with the participation as passengers, voluntarily selected persons from flying personnel, flight attendants, airport staff, to test subsequent solutions with the participation of several infected persons and the press and media. The adopted innovative solutions must still be presented and accepted by the governments of countries where real transport will be carried out. This is even more urgent because in recent days China has strongly tightened restrictions on people arriving in China, with an emphasis on foreigners. Further countries are already adopting Chinese procedures and they will become the norm [1,2, 34, 49, 53].


Those subsections of this chapter and the entire article, which have already been positively resolved in the given two countries, are omitted, if do not we consider them to the needs, because the guide is written for each country in the world. My proposal is to restore to flight and to resume production of the magnificent, in my opinion, Airbus 380, in comes in two versions 550 and 850 people in economy class. It is a pity that this plane does not fly and there are no further orders for it. In this calamity that airlines encountered, a 90% drop in flights is ruin and bankruptcy for airlines. For Airbus 380 this misfortune can be a chance, a light in the tunnel, for a slow, slow return to flying. Since a return to the previous state from before the epidemic is unlikely, effective adaptation of one type of aircraft to times of crisis will allow the slow modernization of the entire industry. This study is most useful for direct practical application for long-range wide-body aircraft, A380 section 8.1 x 7.15 m, or Boeing 747 section 7.81 x 6.5 m. Large hull section and two decks with a large surface allows it to better adapt to flying in COVID-19 times.

In my opinion, the larger the fuselage diameter, the better it is. The large area allows it to better adapt to flying in COVID-19 times. In my opinion, the larger the fuselage diameter, the better it is. The large area allows it to better adapt to flying in COVID-19 times.
There is a simple non-investment method to verify my idea of "Airbus 380 for COVID-19". It is enough to test several economical version 850 planes without any changes on routes to China and other countries. China is also vitally interested in restoring air transport on the China-rest of the world route, and we will need their experience and assistance to further modernize this aircraft to transport people potentially infected with COVID-19. The company Airbus sees the first signs of a revival of the aviation industry in China, the more that it has production facilities in Tianjin producing Airbus aircraft that have briefly stopped production but have already resumed it. General Director Guillaume Faury said on March 23 this year that he saw the first signs of a return to normality in the context of domestic air travel, which with the market of 1.4 billion people is probably not surprising [7]. That is why I propose that air traffic restoration should be started from large national markets and from countries that have lifted the restrictions on crossing borders. Boeing has also decided to build the first terminal equipment line outside the United States, not accidentally in China. The plant will be located in Zhoushan, China and will ultimately produce 100 Boeings 737 a year, in a version most likely MAX [40,42]. All passengers embarking must be potentially treated as infected with COVID-19, despite being healthy despite having no symptoms of illness, despite having no symptoms temperatures, they must be safely transported to the destination port, without contact with another person. At the destination port, they again need to be checked, if there are patients who were revealed only during the flight, they will be referred to hospitals, if they have no symptoms for quarantine in a closed hotel facility, at the beginning, unfortunately, for two weeks and then they will be delivered to the places where they arrived. Perhaps the SARS-CoV-2 virus will disappear by itself, just like the previous virus with the same name SARS has disappeared. In my opinion, this is very unlikely, because governments are ineffective or have ignored the threats and the pandemic has spread to more countries. On April 1, 2020, there should be no SARS-CoV-2 pandemic in any European Union country, only individual cases! Hardly any government has used pandemic suppression methods implemented successfully by states; China 60 million people in blockade, Taiwan 25 million, Hong Kong 7 million, South Korea 52 million, Japan 126 million, Singapore 8 million I conducted quite thorough literature research on COVID-19 disease. I know exactly the methods of infection and the course of the disease from the moment of infection to the end of the disease, recovery, day by day, hour by hour. I know exactly the procedures used by China when transporting people from Europe to work in China after having mastered a pandemic, this is a very difficult organizational issue and you need to adapt to it in air transport, otherwise China and other countries will withdraw passengers from the airport back to the plane.

The first promotional flights, e.g. for 50% of the price, or as you suggest there, you can do to test this idea without investment. The Airbus 380 has 11 rows of seats on two decks. The sale of tickets and their price would have to depend on the variant that you, as a company, accept for use. I only consider large planes, because in my opinion they have the best chances of survival on the market. Nothing stands in the way to then implement similar procedures for all types of Airbus aircraft.

The basic problems and tasks facing the flight organizer that need to be solved step by step to achieve the intended goal.

6.1 Passenger health card, survey, database and recommendation for COVID-19

Establishment of a database for passengers for a given flight "Airbus 380 for COVID-19" containing a boarding pass with a simplified passenger health record prepared on the basis of a prepared survey. The passenger at the stage of ordering the ticket downloads a survey and description of additional conditions. The survey contains justification and a request for his consent to voluntarily disclose his personal data, his telephone number, his telephone contacts, his SMS, e-mail and health data of state services (hospitals, clinics, laboratories) only for the purposes of the COVID-19 pandemic. The simplified health record for the purposes of COVID-19 will be used only for its treatment or for establishing all contacts with infected persons, or who may have infected it, which took place in the last 14 days before the day of flight. The questionnaire in the form of a health record must be prepared in such a way as to allow all passenger contacts and identification of persons with whom he has been contacted so that they can be quickly identified and examined. The survey must be prepared professionally, according to the order of validity of the information provided. If the passenger suffered from COVID-19, he encloses a photocopy of his test results or enter the end dates. The passenger survey is initially verified at the ticket ordering stage and the form is prepared for electronic processing. Different countries have different rules sharing personal data, e.g. GDPR in the EU, so it is recommended to obtain the written consent of the passenger to share his personal data and data regarding his telephone contacts, e-mail and health data. The organizational problem can be solved at the EU level, which will lift the ban on disclosing personal and computer and telephone data for the purpose of the COVID-19. No one will carry out the tasks listed in the study, producers and airlines must do it to launch safe airplane flights.

Admittedly, some countries have already joined the debate on such a health card, but how much can you debate and wait? The EU recommends voluntary use of tracking applications, but does not agree to track infected contacts. According to Deutsche Welle from March 10, 2020, the European Commission has no proposal for tracking applications, however, downloading such an application is to be voluntary and the EC does not agree to the geolocation of infected. So producers and airlines have to count on each other. Philippe De Backer, the telecommunications Belgian Minister explained, "We don't need that. We are able and traditional to look for people who have contact with the infected. " The Belgian authorities announced the employment of two thousand additional people to find contacts called (Epidemic "detectives") by the traditional method [55]. It follows that aircraft manufacturers and airlines can only count on themselves. According to the Korean Ministry of Infrastructure and Transport, "smart city" techniques can reduce the time it takes to track a person's movement from one day to about ten minutes [4]. National governments introduce regulations allowing the location of their stay, which is allowed by the smartphone technologies [56].
If there were difficulties in saving surveys, sickness cards on the servers of aircraft and airline manufacturers, due to the GDPR, you can try to save this data on passengers' smartphones, but there will be a problem as the passenger does not have a telephone or his telephone is of the old type. This data collected on airline servers will be available on the next journeys, while stored on the passenger's phone will be useless.

6.2. Passenger’s written consent to share his personal date, his treatment date and voluntary participation in studies of infectious diseases COVID-19 and other.

Passenger's written consent to share phone data and consent to measurements, tests, tests, contact identification and treatment. The passenger at the stage of ordering a ticket in the survey is informed that if he falls ill with COVID-19 before the day of departure, he will inform the airline about canceling the flight and then he will not incur any costs in this respect. If the passenger, when measuring the temperature before boarding, has a temperature or if the test result is positive, he will not be allowed on board. The passenger consents to temperature measurements, fever camera measurements and others, before the flight, during the flight itself and at the destination airport. I also agree to perform tests and measurements at the airport in the destination country. If the test is positive and if it turns out that the passenger fell ill during the flight, he will agree to receive hospital treatment or a 2-week quarantine in the destination country and will cover the necessary costs himself. The flight organizer will provide him with the necessary assistance in this respect appropriate to the legal conditions at the moment. To this end, it is worth considering cheap insurance to cover research and quarantined hotel in the destination country. The problem of 2-week quarantine, perhaps, will solve itself after the positive implementation of several flights to China and obtaining permission, both countries operating the flight, to replace it in another form, which will be proposed in appropriate time [55,56].

6.3. Optimization of passengers distribution on board due to COVID-19.

The aircraft is fully disinfected, HEPA air-conditioning filters are replaced and is prepared for flight. All passengers are treated as potentially infected with the virus, although they are healthy, even though they have already suffered from COVID-19 and even if they have a certificate that they were ill. The principle of very limited trust should always be applied to this virus. All seats on the plane are taken and sold, if possible. No empty rows of armchairs! The sale begins with the sale of odd-numbered seats, and when they are full, we sell even-numbered seats or vice versa. There are some possibilities here for optimal control of seats in the aircraft, depending on the composition of passengers and susceptibility to COVID-19 disease. Passengers over 60 years of age, especially those suffering from other civilization diseases, should be seated in extreme places in rows, because they are most susceptible to getting sick. People with several diseases affecting the body are treated as those most at risk of infection. As published by the Italian Institute of Health, COVID-19 has many more 58% men suffering and dying than 42% women. This is confirmed by data from Lombardy, which indicates that 82% of patients in the intensive care unit were men, with deceased men representing 78% of patients. Also other studies to date show that men suffer from this disease more often than women [48]. That is why men should be seated between women whenever possible. In contrast, children under 18 can be seated to separate adults among themselves. At a later stage, we will develop a computer application that automatically reads the data from the survey and allocates optimally seats on the plane. I emphasize that the optimization of proper bursting of passengers is of fundamental importance for the epidemiological status of the entire composition of passengers and crew.


Every passenger must have their temperature measured with a laser thermometer before they get on the plane and take their place. Such measurement raises the possibility of an infected measuring person. This temperature measurement also doesn't give us much, because it is only the first indicator, nothing more. A thermal imaging camera should also be used to measure passenger fever. An infrared camera can be installed at the airport during the transition to the sleeve with the plane. However, this allows us to conclude that the passenger did not have overt symptoms as he boarded the plane, because his two measurements were taken. COVID-19 disease has an incubation time of even 1 to 21 days in extreme cases. During a 10-12 hour flight, should be measured the temperature of all passengers every 2 or 3 hours to catch passengers who have already discovered COVID-19 disease during the flight itself and need to be immediately transplanted into a separate room for infected people, so that they do not infect other passengers from the side, back and front. During the flight, it will be better to measure the temperature of passengers with a portable thermal imaging camera that simultaneously measures up to 30 people. It is already known from the literature how I determined that infection is dependent on the number of SARS-CoV-2 viruses infected and the time of exposure to the virus. Approximately 5 places should be prepared in single, separated areas on an airplane for patients whose disease will only become apparent during the flight. It would be advisable for the crew to have a pulmonologist or trained nurse on board who could connect the respirator to the breathing. One ventilator should be easy to use in order not to land on the road. The Airbus 380 has 860 seats, which is almost as many people as on 16 buses. The service at the destination airport is carried out by the services of the given country together with the aircraft personnel who have printed the distribution of seats, who sat where and has all passengers' boarding passes on the laptop. Upon arrival at the destination airport, you must measure the temperature again. This data made available to the epidemiological control services of the destination airport will significantly speed up the flight check-in. We suspect passengers suspected of being infected at the airport from the rest and carry out their tests, including tests, and if we carry out the procedures described above correctly, there will be few or none at all. The decision as to which passengers still make the services of a given country and the aircraft crew must adapt to this. We load quarantine passengers to the bus and take them to a collective quarantine hotel, where service is taken over by the destination country in accordance with the provisions in force there. Passenger service is taken over by the airport and destination country, which makes sure that the plague is not let into your country. Passengers whose temperature has been measured stay in quarantine for 2
weeks (in China they pay for the hotel themselves) or to the hospital for recovery, and after recovery and 2 negative tests are released. Temperature measurement and tests cause that we also catch people suffering from traditional seasonal flu and other viral diseases manifested by high body temperature, e.g. HIV, Ebola, SARS-CoV-1, MERS and a number of others and even colds, but they are not the subject of of this guide, they must be handled in accordance with the medical knowledge and law of the country in which the passengers are. There is never 100% certainty that individual people with no symptoms or people who do not give the truth in the survey will be on the plane but the controlled optimization reduces the possibility of falling ill. Optimization of passenger seating can also take into account other scientifically proven features of the virus. For example, a person suspected of being infected may be asked to indicate the smell of the perfume, because according to research in the United Kingdom, about 80% lose smell and taste. Because there is little experimental research in the literature in this area, while most information is checked, at least in 3 sources, as in this article [57, 53, 51, 50].

6. 5. Personal protection measures to distance passengers and cabin crew.

Passengers at the departure airport receive personal protective equipment for the flight upon boarding. These are aprons from materials impermeable to viruses, in the form of suits appropriately selected, commercially available, a mask one or two, 3-5 wipes soaked in hand disinfectant liquid, 3 pairs of gloves, a plastic bag closed with waste. Caution should be exercised when drinking, eating and using the toilet. Passengers do not have any hand luggage, and drinking and eating is served on the plane. Protect your personal protective clothing so that you cannot touch your face, nose or eyes. At the Lodz University of Technology, fabrics have been developed that are permeable to air and water vapor, and not to allow viruses. If there are manufacturers of overalls from such certified materials that are impermeable to viruses, then they should be tested and ordered. Strict personal protection measures are necessary at the initial stage of launching COVID-19 flights in order not to burn the project. Even if the funds given are redundant, they can be gradually modified and the unnecessary ones be given up in turn.

In the second stage, it is necessary to consider replacing the suit with a mask with a plastic visor with a mask, but first it must be checked experimentally in the plane and with the visualization of the flow of air streams, because IATA claims that the air conditioning of the aircraft produces a vertical draft, which reduces the chance of infection [34, 22, 38.39].

Cabin crew should begin to be secured in the way that doctors are secured in infectious hospitals and gradually, step by step, eliminate the outfit of protective clothing, starting from the shoes towards the head, until only the head, neck and possibly part of the body from the height of the bust up. If the virus tests show that it is impossible to get infected through the skin, then a protective suit in addition to the head and upper torso is unnecessary. It is recommended to avoid designing outfits in white because it is associated with the hospital. According to the publication of photos from Bild 9.06.2020, the airlines have already started designing and using protective clothing.

As it results from the publication of photos and Bild's article of 9.06.2020 showing the protective suits of flight attendants of several airlines; Philippine Airlines, Thai Airways, Gulf Air, Air Asia and European airlines. Air Asia has the most stringent protective clothing, such as medical service in infectious hospitals. Until the end of the year, this line offers promotional prices of tickets within Asia at prices of 3-5 $ one way, it is a pity that hotel prices are not promotional, which I checked. The same article "Masks and coveralls" in Bild was repeated on 11/06/2020 [67, 68] Asian countries had MERS, SARS-CoV-1 and now SARS-CoV-2, so that fear and panic are not unreasonable there. It is a pity that the same rules have not been adopted in the EU and the US, for which we are paying a very high price. You can start by copying the costumes of these airlines to the beginning, but there is one catch hidden in this proposal - a question mark. In Italy, as many as 163 doctors and 37 nurses or nurses died during the pandemic on COVID-19, by 12/05/2020. According to the published opinion of the doctor prof. from Italy (I forgot my name but I have it) one of the reasons for so many deaths of medical personnel is the infection of people while taking off their infected suits. A doctor in full protective suit is not entitled to be infected with a virus. Putting on the suit is simple but taking it off, contrary to appearances, when it is infected, is an extremely difficult and dangerous operation. Special courses are run in hospitals for personnel in removing the infected suit. Therefore, in my opinion, full hospital overalls will not work on the plane (in addition, in the pictures in Bild you can not see the whole outfit) and at the first contact with the virus, flight attendants will get COVID-19. I remind you that a large increase in mortality was also noted, even in gravediggers, during the outbreak of a mass pandemic in Lombardy.

On the other hand, conducting on-board courses for employees in putting on and taking off infected full medical suits is pointless. In the event of infection, the employee must know what to do, subject to PCR and 14-day quarantine. Therefore, other solutions to this problem need to be sought [70]. The suits shown in the pictures in the Bild newspaper can be modeled, but only if they are not full medical suits, because special sanitary regulations must be applied to them. Other elements of the protective suit are acceptable [68,69].

Aircraft personnel should have regular molecular and serological or both tests as described above for their safety and passengers. One collective test can be performed for the entire crew, e.g. for 10 people using the so-called technique of pooling genetic material but it must be a reliable good laboratory [26]. Unfortunately, most of the recommendations used in research and recommendations on how to behave people in the presence of coronavirus were unfortunately wrong, this also applies to WHO and most governments. There is a whole series of news from the research of scientists that we did not know about.

Chinese scientists verified information on the most common coronavirus transmission in May. The fastest way to get infected is by breathing and talking, while the droplet pathway through coughing, sneezing, or a spray from the mouth, also causes infection, but to a lesser extent than we thought. Instead, the role of infection by touch, which was over-preferred, decreased. Masks helped stop the spread of a pandemic, say researchers, but only to whoever wore them. They inform that patients with COVID-19 breathing, secreting even a million viruses per hour. Earlier it was thought that coronavirus spreads fastest through coughing and sneezing. Just as I mentioned, the spray from the
mouth can be 7-8 m away. Now it is known that rapid transmission of the virus is conducive to breathing and speaking. "It would explain why it spread so easily all over the world," writes Dailymail [66]. Earlier studies previously discussed from the USA were confirmed [23, 24].

There are at least a dozen health ministers, members of the government, who said that wearing masks is unnecessary and even harmful. I have been using masks in my laboratories for several dozen years. Studies have shown that the consistent wearing of masks will prevent the second wave of this virus pandemic [71]. Chinese scientists from Sun Yat-sen University, who have already submitted their findings for publication in Gastroenterology, have thoroughly examined 73 patients with confirmed SARS-CoV-2 coronavirus infection. Blood, nasopharyngeal swab, urine and stool samples were collected from all. Tests for SARS-CoV-2 in faeces were performed by RT-PCR. I do not discuss the research results in detail, they are in the given article, but they are shocking. The presence of the virus in faeces, urine and in samples of collected organs was confirmed; esophagus, stomach, duodenum, rectum. According to experts, the risk of infection also increases the use of public toilets [70]. In addition to lung damage, the virus penetrates the brain, heart, kidneys, male testicles and the effects it causes are huge and this also applies to asymptomatic diseases. Faecal and urine infections are also possible with the help of faeces and urine trapped in the air [70]. Therefore, for employees, we can take a throat swab, blood, urine, faeces for periodic tests. Sewage tests for this virus are already being carried out, e.g. from Spain, i.e. by examining sewage from separate airport buildings, we can approximately determine where people were infected with the virus [72]. Therefore, I propose to periodically examine samples of sewage from the aircraft for the presence of a virus to confirm the health of passengers and crew. Toilets for the crew should be separate. The method of testing sewage is suitable for searching groups of employees, groups of passengers where there were people infected with the virus. Tested sewage from the toilet from the plane at the airport in Beijing, will allow you to quickly verify whether our aircraft is clean from the SARS-CoV-2 virus, with a very high probability, efficiently and cheaply. The database on the company’s server and crew computers on the plane, perhaps even at the destination port, find sources of infection.

**Innovative methods for testing SARS-CoV-2 virus and COVID-19 disease.**

The first group of innovative methods are modern tests to study the presence of this virus in the human body, as discussed in the article. These are devices that automatically perform several hundred RT-PCR tests per day, new technologies that shorten PCR tests to several minutes and dozens of tests developed and implemented for mass population testing. An interesting method is pooling swabs for a group of people in one study, if we suspect that everyone is negative. Other innovative methods should also be sought.

**Examination of wastewater from the toilet and in sewage canals.**

It belongs to innovative and cheap method include wastewater testing. We already know that faeces, urine are the source of infection and the entire digestive tract is the habitat of the virus and it should be expected that body fluids, i.e. blood and lymph, will also actively participate in the spread of infections throughout the human body. Using a method of testing the presence of the virus in wastewater, we can track entire groups of people, including those most difficult to detect, in asymptomatic patients, in several studies. Wastewater research conducted in Spain was used to assess whether the virus is already present in the main sewage collectors of Barcelona, and to determine the starting places, the so-called zero patients with outbreaks of infection in the this disease [74]. Sewage epidemiology (wastewater-based epidemiology) is one of the cheaper methods of diagnosing and searching for patients, while it does not cause infections alone [75].

However, research shows that the virus in the sewage system can, however, help to localize the outbreaks of the disease and asymptomatic carriers. Every person infected with SARS-CoV-2 discharges millions (if not billions) of genomes of the virus into the sewage per day. This translates to from 0.15 to 141.5 million viral genomes for every letter of waste water generated. Outside the human body, the virus quickly ceases to be dangerous, although fragments of its RNA still remain, enabling its identification. Nowhere was the virus found in drinking water, as provided by US CDC (Centers for Disease Control and Prevention) [76, 77].

Scientists from several centers; Arizona State University, the Australian University of Queensland and British Cranfield University see in these studies a chance for easier detection of virus outbreaks thanks to sewage epidemiology (WBE). It is therefore possible to determine how many infected people, including asymptomatic carriers, are in a given area. It is only necessary to investigate which aircraft the collected sewage comes from [77, 78]. One should return to the already proven methods of testing sewage for the presence of hepatitis A viruses and polio. This method can be used only in countries where there are efficient sewage systems and it is only 27% of the world’s population, or 2.1 billion people. It is estimated that the sewage method accounts for only 1% of the cost of tests, although the tests cannot be completely eliminated [78]. The proposed method is simple, cheap, effective and easy to use in aviation as one of the methods of virus diagnosis. In some cases it perfectly complements tests and other methods. You can use it in apartment and do it yourself with indicator tests. Unfortunately, most of the recommendations uses in research and recommendations were unfortunately erroneous, including those of WHO and most governments, There is a whole series of news from research scientists that we did not know.

### 6.5.1. Proposed bans and restrictions.

A total ban on carrying hand luggage on board an aircraft and even newspapers, books, a computer, laptop or tablet. It is particularly important to emphasize the prohibition of touching the face and restricting conversations between passengers, the use of common items and everything that is discussed in this guide as conductive restrictions. Passengers are not allowed to bring their own food, sandwiches, sweets, peanuts or drinking on board. I suggest that you completely give up food for passengers, while passengers receive bottled and foiled mineral water. Passengers get a set of protective measures in the form of handkerchiefs impregnated with a disinfectant liquid for washing hands, a trash bag, disinfectant gel in a tiny sachet, 5 pieces of paper towel. The
neighbors can communicate with each other, on board the plane and with the family on the ground, e.g. friends and family members using the modernized Skype form, the on-board entertainment system. Members of the same family will also sit in different places of the plane, as the purchasing system will seat them tickets.

The problem of newspapers and books should be solved by means of an on-board entertainment system and its modernization. Contracts should be signed for the supply of cheap press in electronic form, on such promotional terms as the Berlin Morgen Post does in the field of sharing entire articles on COVID-19. Similarly, the editors of other even scientific journals, such as Lancet. Scientific publishers like Elsevier, Springer provide only selected articles for free, just like JATM, but you can negotiate with them to extend the free offer for airline passengers, this can be collectively negotiated with IATA. 5G network is just entering, i.e. streaming possibilities will increase several hundred times, i.e. this network should be entered into the on-board entertainment system. The on-board entertainment system should allow for recalling cabin crew when needed and ordering a queue for the toilet, as there will be no additional toilet cubicles on the decks. It is recommended to recommend passengers maximum use of the on-board entertainment system and limiting calls from their own mobile phones. In this way, we avoid speaking that strengthens viral infections.

A total ban on smoking cigarettes, including electronic cigarettes, should apply to all facilities: aircraft, airport, commercial and service facilities related to the airport. Cigarette smoke enhances the transmission of the virus in the air over long distances. Ladies should be asked not to overdose fragrances.

6.6. Masks, overalls and other protective elements for passengers and cabin crew.

The mask is supposed to protect us against the virus in closed rooms, because the virus travels in the air for long distances, it can also attach to small liquid droplets or dust particles and all aerosols with diameters below 10 µm can be transported in the air over long distances. For example, the smallpox virus can travel in the air over a distance of over 50 m. The virus transport is also supported by ventilation and air conditioning systems in market halls, airplanes. For now there is no research in airplanes about how small droplet aerosols will move. It is known from my research that the distribution of aerosol droplets in clouds is similar to the distribution in dust clouds of low concentration, i.e. close to normal distribution. For this mask to fulfill its role, it must have a double-sided HEPA filter, which is the standard for masks marked FF2, FFP3. Masks marked with the N95 standard are approved by WHO, but popular surgical masks do not meet these conditions. The mask should preferably be reusable, it cannot pass SARS-CoV-2 viruses with a diameter of 40-140 nm in any direction and it must be air and water vapor permeable, while it must not cause significant difficulty in breathing. Masks with excessive flow resistance that make breathing difficult are harmful. It must be remembered that separate masks are used for running, cycling, walking, etc. Our mask is to stop the virus particles in both directions and this must be recorded in its operating instructions. The selection of passenger masks should be made taking into account the composition of the air supplied by the air conditioning.

Popular masks available in the market, in my opinion, are completely unsuitable for protecting passengers on aircraft from viruses. If necessary, we will take care of these masks in next paper [21, 23, 32, 33, 35, 54].

6.7. A protective cap with an elastic band, covering all hair.

Human hair is most susceptible to electrostatic charging in the air. Therefore, the hair is very electrified, which makes it a reservoir; dust, dust, organic particles in the form of viruses, bacteria and fungi. Tests on the electrification of human hair and their impact on very fine dust particles were performed in my laboratory and recorded with the Schliernaufnahmegerat-80 apparatus [38, 39]. The hair is closest to the human holes susceptible to infection; lips, nose, eyes and ears. In this situation, viruses flowing in the air are caught and attach to the hair. From the hair they get into the nose, mouth, eyes and become infected. Using a mask is completely pointless if you do not have a permanently hair secured protective by means cap or headgear. Both men and women in particular must have their hair tied up in a bun and tucked completely into a protective cap made of non-static fabric. There is no research in the literature on the electrification of human hair and its impact on the increase in virus infection, in this case SARS-CoV-2. In my opinion, a very significant percentage of infections will result from hair infections. To a lesser extent, this applies to beards, mustaches and hair all over the human body. We conduct thorough research for several months literature and my own in the laboratory, I have never met a description of the role of hair in human infection with SARS-CoV-2 virus [32, 34, 38, 39].

6.8. Other methods of distance passengers during the flight.

There are still several solutions to be implemented later. These include transparent plastic covers proposed by Italy, mounted on the seat articulation, tilted back, about 60 cm high, but they must obtain safety approvals. Such covers are used by the Taiwanese authorities in primary schools just to increase the distance between children but are placed on the tables. Such shields for students used are in China and South Korea, Taiwan refer to this. They should be combined with a mask and visor and then slowly try to opt out of plastic visors. Such covers must be tested with the participation of heated mannequins in order to determine air flow streams, whether they meet safety standards [38, 39, 22, 23, 24].

It was published in the press that several airlines are considering the possibility of flights with 50% seat filling in order to distance passengers. The 50% version without individual protection measures for each passenger, in my opinion, will not work. Such a problem has already arisen before, allergenic infections in planes, because it was forbidden to eat peanuts on the plane, because the consumer infected two rows forward and backward, and two rows from its sides. The infected person was given life support. Such a problem has already arisen before, allergic infections in planes, because it was forbidden to eat peanuts on the plane, because the consumer infected two rows forward and backward, and two rows from its sides. The infected person was given life support. Such a problem has already arisen before, allergic infections in planes, because it was forbidden to eat peanuts on the plane, because the consumer infected two rows forward and backward, and two rows from its sides. The infected person was given life support. Such a problem has already arisen before, allergic infections in planes, because it was forbidden to eat peanuts on the plane, because the consumer infected two rows forward and backward, and two rows from its sides. The infected person was given life support. Such a problem has already arisen before, allergic infections in planes, because it was forbidden to eat peanuts on the plane, because the consumer infected two rows forward and backward, and two rows from its sides. The infected person was given life support. Such a problem has already arisen before, allergic infections in planes, because it was forbidden to eat peanuts on the plane, because the consumer infected two rows forward and backward, and two rows from its sides. The infected person was given life support. Such a problem has already arisen before, allergic infections in planes, because it was forbidden to eat peanuts on the plane, because the consumer infected two rows forward and backward, and two rows from its sides. The infected person was given life support.

It was published in the press that several airlines are considering the possibility of flights with 50% seat filling in order to distance passengers. The 50% version without individual protection measures for each passenger, in my opinion, will not work. Such a problem has already arisen before, allergenic infections in planes, because it was forbidden to eat peanuts on the plane, because the consumer infected two rows forward and backward, and two rows from its sides. The infected person was given life support. Alternative solutions that can be easily used later, in my opinion, for the Airbus 380 aircraft version 860, there are, in my opinion, at least a dozen or so, require aerodynamic tests, but considering them at this stage is pointless, because you need to look for low-cost solutions. It is not possible to achieve a distance of 1-2 meters from the passenger on the plane. IATA and the president of Rynair were very harsh against leaving the vacations [42, 43, 49, 53].
6. 9. Benefits and disadvantages of performing RT PCR and rapid serological tests for all passengers just before boarding.

It should be emphasized that performing even very accurate molecular PCR or serological tests at the airport before flight is completely pointless, because this virus is extremely intelligent and contagious and can be detected only on specific days after infection and we do not know in how many days it stops infecting, since its extreme infection periods are 1-50 days. This virus can survive in the freezer for up to 2 years, on objects for up to 17 days. In Europe, there are countries where even more than 50 molecular PCR tests performed for employees of the same hospital were false, because both molecular (genetic) PCR tests and serological (immunological) tests were false positive and negative [26]. Such situations are possible when existing diagnostic laboratories have poor diagnostics, or different tests from different manufacturers are used. Diagnostic laboratories for PCR tests must be with experienced diagnostic staff, while rapid serological tests never give 100% certainty of the result, but we can easily repeat them many times, because there are already 10 and 2 minute tests. PCR and blood tests are completely separate tests and their purpose is different. You have to understand the essence of the SARS-CoV-2 RNA virus and its method of very malicious infection, because PCR measurement is performed only for a given moment of time when the swab is taken, and this virus behaves completely differently the next day from the day of infection. At the same time, the state of infection and disease COVID-19 depends on the patient’s state of health. In aviation, only PCT automatic test devices are considered, e.g. from Roche, 860 tests in 3 hours and similar [27,28,29, 60, 61].

Test attempts for all aircraft passengers have already been done on Emirates, but they cannot, in my opinion, give satisfactory results, as they do not take into account the ability to infect and survive this pathogen. However, just doing the tests is a move in the right direction because it reduces the number of infected.

The rules of very limited trust should be applied to all tests. By their very nature, blood serological tests are much less reliable. Before purchasing, serological tests should be verified in consultation with the seller, who should give a certificate of correctness, as they are sometimes poorly performed and companies claim that they are ineffective and have been deceived by the supplier [60, 61, 62].

6.10. Search for other methods of searching for people with asymptomatic COVID-19.

The situation may improve when a second and further reliable methods or instruments are developed for quickly measuring the state of infection of infected people suffering from asymptomatic diseases, which they themselves do not even know. We need measuring instruments to diagnose people with no symptoms and no such instruments. Asymptomatic people do not have a high temperature, do not have a fever, may not have any other symptoms, but all the time at the same time, they can infect other people without even knowing it. Expensive PCR tests cannot be performed for all passengers, and they also do not give 100% certainty, because they give positive results but only on strictly defined days from the date of infection. Teams of research laboratories consisting of medical scientists and physical and technical sciences have to look for new instruments and cheaper measuring techniques. I will give an example; the dog has a 600 times better sense of smell than a human and can and be, it is one of the hopes, trained to verify passengers infected with SARS-CoV-2 virus at the airport. Works in this area are carried out in Great Britain. In my opinion, such measuring instruments can be pulse oximeters for measuring non-invasive monitoring of blood oxygen saturation percentage (saturation) and heart rate, but this method still requires experimental research and verification. Are needed a quick measurement with non-invasive instruments based on measurements of non-electrical quantities using electrical methods. Also laser technology and fluorescent methods suggest that such measuring instruments will be developed. We fight with an invisible, very tiny enemy with a diameter of 40-140 nm, about which we know practically nothing, because our experience is limited to observing various bad effects of his action [36, 49, 51].

HEPA filter for the aircraft. The aircraft should have one collective HEPA filter whose cartridge is a cassette, easily replaceable. After each flight or after several flights, this filter should be tested for COVID-19 virus content after removal. I know this is quite troublesome because you need an electron microscope, the pathogen particles are 40-160 nm. On this basis, it is possible to assess whether we transported the sick and for which contagious diseases. Based on the amount of virus on the filter, you can estimate how many people were sick. I do not know the construction of the aircraft ventilation and air conditioning system, but if the decks are served by several HEPA filters, it is possible to estimate where the infected passengers sat. This method is to assess whether the transport system used is epidemiologically safe.

7. Increasing the availability of toilet cabins and sinks on board during the COVID-19 era.

It is also a problem to use the bathroom during the flight to use the toilet and wash basin. It would be best if one bathroom was for 50 -80 passengers, so that the passenger does not make long trips on the board of plane. After using the bathroom, the cabin must be automatically disinfected after each use. You can set several toilet cabins on each deck separately, for now portable, and then life will verify how to solve this problem to make it optimal. Because each passenger will use the bathroom and the toilet about 4 times during a flight of 10-12 hours, the bathrooms must handle about 3400 entries. For the passenger, sitting still for 10-12 hours in an armchair, additionally dressed in a tight impervious suit is a significant difficulty, hence other solutions may be considered in the future.

8. The advantage of wide-body aircraft of the Airbus 380, Boeing 747 type, for transport during the COVID-19

The biggest disadvantage of the Airbus 380 was that it is too large, now this large surface becomes its advantage, because it can be used to distance passengers. Airbus 380 planes are probably also designed for cargo transportation, because here the lifting capacity is decisive, because its packaging capacity is high. Don’t hurry up the reconstruction of ready made Airbus 380 aircraft, because the problem may disappear by itself when the pandemic disappears or other methods for simple control of asymptomatic
passengers with infected passengers are developed, e.g. using trained dogs, the emergence of new measuring instruments outside of temperature measurement. The idea is not to incur the costs of modernizing the aircraft, which may prove unnecessary in 3 months. You need to start your first flights and watch the situation very carefully and quickly adapt to changing regulations and the state of the pandemic. The situation on the oil market has changed, it is not known at what level the price of a barrel of Brent oil will stabilize, but its price of around $ 30 means that the importance of the price of fuel drops significantly. A 4-engine plane is safer for the customer, although its servicing and operation are more expensive [42, 49, 51].


In the case of transport using intermediate airports as hubs, this is how the Emirates line worked, the plane lands at a given hub hub, passengers remain on the plane in their seats or they are released from the aircraft to a separate area of the airport, separated from the rest of the airport while maintaining distance 1-2 m. There they can use bars, restaurants, take a walk, read the press and after a break they are loaded onto the plane. If new passengers are loaded from this hub then it is implemented and the aircraft continues to the destination. During their stay at this airport, they keep a distance of 1-2 m from each other. However, hubs are losing importance with the Airbus A380 and Boeing 747 flight ranges, the more so as fixed costs of services in ports will increase significantly and the number of flights will have to be reduced [49, 62]. Hub ports are needed to fill the aircraft with passengers to improve the economics of airline service.

10. Identification of other viral diseases and COVID-19 flights after the invention of the vaccine.

Development of a vaccine against SARS-CoV-2 may solve the problem but it does not have to be at all and it will be only in a year or two, later or not at all. 20 years have passed and there is no vaccine for HIV, MERS, SARS-1, so that announcements of the development of an effective vaccine and its implementation are two separate problems. One passenger infected with COVID-19 can infect half a plane, and he does not even know that he is a virus carrier and infects, it is difficult to even punish him. If the aircraft manufacturer can ensure that the plane is filled with people who are not infected with the SAR-CoV-2 virus and who have not been infected asymptotically and can prove it, then it has an open path for safe flights to any country in the world. Already at present, flights on the "Airbus 380 for COVID-19 "are possible to around 10 countries of the world. Since China is currently ahead of most highly developed countries in the field of computerization, telephony and practical computerization (such as 5G technology), we need to copy their methods used in China as well as possible, we must learn from the better. When it comes to 5G technologies, the leading countries are: South Korea, China, USA, Estonia, Finland, Switzerland, Great Britain and Italy [40, 41, 49].


It should be taken into account that the SARS-CoV-2 pandemic will not be controlled in all countries even within 2-3 years. It will be possible to fly to some countries almost completely safely, e.g. to China, Taiwan, Hong Kong, Singapore, Japan and other expensive procedures will have to be used. It should be remembered that planes prepared in this way can safely transport people infected with other viruses, e.g. HIV, SARS-CoV-1, MERS, Dengue, etc. The list of these diseases caused by viruses is over 20. The worst is that even if we had mastered the SARS virus -CoV-2 causing COVID-19 throughout the world, in all countries, which is unlikely to happen, in 3 months, a year or two, the mutated virus will appear even more contagious and we are having fun again. The SARS-CoV-2 virus is already the third coronavirus in this group that caused epidemics in 2003 and 2010. According to Iceland researchers, there are already 40 minor mutations of this SARS-CoV-2 virus. This SARS-CoV-2 virus has already been discovered in a much more contagious form than the one raging in Wuhan.

I would like to point out that the COVID-19 vaccine, as developed, will be able to be used, but only for healthy people, because it is probably not for infected people. For people who have suffered from COVID-19 overt and asymptomatic, it will be necessary to test antibodies to this virus, as is done for vaccinating hepatitis B. At present, no one tests COVID-19 antibody levels, and if these antibodies are unstable, the problem is that no vaccine can be produced. Its purposefulness is doubtful for people who have previously suffered from COVID-19, because scientists need to determine how many years the antibody protects the person from getting sick. It cannot be excluded that there will be further pandemics of similar or more contagious viruses [12, 26, 34, 35, 59, 60].

12. Use the recommendations of this guide to distance people staying in the following clusters; sports stadiums, entertainment halls, street manifestations, cinemas, theaters, parliament rooms, parliamentary rooms, lecture halls at universities. Direct use of the recommendations given in the organization of rail, bus, road transport for passenger transport and sea transport.

Adaptation of distance and safety methods for rail transport, in meters, buses, in parliaments, parliaments, theaters, cinemas and stadiums.

The technical safety rules given in this article are almost identical, with only a few modifications to be applied, in every type of mass transport; by trains, metro, buses and car traffic. Procedures in relation to airplanes can be used to distribute people in other rooms with the structure and arrangement of seats in the form of large halls, when we want to increase safety in relation to the distance of people as well as to secure people in places of collective stay. This applies to parliaments, parliamentary halls, lecture halls, entertainment halls, sports halls, theaters, cinemas and stadiums. For example, a football stadium like Barcelona's Camp Nou needs to solve similar problems as Airbus 380 to fill with people. According to several scientists, a patient with COVID-19 may throw coughs, sneezes at a speed of 55-160 km / h, at a distance of 7 - 8 m, when subsequent rows arranged in Roman Colosseum technology [63].

A more difficult situation exists on large cruise ships, such as Daimond Princess, where with so many decks, cabin and corridor dimensions this is a much more difficult problem to solve. Adaptation of a large cruise ship to transport people during a pandemic is much more difficult than adaptation of such an Airbus 380.
13. Final conclusion and comments
The aircraft is the most dangerous means of transport during an epidemic and must therefore be subject to special, redundant control in terms of passenger safety. According to my research, one patient with COVID-19 who doesn’t even know he is sick, a passenger or flight attendant can infect even most passengers, if he is so sick on the plane and he will infect the environment with viruses for several hours, because it is important the number of viruses it will release and the long exposure of passengers to infection. Recall according to “Dailymail”, such a sick person can secrete up to a million viruses per hour and infect everyone around. Until now, it was thought that infection could occur only through coughing and sneezing, but now it is already known that rapid transmission promotes breathing and speaking. This would explain why this virus has spread so rapidly throughout the world [66, 77]. It follows that it is necessary to rigorously protect the head of the passenger and the service, of course, provided that the virus can not penetrate the human skin, which is 100% so far, we do not know it either. All WHO recommendations, most governments are not worth a pound of trouble. Two people can safely talk to each other outdoors at a distance of 7-8 m from each other, but we can not provide such a distance in any apartment, store, premises. Unless there is thorough research in the laboratory regarding SARS-CoV-2 virus and COVID-19 disease, all protective measures should be taken to protect passengers against illness. The introduced replacement distance means also protect against other infectious diseases. Isolation of each passenger and crew member as if he were placed in a single 2 m high plastic pipe, together with his seat, completely isolated from all other passengers, which is technically impossible to implement but this theoretical distance model should be sought. I would like my recommendations to be aimed at implementing this theoretical model as much as possible.

The most important tasks to be performed according to the guide:
1. Treating every passenger as a suspected person due to COVID-19 disease.
2. Introduction of passenger geolocation control by means of tracking his phone, connected to GPS, medical databases, airline database locating his place of stay and his contacts on the map for treatment, quarantine and flights. In many countries this problem has been solved at the government level, where not, you need to ask the passenger for permission and create these bases himself.
3. Performing pre-flight tests only in doubtful cases, the rest of the organizational work must be performed by the passenger in cooperation with the airline on the basis of a questionnaire and health card.
4. The use of computer technique for selecting seats on the aircraft in accordance with the instructions of the guide. Performed measurements during the flight and isolating the patient immediately as soon as it reveals so that it does not infect further.
5. Selection of innovative measuring apparatus in accordance with the guide.
6. Selection of several methods of passenger protection and isolation in order to effectively distance and isolate them from neighbors.
7. Introduction of innovative methods for testing the presence of virus in aircraft wastewater and air conditioning filters.
8. Modernization of the on-board entertainment system in accordance with the guide’s instructions and coupling it with passenger service databases and 5G internet.
9. Commissioning scientific research to develop new innovative head protection measures and testing the distribution of air streams in the aircraft.
10. The implementation of the guide’s recommendations by each reader for their own private health purposes.

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Design and Simulation study of Electro-Mechanical Actuator for Missile Maneuvering

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Abstract- Electro-Mechanical Actuator (EMA) is the key component in the guidance systems of missiles to convert electrical power into mechanical power. EMAs have shown significant improvement in response times and are more reliable compared to other actuators. This paper proposes a Simulink model for linear electromechanical actuator which is very efficient and can withstand noise and disturbances. Electromechanical actuators are mechanical actuators where the control handle has been supplanted by an electric motor. This model is subjected to sudden loads and disturbances and the precise actuation is obtained within the specified settling time. The model is also subjected to nonlinearities and the results were found out to be competent.

Index Terms- Electromechanical Actuator, BLDC motor, Electric motor, Simulink, Non-Lineairities.

I. INTRODUCTION

A typical aerospace application involves a device or object which is able to change its direction and follow a desired path. The object is able to dynamically change its trajectory and moves from point A to point B. The object can change its direction with the help of fins, or flaps. These flaps/fins generate a torque due to aerodynamic friction present in the atmosphere and this torque rotates the object flying in the atmosphere. These fins are raised and lowered depending on the direction our object has to follow. The movement of flaps is done with the help of actuators. In aerospace applications, precision and accuracy play a very important role. But there are many aerodynamic forces that affect the missile during its motion to the interception of the target. A slight error can cause adverse effects to the object. So, the integration of guidance system to a missile is to provide the required force for its propulsion, intelligence to evade targets and effective maneuvering which are the main features of the guided missile systems. In recent years, the requirements for the quality of automatic control increased significantly due to increased complexity of design of aerospace applications. In the real time scenario, there are many factors that affect the precision and accuracy of the missile. When describing the action of forces, one must account for both the magnitude and the direction. In flight, a missile is subjected to four forces; weight, thrust, and the aerodynamic loading, lift and drag [1]. These forces account for deviation of the missile from its trajectory which can ruin the performance of the whole system as the missile fails to terminate the target. In order to avoid this, missiles are equipped with fins which helps us to steer the missile in such a way that the missile gets back into trajectory. So, the efficiency of the system depends on the efficiency of the fin actuators. In our project, we have developed a linear electromechanical actuator which is very efficient and this control system can withstand noise and disturbances. So, this paper emphasizes on the modelling of PMBLDC motor and controlling its position using PID Controller to suit all the aerospace application requirements which can withstand the effects of disturbances and non-linearities.

II. ELECTRO-MECHANICAL ACTUATOR

The mechanical actuators where the control handle has been supplanted by an electric motor is Electro-Mechanical Actuator. The rotary motion of the BLDC motor is converted to linear motion. In the greater part of the electromechanical actuators, the principal activity depends on the inclined plane concept. In order to achieve higher mechanical efficiency, speed operation, and increment load capacity, the variations of Electro-mechanical Actuators are devised.[2] The main advantage of EMAs is that engineers have unlimited oversight over the motion profile. These are provided with encoders that can accurately control velocity and position. The ability to monitor and regulate torque is also provided by them resulting the amount of force applied. Electromechanical actuation systems can be programmed and reconfigured without shutting them down, which means the force and motion profile can be altered by the software while the device is still running. Electromechanical actuators also offer critical cost savings since they possibly devour power when they are performing work. To maintain a position, the system stays in place while idle which makes it very efficient. The operating costs are drastically reduced making them suitable to use in hazardous areas because of their high efficiencies, low maintenance, and increased up time. Electromechanical actuators can disentangle the design procedure since they are simpler to indicate and design.
An EMA generally consists of a PID controller, a BLDC motor, a speed reduction gearbox, a lead or ball screw as shown in figure 1. All these blocks work in congruence and give an accurate actuation motion.

A. PID Controller

PID control represents a proportional–integral–derivative control. PID control is a feedback mechanism utilized in a control system. By ascertaining and controlling three boundaries – the proportional, integral, and derivative of how much a procedure veers off from the ideal set-point esteem – we can accomplish diverse control actions for specific work. The error between the actuator position and the input signal is given to the PID controller. The PID controller used in this simulation uses the compensator formula as shown in equation (1). The block output is a weighted sum of the input signal, the integral of the input signal, and the derivative of the input signal [3].

The PID position controller has the following parameters:

\[ S = P + \frac{1}{s} + D \frac{N}{1 + N_s} \]

(1)

Where,

S: Speed at an instant
P: Proportional gain
I: Integral gain
D: Derivative gain
N: Filter co-efficient.

B. BLDC Motor

EMA typically employs a BLDC motor because of its high efficiency, high reliability, increased lifespan, better speed-torque characteristics, and low electromagnetic interference. The stator windings should be energized in a sequence to rotate the BLDC motor. It is essential to realize the rotor position to comprehend energized winding following the energizing sequence.

Rotor position is sensed using Hall Effect sensors embedded into the stator. Most BLDC motors have three Hall sensors embedded into the stator on the non-driving end of the motor [4]. Whenever the rotor magnetic poles pass near the Hall sensors, they give a high or low signal, indicating the N or S pole is passing near the sensors. Based on the combination of these three Hall sensor signals, the exact sequence of commutation can be determined. A commutation logic specifies correct phases to be excited to the 3-phase inverter. This block represents how a motor would spin (at a constant speed) depending upon the position of the rotor. There are totally six switches from S1 to S6 on the 3-phase inverter which forms the commutation circuit. Process of switching ON and switching OFF the switches in the inverter arms is based on the predefined pattern or sequence depending on hall sensor values as shown in the fig. 2.

The decoder logic for the above switching sequence is implemented in Simulink as shown in figure 3.
deterioration of system performance which can even lead to instability [5]. This non-linearity increases with wear of the systems. When backlash is traversed, there is no torque transmitted through the shaft and when sudden contact is established, the resulted impact can destroy the gear and it causes a high frequency noise.

C. Lead Screw
A lead screw converts rotational motion of the motor into linear motion which is the most essential part of a linear actuator. The ratio of linear to rotational motion is called the lead of the screw. The pitch of the screw determines the amount of distance the actuator advances per one rotation of the screw.

As we have considered a missile as our aerospace application, the EMA is connected to the fins of the missile. The linear motion of the lead screw results in the angular rotation of the fin which changes the direction of the missile.

III. DESIGN IMPLEMENTATION IN SIMULINK
The designed model in SIMULINK software is shown in figure 4. The voltage demanded by this design is limited to 180V as most of the missile electrical systems work within this limit. This voltage is supplied to a 3-Phase inverter which controls the speed of the BLDC motor which is driven by the commutation sequence provided by the decoder. Now the rotational motion of the BLDC motor is converted into linear motion by the lead screw. The mathematical representation of the lead screw is given by eq-2.

\[ T_F = \frac{P}{2 \pi s} \]  
(2)

Where,

TF: Transfer function of the Lead screw
P: Pitch of the Screw

As the lead screw is attached to the fin of the missile, the linear motion is converted to angular motion of the fin. The pitch of the screw determines the distance travelled by the screw for one rotation. The pitch of the screw used in our design is taken as 3 millimeters. We have designed the model considering that our fin shifts by 4° in position for every 5-millimeter displacement in the lead screw. So, if the desired fin movement is 50°, the actuator should give a linear displacement of 62.5-millimeters.

In a control system, generally there are many unwanted inputs which will affect the output of control system resulting in the increase of system error [6]. These unwanted signals are disturbance signals. So, in order to eliminate these disturbances from the system, we use the system feedback to enable the control system to monitor and process them to minimize these disturbances to reach a state of stability. The model is designed to resist these unwanted signals dynamically. Also, the control systems are susceptible to the non-linearities (static or dynamic). A motor that does not react to very low input voltages due to frictional forces shows a nonlinearity called dead zone. Gears that do not fit perfectly exhibit a nonlinearity called backlash [7]. This model is designed in such a way to withstand them to certain acceptable range.

IV. RESULTS AND DISCUSSION
The system requirements and system parameters used in this design are shown tables 1 and 2. The input signal and the actuator response are shown in the figure 5,6. The error signal which is the difference between input signal and feedback decreases with time as shown in figure 12. The demanded speed S by the BLDC motor is shown in figure 7. This assumes that the motor initially demands high speed and once the desired actuation output is achieved, the motor stops spinning. Also, it is observed that when a sudden load is acted on the motor (at 0.5 sec), the motor tries to counteract the load and the desired actuation is achieved with some delay as shown in figure 8. The demanded voltage by the EMA is shown in figure 9. It is observed that initially 180V is demanded by the actuator and the demand correspondingly reduces as the fin approaches the desired position. Stator currents and Hall sensor outputs are shown in figures 10, 11. The PID controller is tuned in such a way that if a backlash nonlinearity with a dead band value of 60 is applied, the system is still able to achieve the desired actuation within specified time of 2 seconds as shown in figure 13. The model is also tuned to withstand a dead zone nonlinearity with a band value ranging from -30 to +30 as shown in the figure 14.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting time</td>
<td>2 seconds</td>
</tr>
<tr>
<td>Peak overshoot</td>
<td>&lt;10%</td>
</tr>
<tr>
<td>Maximum input voltage</td>
<td>180 volts</td>
</tr>
</tbody>
</table>

Table 1. System Requirements

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Supply</td>
<td>180V DC</td>
</tr>
<tr>
<td>Number of phases</td>
<td>3</td>
</tr>
<tr>
<td>Back EMF waveform</td>
<td>Trapezoidal</td>
</tr>
<tr>
<td>Mechanical Input</td>
<td>Torque</td>
</tr>
<tr>
<td>Stator phase resistance Rs (ohm)</td>
<td>0.2</td>
</tr>
<tr>
<td>Stator phase inductance Ls (H)</td>
<td>8.5e-3</td>
</tr>
<tr>
<td>Flux linkage</td>
<td>0.175</td>
</tr>
<tr>
<td>Motor Current</td>
<td>15A</td>
</tr>
<tr>
<td>Inertia $(J(kg.m^2))$</td>
<td>0.6e-3</td>
</tr>
<tr>
<td>Viscous damping $(F(N.m.s))$</td>
<td>1e-3</td>
</tr>
<tr>
<td>Screw (displacement per revolution)</td>
<td>3 mm</td>
</tr>
</tbody>
</table>

Table 2. System Parameters

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Kp</th>
<th>Ki</th>
<th>Kd</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10</td>
<td>0.0001</td>
<td>0.005</td>
</tr>
<tr>
<td>2</td>
<td>25</td>
<td>0.02</td>
<td>0.000001</td>
</tr>
<tr>
<td>3</td>
<td>50</td>
<td>10</td>
<td>0.5</td>
</tr>
<tr>
<td>4</td>
<td>70</td>
<td>20</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>90</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 3. Various PID values
The fin response to various PID values as in table 3 are shown in figure 15.

V. CONCLUSION

The design and simulation study of Electro-Mechanical Actuator using MATLAB Simulink software has been executed and is validated. The model is developed towards high reliability and high-power efficiency. The effects of parameters variations on system’s stability and performance were also analyzed. The model can handle the disturbances and non-linearities to a great extent. This model can also thwart the effect of sudden load on the motor and can achieve desired actuation within a very short settling time. The maximum tolerable range for nonlinearities has been found out. The model stands out to be very reliable even when acted upon with disturbances and high amounts of non-linearities the outcomes acquired from this simulation study are satisfactory and experimental validations are presented.

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Figure 4. Electromechanical Actuator Subsystem
Figure 5. Model input-output

Figure 6. Fin response

Figure 7. Demanded Speed by the motor
Figure 8. Motor response for sudden load at 0.5 sec
Figure 9 Demanded Voltage

Figure 10. Stator Currents

Figure 11. Hall Sensors

Figure 12. Error Signal

Figure 13 Introduction of Backlash nonlinearity

Figure 14 Introduction of Deadzone nonlinearity
Figure 15. Fin response for different PID values
The Effect of Generative Teaching Strategy In Academic Achievement And Retention In Science For the Eighth Grade Male Students At Al Mazarsouthern District Schools

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Abstract- The study aimed at investigating the effect of generative teaching strategy in academic achievement and retention in science for the eighth grade male students at Al-Mazar southern district schools. The study sample consisted of (62) students divided into (30) students for the experimental group who learned through generative learning methodology and (32) students for the control group who learned through traditional method. The study used Quasi - experimental approach and a guide was prepared for both the student and the teacher regarding how to use generative learning strategy as well as an achievement test in the unit consisting of (20) multiple choice items whose validity and reliability were verified. The study concluded that: there were statistically significant differences among post- achievement scale in science in favor of the experimental group. The effect size was (68%). It was also concluded that there were statistically significant differences among the averages of both groups' scales regarding achievement test and retention in favor of the experimental group. The effect size was (70%). In the light of this study results, the generative learning strategy for teaching science was suggested.

Index Terms- Generative Teaching, Achievement in Science, Retention in Science.

I. INTRODUCTION

Science has an essential role in the current society progress by tackling all aspects of life as well as achieving cultural development that is regarded a result of rapid progress of science. It follows that the people interested in science consider the real value if it lies in its ability in interpretation of phenomena and events. This can be attained through fact interaction and correlation in terms of concepts and theories rather than through facts by themselves; the facts without concepts are opaque and the concepts without facts are speculative. (Tamam 1995).

The science teachers are essentially concerned with teaching concepts and scientific principles that represent mental images for the perceptive. These concepts and principles vary due to their different sources as well as the way they are formed. A lot of teachers nowadays are mere exact copies of those who had taught the mand follow the same methodology. They also carry the same thoughts in spite of the training they received to teach more effectively instead the traditional methods they were accustomed to. (Windschitl, 1999).

Various changes took place in science teaching programmers in the second half of the 20th century. These changes were reflection to economic, scientific and technological shifts and there was need to cope with these changes and adopt new approach in science depending on scientific strategies in research and thinking. (Al Hilah, 2002).

It is worth mentioning that the effective instruction is not confined to introduce concepts, facts skills and activities but rather to perform scientific operations on the part of the learner. In that vein, the education specialists have emphasized that one of the most important aims of teaching science is thinking skills development among students by teachers' using of teaching strategies through which students practice activities that trigger thinking and encourage them to ask questions. (Zaitoon, 2004).

On the other hand, science instruction requires adoption new approaches and contemporary theories as well as new methodology to activate teaching and learning science at different education stages. (Al Baz, 2001).

As long as grasping students' teaching is primary focus of the process of instruction strategies, there emerge need for identifying the impact of use of teaching strategies on student's learning and their acquisition of scientific concepts as well as their attitudes and beliefs toward science in the light if increasing call to activate group learning. This matter obliges teachers to be aware that the change in the education outcomes requires equal change in curricula and methodology and that student's motivation plays essential role in conceptual change. Instruction strategies also help students and increase their scientific achievement. (Salmit, 2003). When using generative teaching strategy, it is necessary to provide for teaching situation that enable students to relate the previous learning to the later and allowed him to ask questions, exchange views and criticize thoughts (Abdulsalam, 2006).

Statement of the problem is to answer the following main QUESTION:

Various changes took place in science teaching programmers in the 20th century. These changes were reflection to economic, scientific and technological changes and there was need to cope with these changes and adopt new approach in science
depending on scientific strategies in research and thinking. (Abdulsalam, 2001).

The researcher, through his practical experience, noticed student’s failure and weakness in achievement and retention with regard to scientific concepts. This was due to not relating their new experiences to the previous ones and not implementing what they learn in real life. Generative teaching strategy was an attempt to solve this problem. Generative teaching strategy include two stages: the primary stage which is concerned with relation new experiences to the previous ones, and application stage which has to do with the student's implementation of everyday skills and experiences they learn. This, in turn, extends the effect of learning for a long time and increase the academic attainment.

This study- generative teaching strategy for retention and attainment among students--is an addition to the studies and researches based on constructive learning. It aims to answer the following main question:

What isthe effect ofgenerative teaching strategy in academic achievement and retention in science for the eighth grade male students at Al Mazar southern district schools?

The main question had the following sub- questions:

1. Were there statistically significant differences at the level (0.05 = α) between the control group and experimental group in post-test application in science achievement test?

2. Were there statistically significant differences at the level (0.05 ≥ α) in retention for the eighth grade students in science that could be attributed to teaching strategy(generative or traditional teaching)?

II. STUDY SIGNIFICANCE

The study is significant in that it is regarded a step toward new strategy improvement and implementation where it is in line with new instruction approaches that require a student to be the engine of the teaching- learning process. The significance of the study is as follows:

1. Its response to the improvement of science teaching process to achieve the targeted aims in the framework of education development adopted by the Ministry of Education in Jordan.

2. Opening the door to conduct studies dealing with educational materials and variables not adopted in this study.

3. Enrichment science teachers with constructivism- based strategies, thereby they will be helped with well- per petratedin struction. It shows model classes using generative teaching strategy.

Previous studies 2.2

The study of (Al Jaman 2013) aimed to investigate “the effectiveness of generative teaching in retention in chemistry and the scientific deduction for ninth grade students” compared to the traditional method before and after conducting the experiment research. The study sample consisted of (61) ninth grade female students from two sections in Al Khaledia secondary school for girls in Western Northern Badia, directorate, Mafrac. (31) female students for the experimental group and (30) students for the control group. The experimental group was taught through generative teaching strategy while the control group was taught through traditional method. The study was conducted in the second semester 2012/ 2013. To achieve the aims of the study. An achievement test in the unit and scientific deduction had been prepared. The results showed that there were statistically significant differences at the level (0.05 = α) in the average on ninth grade female students in chemistry retention in favour of the experimental group taught through generative teaching strategy.

The study of (Al Saedee 2011) aimed to investigate “the effect of the strategy of generative teaching and learning course in tenth grade students’ acquisition of the basic concepts of physics and establishing their beliefs toward physics and learning. The study sample consisted of all tenth grade sections in the governments in Al Ramtha’s directorate. The study sample was (154) male and female students divided into three groups: the first experimental group was taught through generative learning, the second experimental group was taught through learning course, and the third control group studied through traditional method. To achieve the aims of the study, a test for physical concepts acquisition was administered to the tenth grade students. The results showed that there were statistically significant differences among the averages of physical concepts acquisition for the students in favour of generative learning strategy compared to the learning course and traditional method and this was attributed to the teaching strategy.

III. METHODOLOGY

The study used quasi-experimental approach to cover the application aspect, answer its questions and to elicit results depending on measurement tools designed for the purposes of this study according to commonly accepted procedures.

Study in strument

An achievement- test in material unit in eighth grade science book was developed. It consisted of (20) multiple- choice items and every student had to choose one correct answer out of four choices.

Study variables

The present study included the following variables:

The dependent variable: it represented in teaching strategy and it had two types (traditional teaching method and generative teaching strategy)

The independent variable: it represented in students' achievement- test and retention. It was measured through study sample's answers to the achievement- test.

The study sample consisted of eighth grade students from Al Mazar Al-Janoubi is choools in the academic year 2015/ 2016. The study sample was chosen in purposive method from Mu'tah secondary school for boys, Mazar Al-Janoubi, two eighth grade sections out of four sections were chosen. The number of the two section branches reached eight (62) students, (30) students group learned through generative teaching methodology and (32) students learned through traditional method.

Statistical treatment

Statistical processing had been carried out using SPSS (Statistical Package for the Social Sciences) to assess the study results as follows:
1. The arithmetic means and standard deviations for responses of the study sample individuals to the achievement-test of each group.
2. ANCOVA (Analysis of Covariance) to examine the differences among the groups in post application of the achievement-test.
3. Eta squared to measure the size effect.
4. Kuder-Richardson 20 to verify the reliability of the achievement-test.
5. Difficulty and discrimination coefficients
6. Coefficient of skewness: Kolmogorov-Smirnov test to examine normality tests.

1. Were there statistically significant differences at the level \(0.05 = \alpha\) between the control group and experimental group in post-test application in science achievement test?

To answer the question, the researcher used (ANCOVA) between the control group and experimental group to compare the performance level in post-measurement of achievement—taking into consideration that the achievement level of post-measurement was the covariate variable (control variable) as shown in the tables (1) and (2).

**Table 1: Arithmetic MEANS FOR eighth grade students' achievement in science**

<table>
<thead>
<tr>
<th>Group</th>
<th>Arithmetic-mean</th>
<th>Post-measurement</th>
<th>Adjusted Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Arithmetic Mean</td>
<td>Standa Deviation</td>
<td>Arithmetic Mean</td>
</tr>
<tr>
<td>Control</td>
<td>4.30</td>
<td>1.79</td>
<td>10.88</td>
</tr>
<tr>
<td>Experimental</td>
<td>5.30</td>
<td>1.37</td>
<td>16.47</td>
</tr>
</tbody>
</table>
Table 2: ANCOVA to examine the differences between achievement groups in science in post-measurement

<table>
<thead>
<tr>
<th>Source of variance</th>
<th>Sum of squares</th>
<th>D. f</th>
<th>Mean squares (MS)</th>
<th>F Value</th>
<th>Level of significance</th>
<th>Size effect ETA squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>332.80</td>
<td>9</td>
<td>332.80</td>
<td>122.42</td>
<td>7* 0.00</td>
<td>0.68%</td>
</tr>
<tr>
<td>Error</td>
<td>160.38</td>
<td>5</td>
<td>2.718</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>12216.00</td>
<td>6</td>
<td>2.718</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusted</td>
<td>781.09</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Statistically significant at the level (0.05 ≥ a)

Data in table (1) indicated that there were statistically significant differences at the level (0.05 = a) between the means of achievement post-measurement in science according to the group variable (control, experimental) after controlling the post-performance. By reference to the adjusted arithmetic means, it appeared that the mean of control group members' performance was (11.26) and the mean of experimental group members' performance was (16.06). This indicated that the differences were in favor of the experimental group and the results promoted the fact that generative teaching strategy had an effect on eighth-grade students' achievement in science.

According to Cohen's classification, the calculated size effect which was (68%) assured that there was great effect of generative teaching strategy on eighth-grade students' achievement in science.

Figure (1) shows the variation between the control and experimental group in the post-application of the science test after controlling of the post-measurement.

![Figure 1: Variation between the control and experimental group in the post-application of the science test after controlling of the post-measurement.](image)

2. The results related to the second question of the study stating that: were there statistically significant differences at the level (0.05 ≥ a) in delayed achievement (retention) for the eighth grade students in science that could be attributed to teaching strategy (generative or traditional teaching)?

To answer the question, the researcher used (ANCOVA) between the control group and experimental group to compare the performance in delayed measurement taking into consideration that the achievement of post-measurement was the pre-variable (control variable) as shown in the tables (3) and (4).
were in favor of the experimental

dous

generative learning strategy. The study of (Kourilsky
-
results referred to
-
her
-
achievement test?

and experimental group in post
differences at the level (0.05 = a) between the control group
which stated that: Were there statistically
retention in science.

According to Coheen's classification, the calculated size effect
strategy had effect on eighth grade students' retention in science.

indicated that the difference
experimental group members' performance was (14.30). This
performance was (8.81) and the mean of and the mean of
means, it appeared that the mean of control group members'
variable (control, experimental) after controlling the performance
the delayed achievement in science according to the group
significant differences between the means of

Table 3: The Arithmetic means for eighth grade students' post and delayed achievement in science

<table>
<thead>
<tr>
<th>Group</th>
<th>Post-measurement</th>
<th>Delayed-measurement</th>
<th>Adjusted arithmetic Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Arithmetic Mean</td>
<td>Standard Deviation</td>
<td>Arithmetic Mean</td>
</tr>
<tr>
<td>Control</td>
<td>10.88</td>
<td>2.49</td>
<td>7.13</td>
</tr>
<tr>
<td>Experimental</td>
<td>16.47</td>
<td>1.91</td>
<td>16.10</td>
</tr>
</tbody>
</table>

Table 4: ANCOVA to examinethe differences between achievement groups in science in delayed measurement

<table>
<thead>
<tr>
<th>Source of variance</th>
<th>Sum squares</th>
<th>df</th>
<th>Mean squares (MS)</th>
<th>F Value</th>
<th>Level of significance</th>
<th>Size effect ETA squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>177.411</td>
<td>1</td>
<td>177.411</td>
<td>136.245</td>
<td>0.00*</td>
<td>0.70</td>
</tr>
<tr>
<td>Error</td>
<td>76.827</td>
<td>59</td>
<td>1.302</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>9593.000</td>
<td>62</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusted</td>
<td>1439.435</td>
<td>61</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Statistically significant at the level (0.05 ≥ a)

Data in table (3) indicated that there were statistically significant differences at the level (0.05 ≥ a) between the means of the delayed achievement in science according to the group variable (control, experimental) after controlling the performance in post-measurement, by reference to the adjusted arithmetic means, it appeared that the mean of control group members' performance was (8.81) and the mean of the mean of experimental group members' performance was (14.30). This indicated that the differences were in favor of the experimental group and such result promoted the fact that generative teaching strategy had effect on eighth grade students' retention in science. According to Coheen's classification, the calculated size effect which was (70%) assured that there was great effect of generative teaching strategy on eighth grade students' achievement and retention in science.

IV. DISCUSSION

1. Discussion of the results related to the first question which stated that: Were there statistically significant differences at the level (0.05 = a) between the control group and experimental group in post-test application in science achievement test?

   [1] The results showed that there were statistically significant differences between the means of the two groups (experimental and control) regarding the post-measurement of achievement in science and in favor of the experimental group. This indicated that there was an impact of the generative teaching strategy in the eighth grade students' achievement in science. The size effect (68%) emphasized the great impact of this strategy. The researcher explained this result according to the fact that the mental correlations of chemistry concepts established by the students who learned through this strategy had effect on their scores. He also added that teaching through this strategy helped students relate what they hear, see and read by constructing relationship among these senses as well as coordination of sight, hearing and articulation, which facilitated establishing relation which in turn facilitated students' realization and acquisition of concept. As a consequence, it had been reflected on their achievement in sciences characterized by difficult concepts. Generative instruction strategy – according to the researcher - make it easy for eighth grade students to acquire the rigid of science concepts due to its multiple strategies combined together and achieved the expected result which was formation of conceptions of science concepts by acquiring new concepts and relating them to their previous outcome of these concepts. This result is also explained based on the fact that the learner is the focus of this strategy, so it is consistent with the results of the study of (Al Jaman 2013) in which there were statistically significant differences in the average of the ninth grade students' achievement in chemistry. This was due to the teaching model and in favour of the experimental group which studied through generative teaching strategy and the study of (Al Saedeen 2011) whose results referred to statistically significant differences between the means of physical concept acquisition attributed to the strategy of teaching, and in favor of the strategy of generative learning. The study of (Daheer 2009) which came with the results: the effectiveness of generative learning among the eighth grade students and the existence of statistically significant differences between the average scores of the students in the two post-test groups in favour of the experimental group due to the generative learning strategy. The study of (Kourilsky 2004) whose results indicated that the use of the generative teaching strategy in instruction was effective and positive. The study of (Muhammad, 2003) showed that the generative model in teaching has a great influence and effect in modifying the alternative perceptions about frightening natural phenomena and it also had great influence and

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www.ijsrp.org
effectiveness in students’ acquisition of the scientific deduction skills, thus this result contradicted the study of (Saleh, 2009) whose results showed that there were differences in the post-application between the two groups in favour of the experimental group that studied the same units (heat and the expansion of objects by heat) in the traditional method.

2. Were there statistically significant differences at the level (0.05 ≥ a) in delayed achievement (retention) for the eighth grade students in science that could be attributed to teaching strategy (generative or traditional teaching)?

The results showed that there is a statistically significant difference between the means of both groups 'scores (control and experimental) on the delayed achievement test (retention) in science in favour of the experimental group. This demonstrated the effectiveness of the generative teaching strategy in the eighth grade students’ retention of learning material that was implemented in accordance with the generative teaching strategy. The researcher attributed this result to the fact that education in this strategy has developed the skill of thinking, recalling and retention of students. The researcher also attributed this result to the fact that teaching in this strategy developed students’ thinking skills, recall and retention.

The researcher also ascribed this result to the fact that teaching through this strategy facilitated students’ acquisition of science concepts and helped them establish relations among these concepts compared to the control group learning through traditional method and who performance didn't develop regarding delayed achievement test where their achievement test results didn’t improve. This is evidence that traditional method was not effective as far as thinking development and retention was concerned, and the student was not able to establish relations among concepts so that he could keep and recall the learned material.

This result might be attributed to the impact of the generative teaching strategy in facilitating the transfer of learning effect. This result may be attributed to the social and dynamic atmosphere and interaction between the chemistry teacher and the students, being of things this strategy depend on. This facilitated the acquisition, retention and recall of the concepts when needed (delayed test). the researcher also accounted for this result in that students' retention and easy recall of concepts – compared to the control group's lack of exposure to such experiences -were enhanced by discussing lesson concepts, allowing them reintroduce their notes, expressing what they understand, discussing lesson activities, using appropriate teaching aids, recycling concepts, relating the stages of this strategy.

This result might be attributed to the fact that teaching by this strategy had helped students to retrieve the concepts of science. It is as well due to the effectiveness of this strategy in helping students to remember previous concepts and relate them to current knowledge. This enabled students to retain concepts and call them during the delayed test. It may be attributed to the repetition of concepts during the application of generative teaching stages that enabled students to understand and retain concepts as well as their ease of retrieval.

REFERENCES


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Development of Bilingual Ambiguity Resolution

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Abstract- Bilingualism is a striking feature of all expanding cultures. In such bilingual environment, ambiguity in language is crucial and inevitable part that must be resolved to understand the given sentence. This study is aimed at understanding the development of ambiguity resolution in sentence level in Bilingual children. Knowing the developmental paradigm helps a clinician to understand normative and target their intervention strategies age appropriately. The present study investigated 120 typically developing bilingual subjects in the age range of 4 to 15.11 years (Native language being Tamil and second language being English). They were classified into 6 groups. Sixteen sentences in Tamil incorporating various types of ambiguity such as phonological, lexical and structural ambiguity served as the experimental stimuli. The responses obtained were analyzed both qualitatively and quantitatively. Results showed that phonological and lexical ambiguity starts developing at the age of 4. Phonological ambiguity is mastered around 15.11 years whereas; lexical ambiguity is continuing to develop even after 16 years. Structural ambiguity was observed to develop around 8 to 9.11 years and the performance was observed to reach maximum at around 15.11 years. The order of acquisition of Tamil speaking bilingual typically developing children is similar to that of western population.

Index Terms- Bilinguals, development, ambiguity resolution, phonological ambiguity, lexical ambiguity, structural ambiguity

I. INTRODUCTION

We are born in a linguistic condition, where each individual are only exposed to two or more languages (Bilingualism and Multilingualism). As world becomes more interconnected, it is increasingly apparent that bilingualism is the rule and not the expectation. For people of any age or profession, knowing a second language boosts cross-cultural awareness and understanding.

Language comprehension involves the integration of different linguistic input and the configuration of mental models. Whether they do so consciously or not, learners pay attention to and integrate specific linguistic information in order to become competent speakers of their native language. The acquisition of metalinguistic skills, especially ambiguity detection has long been an important area of research.

Ambiguity in language is an important part of language; it is often a hitch to be unnoticed or a problem to be solved for people to understand each other. It can be agreed as an illustration of the complexity of language itself. The child’s ability to address the form of language as distinct from its content was viewed as a specific effect of a general perceptual flexibility that develops in middle childhood.

Ambiguity in a language occurs whenever a given sentences possess two or more distinct semantic interpretations. The ambiguity aspect is of particular interest to language researchers because it allows us to explore how the mind first activates multiple representations and then selects or settles on one particular representation. While it is true that there is plenty of ambiguity within single language, entirely new layer is introduced when there is an additional language within the same cognitive system, as seen in the case for bilinguals.

Developmental changes in sentence interpretation strategies within monolingual children may stem from increased language proficiency, enhanced cognitive processing associated with maturation or the combination of both (Pham and Ebert, 2016). Bilingual children face greater challenges in sentence interpretation than monolingual speakers.

There are several researches done on ambiguity resolution in Western countries. Schultz and Pilon (1973) assessed children between the age ranges of 6 to 15 years of age and documented that ability to detect various types of linguistic ambiguity develops at different rates depending on types of ambiguity. The phonological ambiguity was observed to be developing first, followed by lexical ambiguity and the structural ambiguity did not occur until the age of 12.

Prasitha et al., (2008) conducted a study on lexical ambiguity in sentences on ten monolingual (Tamil) and bilingual (Tamil and English) children in the age range of 8 to 10 years and found that the lexical ambiguity in this age range was at a developing stage. Also, they reported that bilinguals performed better than the monolinguals. Ramkarthik et al., (2010) investigated the perception of the lexical ambiguity in sentence processing in school going children who were monolinguals (Tamil) and Bilinguals (Tamil and English) in the age range of 11 to 13 years of age. With the use of ten ambiguous sentence prepared in Tamil, they concluded that the ability to interpret ambiguity was better in bilinguals, which may be due to second language input, more exposure from the environment and cognitive flexibility as compared to monolinguals. The results also indicated that the 12 and 13 year olds were able to perform better than the 11 years old children which can be contributed to the fact that cognition improves with age.

India being a country with wide multilingualism, there definitely exist a need to do various researches on bilingualism and multilingualism to understand their cognitive ability to perceive information from the environment. There are high chances that a
bilinguals or multilinguals can get confused with the meanings of words or sentences as they may be ambiguous.

II. NEED FOR THE STUDY

Though few research is done to study various types of ambiguity in Tamil Speaking bilingual children, there is no evidence on when an individual start resolving the ambiguity and when they develop it. Thus, there definitely exists a need to identify whether children are able to resolve ambiguity like an adult and also at what age a child starts resolving the ambiguity of the words to avoid the communication breakdown.

III. AIM

The current study aimed to explore the developmental continuum of ability to disambiguate in sentence processing in Tamil speaking bilingual typically developing children.

IV. METHODOLOGY

To uncover the development of various types of ambiguity among typically developing Tamil speaking bilingual children, a list of sentences in Tamil were prepared incorporating the major types – phonological, lexical and deep structure ambiguity. Children across the age range of 4 to 15.11 years categorised into 6 groups were included in the study. Bilingual children who are exposed to the second language (English) since 2 years of chronological age with a continuous exposure till 16 years of age with good academic performance and with no other associated problems were selected. The children were grouped into six (Table 1)

<table>
<thead>
<tr>
<th>S.No</th>
<th>Age Range</th>
<th>Group</th>
<th>Respective Grades</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4 - 5.11</td>
<td>I</td>
<td>UKG &amp; I</td>
</tr>
<tr>
<td>2</td>
<td>6 - 7.11</td>
<td>II</td>
<td>II &amp; III</td>
</tr>
<tr>
<td>3</td>
<td>8 - 9.11</td>
<td>III</td>
<td>IV &amp; V</td>
</tr>
<tr>
<td>4</td>
<td>10 - 11.11</td>
<td>IV</td>
<td>VI &amp; VII</td>
</tr>
<tr>
<td>5</td>
<td>12 - 13.11</td>
<td>V</td>
<td>VIII &amp; IX</td>
</tr>
<tr>
<td>6</td>
<td>14 - 15.11</td>
<td>VI</td>
<td>X &amp; XI</td>
</tr>
</tbody>
</table>

Preparation of Experimental stimulus

Experimental stimuli selection criteria:

The sentences were selected on the familiarity, those most occurring in their environment and in their school text books. Sentences with phonological, lexical (homophones and homonyms) and structural (surface and deep) ambiguities ranging from simple to complex in semantic as well as syntactic structure were framed. 27 sentences were shortlisted after the opinion from Linguist. 23 sentences were selected during the second phase of validation with 5 experienced Speech- Language Pathologists.

A pilot study was carried out with 12 typically developing bilingual children between the age range 4 to 16 years and 16 sentences were finalized for the study based on the results. Among the 16 stimuli, 4 were to evaluate phonological ambiguity, 4 were to evaluate structural ambiguity and the rest 8 were to evaluate the lexical ambiguity. (Appendix 1)

a) Phonological Ambiguity:

It can be defined as the presence of two or more possible meanings within a single word. Experimental stimuli: 1, 6, 7 and 16 were phonologically ambiguous stimuli.

b) Lexical Ambiguity:

The lexical ambiguity of a word or a phrase pertains to its having more than one meaning to which the word belongs. Sentences were framed using homophone as well as homonym.

Homonyms are those words that share the same spelling and same pronunciation but different meaning. Experimental stimuli: 3, 4, 11, 13, and 15 contained homonyms.

Table 2

Example of phonologically ambiguous stimuli and possible Interpretation in English and Tamil

<table>
<thead>
<tr>
<th>Stimulus No.</th>
<th>Stimuli</th>
<th>Possible Interpretation</th>
<th>Language</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 /a:ranʧu /</td>
<td>1. Fruit</td>
<td>Tamil &amp; English</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Color</td>
<td>Tamil &amp; English</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Number</td>
<td>Tamil</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Time</td>
<td>Tamil</td>
<td></td>
</tr>
</tbody>
</table>

Table 3

Example of lexically ambiguous stimuli (Homonym) and possible Interpretation in English and Tamil

<table>
<thead>
<tr>
<th>Stimulus No.</th>
<th>Stimuli</th>
<th>Possible Interpretation</th>
<th>Language</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 /avanidam/ /mani/ /ketten/</td>
<td>1. Time</td>
<td>Tamil</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Money</td>
<td>English</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Bell</td>
<td>Tamil</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Name</td>
<td>Tamil</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Beads</td>
<td>Tamil</td>
<td></td>
</tr>
</tbody>
</table>

Homophones are those words that share pronunciation regardless of their spelling. Experimental stimuli: 5, 10, and 11 contained homophones.

Table 4

Example of lexically ambiguous stimuli (Homophone) and possible Interpretation in English and Tamil

<table>
<thead>
<tr>
<th>Stimulus No.</th>
<th>Stimuli</th>
<th>Possible Interpretation</th>
<th>Language</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 /River bank</td>
<td>1. River bank</td>
<td>Tamil</td>
<td></td>
</tr>
</tbody>
</table>
c) Structural Ambiguity:
Ambiguity that arises from the fact that two or more different meanings can be assigned to one string of words is structural ambiguity. Experimental stimuli: 2, 8, 9 and 4 were structurally ambiguous stimuli.

<table>
<thead>
<tr>
<th>Stimulus No.</th>
<th>Stimuli</th>
<th>Possible interpretation</th>
<th>Language</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>/ikkaraikkul/ /akkairai/ /pafal/</td>
<td>1. Other bank of the river looks green</td>
<td>Tamil</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Other side will always be better when you are this side</td>
<td>Tamil</td>
</tr>
</tbody>
</table>

Table 5
Example of structurally ambiguous stimuli and possible Interpretation in English and Tamil

The Main study
The study was carried out in Chennai, Tamil Nadu. The selection criteria were strictly followed in selecting each child for the study. 20 participants in each group with a total of 120 children were selected for the study. The ability to process the ambiguity in sentences were examined. The sentences were presented in audio verbal mode. Children were assessed individually by seating them comfortably in a quite environment.

Response time to disambiguate was observed. The children were instructed to tell how many possible meanings they can understand from that word or sentence with explanation.

A score of zero was given when the subject fails to interpret at least one meaning of the sentence. A score of one was given for every correct interpretation of the sentence. A child can obtain a maximum score of 39 if they interpret all the meanings correctly.

The raw scores obtained for each child was then computed and subjected to qualitative and quantitative statistical analysis. The data were analysed using statistical package for Social Sciences (SPSS) 17.0 version software. The data was described using the statistical mean and standard deviation using ANOVA. The difference between the groups and across the groups was obtained using the post hoc tests. The correlation values were obtained using 2-tailed Pearson correlation coefficient tests

V. RESULTS AND DISCUSSION
The results obtained after the statistical analysis are discussed based on the age at which the development of disambiguation occurs incorporating various types such as phonological, lexical and structural ambiguities into account.

Phonological ambiguity:
The ability to phonologically disambiguate a sentence was observed to start developing at the age of 4 years. It is the only type of ambiguity that develops early in a child compared to other types. As age increased, the performance also increased significantly (Table 6, figure 1).

It was observed that among Group VI, 14 – 15 year olds could perform 70.1% whereas, 15 – 15.11 years disambiguated 100%. Hence, could conclude that phonological ambiguity is mastered at around 15 – 16 years of age.

Table 6
Performance score of various groups for Phonological ambiguity

<table>
<thead>
<tr>
<th>Groups</th>
<th>% Score</th>
<th>Mean score</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>17.8</td>
<td>2.50</td>
<td>1.235</td>
</tr>
<tr>
<td>II</td>
<td>26.7</td>
<td>3.75</td>
<td>0.910</td>
</tr>
<tr>
<td>III</td>
<td>40.7</td>
<td>5.70</td>
<td>1.455</td>
</tr>
<tr>
<td>IV</td>
<td>53.5</td>
<td>7.50</td>
<td>1.821</td>
</tr>
<tr>
<td>V</td>
<td>71.7</td>
<td>10.05</td>
<td>1.276</td>
</tr>
<tr>
<td>VI</td>
<td>85</td>
<td>12.85</td>
<td>3.066</td>
</tr>
</tbody>
</table>

Across group analysis were done using post-hoc tests. The results revealed significant difference between all the groups except for Group II (Table 7). The reason for this finding could be that subjects in Group II were still in the developmental phase with regard to phonological ambiguity. ANOVA analysis was carried out to determine the difference across groups and the level of significance was found to be 0.000.
Table 7
Results of across group analysis for Phonological ambiguity

<table>
<thead>
<tr>
<th></th>
<th>GI</th>
<th>GII</th>
<th>GIII</th>
<th>GIV</th>
<th>GV</th>
<th>G VI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of significance</td>
<td>0</td>
<td>0.23</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

These results are in correlation with the study done by Schultz and Pilon, 1973. They reported that the ability to detect phonological ambiguity appeared first and with largest improvement occurring between 6 and 9 years of age.

**Lexical Ambiguity**

The results indicated that the ability to disambiguate lexical ambiguity also starts to develop simultaneously with phonological ambiguity. Group I and Group II identified only the dominant meaning of the simplest stimuli and the most frequently occurring homophone / homonym. Group II performed comparatively better than the Group I in interpreting, which can be due to their language exposure. Group III interpreted at least the dominant meaning of all the stimuli presented. Most of the children failed to interpret the subordinate meaning of a homonym compared to sentences having homophones in it. On observing, Group IV showed a significant leap in their performance compared to Group III. Group V and VI performed almost equally in disambiguating the dominant and subordinate meanings of all the stimuli but they fail to reach the maximum score of certain stimulus interpretation. Even though there was no statistically significant difference in between these two groups. Group VI performed better (Table 8, Figure 2).

**Table 8**
Performance score of various groups for Lexical ambiguity

<table>
<thead>
<tr>
<th>Groups</th>
<th>Qualitative Analysis</th>
<th>Quantitative Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% Score</td>
<td>Mean score</td>
</tr>
<tr>
<td>I</td>
<td>17.05</td>
<td>2.90</td>
</tr>
<tr>
<td>II</td>
<td>31.1</td>
<td>5.40</td>
</tr>
<tr>
<td>III</td>
<td>62.3</td>
<td>10.60</td>
</tr>
<tr>
<td>IV</td>
<td>90.8</td>
<td>15.45</td>
</tr>
<tr>
<td>V</td>
<td>98</td>
<td>16.80</td>
</tr>
<tr>
<td>VI</td>
<td>98.2</td>
<td>16.70</td>
</tr>
</tbody>
</table>

**Figure 2 Performance in percentage for Lexical ambiguity across groups**

Across group analysis were analysed using post-hoc tests. The test result reveals significant difference across groups for lexical ambiguity Analysis to determine the variability between groups and across groups was done using ANOVA and the value was found to be 0.000.

To conclude, the ability to disambiguate lexical ambiguity develops at around the same time as that of phonological ambiguity but the performance improved when they are in Grade IV and V. Significant improvement in scores were observed in Grade VI and VII and reached stability from Grade VIII to XI. This result is supported by the findings of Ramkarthik et al (2010) who reported that lexical ambiguity in bilingual children developed significantly between 12 to 13 years and continues to improve with age.

**Structural Ambiguity**

The results obtained indicated that the ability to structurally ambiguate a sentence starts developing only around 8 – 9.11 years of age. In Group IV, most of the children interpreted at least the surface structure. But a major leap was seen for Group V and VI in interpreting deep structure ambiguity indicating the complexity of cognitive processing (Table 10, figure 3). This ability to quickly activate semantic information is a critical component of sentence comprehension.

**Table 9**
Performance score of various groups for Structural ambiguity

<table>
<thead>
<tr>
<th>Groups</th>
<th>Qualitative Analysis</th>
<th>Quantitative Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% Score</td>
<td>Mean score</td>
</tr>
<tr>
<td>I</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>II</td>
<td>0</td>
<td>0.10</td>
</tr>
<tr>
<td>III</td>
<td>10</td>
<td>0.85</td>
</tr>
<tr>
<td>IV</td>
<td>58.70</td>
<td>4.70</td>
</tr>
<tr>
<td>V</td>
<td>96.20</td>
<td>7.70</td>
</tr>
<tr>
<td>VI</td>
<td>100</td>
<td>8.00</td>
</tr>
</tbody>
</table>
Across group analysis was done using Post-hoc test to determine the variability in performance with structural ambiguity. The results revealed the presence of significant difference (Table 11). The ANOVA analysis determining the difference between groups and within groups revealed significant difference with a value of 0.000.

### Table 10

**Results of across group analysis for Structural ambiguity**

<table>
<thead>
<tr>
<th>Groups</th>
<th>GI</th>
<th>GII</th>
<th>GIII</th>
<th>GIV</th>
<th>GV</th>
<th>GVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of significance</td>
<td>0.06</td>
<td>0.06</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Schultz and Pison (1973) reported that the detection of surface and deep structure ambiguities did not occur until the age of 12. But in this current study it was observed that around 10 - 11.11 years, children detected surface structure forms and at around 12 – 13.11 years, children were able to detect even the deep structure.

The performance of Group V and VI could be reasoned with their learning through environmental experience. As Felser et al., (2003) reported, the cross linguistic differences between the ways in which the structural ambiguities are resolved indicate that some parsing strategies are language specific rather than universal and thus must be learned through experience.

**Developmental Continuum**

On comparison of the development to detect phonological, lexical and structural ambiguity in all the six groups, the scores showed that the acquisition of phonological ambiguity and lexical ambiguity resolution starts in parallel with group I and as age increased, the children were able to resolve ambiguity more efficiently compared to phonological ambiguity. This can be attributed to the fact that as the age increases the vocabulary also increases. Another factor is that the number of experimental stimuli for lexical ambiguity was more compared to the other two types of ambiguity. There is a steady increase in the scores of resolving the phonological and lexical ambiguity as the age increases.

The ability to resolve structurally ambiguous sentences was observed to be starting to acquire from the age range of 8 to 9.11 years and completely mastered at the age range of 14 to 15.11 years. Hence, it can be concluded that Tamil speaking typically developing bilingual children acquire ambiguity resolution in a defined pattern as that of children of other countries. The order of acquisition to disambiguate is observed to be phonological, lexical...
and followed by structural. All three types are acquired by around 15 – 15.11 years and still learning to resolve the complexity as the age increases.

VI. SUMMARY AND CONCLUSION

It can be concluded that Tamil speaking children also follow the same trend as that of other western population reported by various researchers. The relationship between ambiguity detection in sentences and reading comprehension are well documented. As reported by Zipke in 2007, training in ambiguity detection ultimately improves reading comprehension score. Hence, knowing the developmental paradigm helps a clinician to understand normative and target their intervention strategies age appropriately. This view is been supported by Oakhill et al., 1998. They reported that children can be trained to accelerate Linguistic, Metalinguistic and Psycholinguistic processing skills within the zone of proximal ambiguity development, that resulted in improved reading skills.

APPENDIX

<table>
<thead>
<tr>
<th>Stimuli No</th>
<th>Experimental Stimuli in IPA</th>
<th>Number of interpretations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>/uːŋaː/ /paːŋaː/</td>
<td>2</td>
</tr>
<tr>
<td>2.</td>
<td>/iːkkaarɪkkuː /akkaaray/ /paːfai/</td>
<td>2</td>
</tr>
<tr>
<td>3.</td>
<td>/iːd̪uː /kaːˈhlː/ /paːɡu/</td>
<td>2</td>
</tr>
<tr>
<td>4.</td>
<td>/avanidam/ /mani/ /ketten/</td>
<td>4</td>
</tr>
<tr>
<td>5.</td>
<td>/iŋgu/ /karai/ /ullaːɡu/</td>
<td>2</td>
</tr>
<tr>
<td>6.</td>
<td>/naːlu/ /ruubaɡu/</td>
<td>4</td>
</tr>
<tr>
<td>7.</td>
<td>/aːd̪u/ /kalam/</td>
<td>4</td>
</tr>
<tr>
<td>8.</td>
<td>/paɭaɡa/ /paɭaɡa/ /paːˈlum/ /pulɪkkuːm/</td>
<td>2</td>
</tr>
<tr>
<td>9.</td>
<td>/ad̪i/ /mel/ /ad̪i/ /veːɡaːlː /āmmiːmjuː /nagaraum/</td>
<td>2</td>
</tr>
<tr>
<td>10.</td>
<td>/nɛrən/ /vendum/</td>
<td>2</td>
</tr>
<tr>
<td>11.</td>
<td>/naːn/ /paːttaːm/ /vaːŋgɪnen/</td>
<td>2</td>
</tr>
<tr>
<td>12.</td>
<td>/unaɪkuː /arai/ /vendumaː/</td>
<td>2</td>
</tr>
<tr>
<td>13.</td>
<td>/oruː adʊ /poːdʒum/</td>
<td>2</td>
</tr>
</tbody>
</table>

REFERENCES


AUTHORS

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Effectiveness of Ayurveda Treatment for Ovarian Cyst: A Case Report

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Abstract- Ovarian follicles undergo various rates of maturation and involution under the influence of hormones. The functional, non-neoplastic and benign cystic ovarian lesions are common in the young age of females. Ovarian cyst is usually asymptomatic and these forms whenever ovary produce too much of estrogen hormone. These are fluid filled sacs inside the ovary which make serious symptoms if ruptured. According to Ayurveda, the ovarian cyst which containing fluid can be equated with Kaphaja Granthi. In this case report, a 27-year-old female patient was presented to the Yakkala Wickramarachchi Ayurveda Teaching Hospital, Sri Lanka with a complaint of lower abdominal pain, back pain and irregular menstruation. The Ultrasonography findings indicated left ovarian cyst (4 cm x 3.5 cm). She was treated with internal Shodhana therapy followed by Ayurvedic formula for one week. Raktha shodhaka Panta, Kaishora guggulu, mixture of Maha manjishthadi kwatha with Maha rasnadi kwatha and Pippalimula Panta formulae were administered for 11 weeks followed by 7 days of Pinda oil application with Sweda karma while managing pathya (do) and apathy (don’t) of ahara (food) and viharana (regimens). At the end of the treatments, patient was totally cured from lower abdominal pain and back pain with regular menstrual cycle that observed with bilateral normal ovaries. No adverse effects were noted during the treatment period. The present case study concluded that above formulae is very effective in the treatment of Ovarian Cyst.

Index Terms- Ovarian Cyst, Kaphaja Granthi, Ayurveda

I. INTRODUCTION

Ovarian follicles undergo varying rates of maturation and involution under the influence of hormones guided by the hypo pituitary axis [1]. Ovarian cyst is fluid filled sacs inside the ovary which make serious symptoms if ruptured. Ovarian tumors may be physiological or pathological and may arise from any tissue of the ovary [2]. Pathological tumors are also classified into benign and malignant. From all ovarian tumors 90% are benign and this varies with age [3]. The functional, non-neoplastic and benign cystic ovarian lesions are common in the young age. Ovary is a partially cystic organ and due to that, malignancy is usually less. When the advance age, chance of malignancy is increases [4]. Though, ovarian malignancy is rarely seen in the age group of 15-40 years [5]. The follicles in the ovary forms small cysts that called “Simple Cysts”. These forms whenever ovary produce too much of estrogen hormone. Ovarian cyst is usually asymptomatic and often an incidental finding during ultrasonography performed for other reasons. Lower abdominal pain which is sharp, intermittent, sudden and severe is the most common symptom. Nausea and / or vomiting, fullness or heaviness of abdomen, urinary urgency may occur due to pressure on bladder, menstrual disturbances, bloating, breast tenderness, pain during sex, hormonal effects or an abnormal cervical smear are the other symptoms [6]. Sometimes ovarian cyst give rise to complications like rapid breathing, sudden severe abdominal pain, weakness, dizziness, fainting, pain with fever, vomiting, turning normal cyst into cancerous ones and infertility. Sudden onset of abdominal pain may suggest for cyst rupture. Strenuous activities, such as exercise or sexual intercourse, may precede torsion or rupture. Early menstruation, irregular menstrual cycle, habits like smoking and increased upper fat distribution are the risk factors for developing ovarian cyst [1]. According to Ayurveda, cyst is correlated as Granthi which is mainly due to vitiated Kapha dosha. In the Samprapti (pathogenesis) of Granthi, it was mentioned that mamsa (muscle fibers), rakta and medo dhatu were vitiated [7]. These Granthi are classified under nine varieties as Vataja, Pittaja, Kaphaja, Medoja, Siraja, Mamsaja, Asthi, Vrana and Rakta granthi. The ovarian cyst which containing fluid can be equated with Kaphaja Granthi. The kaphaja granthi is slightly painful in lower abdomen, usually skin colored, gradually increases of size with feeling of heaviness and white thick pus discharges when rupturing [8]. Granthi roga can managed according to the principles of Samprapti Vighatana (to break the pathogenesis) [7]. In modern text use of oral contraceptives, pain relievers and surgical procedures as laparoscopy/laparotomy are advised for this condition. However, Ayurveda medicine has good capabilities to help with conventional treatments.

II. CASE PRESENTATION

A 27 years old unmarried female presented to the Stree roga (Gynecology) clinic, Wikramarachchi Ayurveda Teaching Hospital, Yakkala, Sri Lanka on 6th August 2019 with complaints of lower abdominal pain and back pain since two months with irregular menstruation since 6 months, that having the interval of 45 to 60 days. She mentioned that abdominal pain localized in the left lower quadrant had started few months back. Menarche occurred at 13 years of age and her menstrual periods had regular and normal flow in earlier with mild dysmenorrhea. She reported no changes in bowel habits and denied any urinary symptoms.

Personal history: allergies - to prawns, crabs and pineapple; occupation - accountant; diet - more use of fried foods,
fast foods, meat, cool drinks and less water drinking; psychological aspects - stressed.

On examination she was not pale. Pulse rate 74/min, normal rhythm and BP were 110/70 mmHg. Her BMI was 28kgm\(^2\). Cardiovascular, respiratory, and nervous systems examinations were unremarkable. Abdominal examination revealed the presence of moderate tenderness on left lower quadrant. In vaginal examination, there were no discharges. The Prakriti of the patient was diagnosed as pittavata.

Trans Abdominal Ultrasonography report in August 2019, revealed the left ovarian cyst (4cm x 3.5cm) while right ovary was normal in size. It revealed uterus in normal size, antverted and endometrial thickness was 4mm.

Other investigations as follows: Hb level -12.3g/dl, WBC - 7.43x10\(^3\)/μl, Neutrophils – 62.5%, Lymphocytes 27.5%. Urine Full Report (UFR) - NL.

Figure 1: The Trans Abdominal Scan at day 12 (D12) indicating a left sided ovarian cyst

III. MANAGEMENT

The treatment was carried out with oral medicines (Raktha shodhaka Panta, Kaishora guggulu, mixture of Maha manjishtadi kwatha with Maha rasnadi kwatha and Pippalimula Panta) over 11 weeks and external treatments (Pinda oil application and Sweda karma) over 1 week as depicted in table 1. At the beginning of the treatment the patient underwent on internal Shodhana therapy (purification) for one-week duration. Oral drugs were given for mild Shodhana therapy. After that, oral drugs were started to reduce ovarian cyst. Total duration of the treatment was 3 months and oral drugs were given continuously while external treatments limited for 7 days.

<table>
<thead>
<tr>
<th>Medicine</th>
<th>Dose</th>
<th>Time</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Drugs for purification (Shodhana) in 1st week</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pippalimula Peyawa</td>
<td>120ml</td>
<td>Before meals bd</td>
<td>1 week</td>
</tr>
<tr>
<td>Nawarathna Kalka</td>
<td>2 pills</td>
<td>After meals bd</td>
<td></td>
</tr>
<tr>
<td>Abhayarishtha + Pippalyadyasawa</td>
<td>2 table spoons</td>
<td>After meals bd</td>
<td></td>
</tr>
<tr>
<td>Maha rasnadi Panta</td>
<td>1 table spoon</td>
<td>After meals nocte</td>
<td></td>
</tr>
<tr>
<td><strong>2. Drugs up to 3 months</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Raktha shodhaka Panta</td>
<td>2 table spoons</td>
<td>Before meals bd</td>
<td></td>
</tr>
<tr>
<td>Kaishora guggulu</td>
<td>2 pills</td>
<td>After meals bd</td>
<td>11 weeks</td>
</tr>
<tr>
<td>Maha manjishtadi kwatha + Maha rasnadi kwatha</td>
<td>2 table spoons</td>
<td>After meals bd</td>
<td></td>
</tr>
<tr>
<td>Pippalimula Panta</td>
<td>1 table spoon</td>
<td>After meals nocte</td>
<td></td>
</tr>
</tbody>
</table>

After using oral drugs for Shodhana Therapy,
- External Treatment Pinda oil
  After oil application, sudation (Sweda karma) had performed by using Steam bath.

<table>
<thead>
<tr>
<th>Medicine</th>
<th>Dose</th>
<th>Time</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>After using oral drugs for Shodhana Therapy,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pinda oil</td>
<td>60ml</td>
<td>15 minutes</td>
<td>1 week</td>
</tr>
</tbody>
</table>

Upon completion of treatments for 3 months, patient underwent a Trans Abdominal Ultrasonography (TAS). Patient was followed up for 3 months period that after completion of the 3 months treatment. After the follow up period patient was assessed. She was advised for pathya (do) and apathy (don’t) of ahara (food) and viharana (regimens) as drink more water, use of low-fat diet consisting with whole grains, green leafy vegetables, fruits and to avoid fried foods and meat. She was also encouraged to exercises regularly.
Results

During the treatment, she noted gradually curing of lower abdominal pain and back pain. At the end of 3 months treatments, her menstrual cycle was regular with normal intervals and without dysmenorrhea. No adverse effects were noted during the treatment period. Trans Abdominal Ultrasonography (TAS) was performed to assess the results of management after completion of treatment for 3 months. TAS revealed normal uterine cavity with bilateral normal ovaries. The patient did not report of any adverse effects during the treatment period and the follow up period.

 intolerance, mixture of welling/ fluid content), occurred procedures (karma) of associated with movement), body hear, etc.

Figure 2: The Trans Abdominal Scan after the treatments

Figure 3: Samprapti / Pathophysiology of the Granthi

Patient presented with lower abdominal pain and back pain for two months with irregular menstruation for 6 months, that having the interval of 45 to 60 days. She mentioned that abdominal pain localized in the left lower quadrant had started few months back. Trans Abdominal Ultrasonography report in August 2019, revealed the left ovarian cyst (4cm x 3.5cm in size) while right ovary was normal in size.

According to Ayurveda, Cyst is correlated as Granthi which is mainly due to vitiated Kapha dosha. Due to Nidana sevana (Etiological factors) of this patient, mamsa (muscle fibers), rakta (blood) and medo (fat) dhatu were vitiated and Samprapti (pathogenesis) of Granthi was occurred [7]. The features suggestive of Ovarian Cyst containing fluid can be correlated with Kaphaja Granthi that according to Ayurveda. When levels of impurities and toxins increase in rasa and rakta dhatus, body stores them and form of cyst around ovaries. Also, Dhatwagnimandya (indigestion) of a patient may causes due to history of improper diet and lifestyle that leads to increase the levels of impurities in body. All these things can produce toxins in body and cause diseases like ovarian cyst. Sign and symptoms in ovarian cyst patients suggest imbalance of all three doshas as vata (subtle energy associated with movement), pitta (energy of digestion or metabolism) and kapha (related to organic tissues, fluids and other substances). In hear, vata vitiation mainly leads for increase in pain and vitiated apana vata can retrograde the menstruation. Pitta dosha vitiation results in imbalance of female hormones. Due to that, ovary produces too much of estrogen hormone. Kapha dosha vitiation causes for fluid contain cyst formation [9].

Granthi roga can be managed according to the principle of Samprapti Vighatana (to break the pathogenesis). This condition should be treated with medicines which have ama pachana, agni deepana (increase digestive power), kapha medohara, vata shamaka and rakta shodhaka (blood purification) properties with external procedures (karma) of swedana, avagahana and udwarthana [10].

Raktha shodhaka Panta, Kaishora guggulu, mixture of Maha manjishtadi kwatha with Maha rasnadi kwatha and Pippalimula Panta were prescribed as internal medicines. Rakta shodhaka panta has the effect of rakta shodhana (blood purification) and Pippalimula panta has the ama pachana and agni deepana (increase digestive power) effects. Kaishora Guggulu has the shotha hara (reduce swelling/ fluid content), rakta shodhaka (blood purification) and vruna shodhana (wound purification) properties. In addition to that, main ingredient of pills was guggulu which promotes detoxification, rejuvenation, purification of blood and Karshana effect. Maha manjishtadi kwatha has rathpithi shamaka effects (reduce the vitiation of blood, imbalance of metabolism and hormones). Maha rasnadi kwatha has vata shamaka properties which reduce pain and regulate menstruation through balancing of apana vata [11, 12]. Pinda oil is rakta and pitta falsifying oil and Sweda karma had performed by Steam bath which helps to increase blood circulation with detoxification. Hence, the use of oral and local Ayurveda treatments were successful effects on the progressive follow up of the patient to remove the ovarian cyst.

IV. DISCUSSION

Due to previously used fried foods, fast foods, meat, cool drinks and less water drinking and stressed mind (Nidana / Etiological factors)

Tridoshas – kaphanuviddha mainly vata (Dosha Vigunya)

Rakta, Mamsa and Medas Vitiation (Dushya)

Rakta vaha and Artava vaha Srotas dushti (Female genital tract) (Kha vaigunya)

Sanga (Shrotodushti)

Granthi (Cyst formation) (Disease / Vyakta avastha)

V. CONCLUSION

The management by use of selected Ayurveda treatment modalities has been proved with safe, reliable and effective results on Ovarian Cyst. Hence, the treatment protocol can be used as the standard treatment for the management of ovarian cyst.
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Toxic Parenting Adversely Correlates To Students’ Academic Performance In Secondary Schools In Uasin Gishu County, Kenya

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Abstract- The study investigated the connection between toxic parenting and students’ academic performance in secondary schools. This was in the light of apprehension that there existed dwindling academic performance. At the same time, school administrators were depending on parents to assist students with inadequate academic performance to improve. Yet, reports of parental malpractices involving national examination were on the increase in Kenya. The study was steered by family system theory that states that an individual cannot be understood in segregation from the other family associates. The study adopted quantitative method, correlational research strategy. Stratified and simple random techniques were applied to select a sample of 344 form three students from 10 schools. A personal biographical data form, toxic parenting questionnaire and a document analysis schedule were used to collect data. Descriptive data were presented in form of frequencies. Inferential data was tested using the Pearson’s Product Moment Correlation Coefficient. The results revealed that there was a statistically significant relationship between toxic parenting and students’ academic performance, r(342) = -.25, p = .000. Students who scored high in toxic parenting scored low in academic performance. This study concluded that toxic parenting adversely correlated to students’ academic performance. The study recommended that school administrators could use other methods like psychological counselling services to improve inadequate academic performance rather than inviting toxic parents to assist. A toxic parenting test could be run before a student is sent home to bring a parent to school for scoring low in academic performance.

Index Terms- Toxic Parenting, Students Academic Performance.

I. INTRODUCTION

Toxic parenting practices are destructive approaches that parents use in their child-rearing. They undermine children’s healthy advancement. Toxic parenting practices fail to nourish the physical, psychological and emotive necessities that allow children attain surviving skills essential for psychological and scholastic modifications at school. Toxic parenting encompass beating of children with leather belts, demeaning verbal criticisms to hitting them with cooking sticks and waist belts. These parents still rationalize these cruelties as acts of moral chastisement or of edification. They subjugate their children through use of fear, guilt and humiliation. Toxic parents leave a legacy of guilty, shame and low motivational levels that could obstruct children’s performance throughout their life’s (Forward & Buck, 2018). In this study toxic parenting denoted parents who disregarded or flopped to meet the physical, psychological or emotive necessities of their children; those who abused their children physically, verbally and sexually; those that used fear, guilt, obligation, ridicule or humiliation to manipulate and control their children; those who were addicted to alcohol or drug and/or those who could have been suffering from various personality disorders and were not yet clinically diagnosed.

Academic performance refers to the extent to which students achieve educational benchmarks in terms of knowledge and skills in schools and colleges. Measures of academic performance include; different levels of academic grades achieved in a given test and different categorizations of extra-curricular activities like sports, dances, drama, leadership and other learned skills (Williams, 2018). In this study, academic performance referred to the grades which students attained in their continuous assessment tests that were standardized into T scores to enable comparisons. In Kenya, Academic performance is measured by the quality of grades attained in the National Examination known as the Kenya Certificate of Secondary Education (KCSE). Grades attained range from A, A-, B+, B, B-, C+, C, C-, D+, D, D-, E and F for fail. National examinations in Kenya involve stiff competition between students and different categories of schools. This is because opportunities to proceed to higher institutions of learning depend on the quality of grades achieved. Students who qualify to pursue university education have got to achieve grades that range from A to C+. The students who score grades between C and D join technical and vocational training institutes for various technical courses that are not popular in Kenya (Kweyu, 2017). Those who score D- and below join even a lesser popular category of job sector known as ‘Jua Kali’, a word used locally in Kenya to denote informal labor (Agewa, 2017).

Kenya had been witnessing incidences of leakage and cheating in national examination (Matiangi & Magoha, 2018). The KCSE is conducted as a summative exam at the end of four-year secondary education cycle. Achieving good grades at this level, means a bright future for majority of Kenyans. At the time this study was being conducted in September 2018, there was noted decline in quality grades in KCSE examination and a noted...
disparity in academic performance between schools and regions (Ouma, 2016). Just like there had been dwindling academic performance, parents also had increased malpractices to do with their children’s examination behaviors. For example, Chege (2018) highlighted that there were trends of parental brutality on children for poor academic results urging them to stop basing their children’s worth on examination results. Some children commit suicide on realizing that their results were not exactly what they had expected (Makokha, 2018).

II. TOXIC PARENTING AND ACADEMIC PERFORMANCE

From the literature reviewed, the researchers noted that, the changing nature of work, technology and competition in job market had outpaced what Kenyan education system provided for students (Okoth, 2017). That was in spite of the efforts that had been put in place by educators and communities to improve the quality and quantity of educational institution and standards (Ministry of Education, 2019). As a result, most of Kenyan schools were experiencing increasing pressure from the government and business leaders to raise academic standards for all students in terms of producing quality academic grades (Matangi & Makoha, 2018; Ayiro, 2016).

A study was conducted by Wenzlaff and Eisenberg (2018) on parental restrictiveness of negative emotions among children and how it affected them in future. The study established that negative emotional restrictiveness was like sowing seeds of thought suppression. The researchers argued that parents planted mental and emotional seeds in children. The seeds grew as the children grew up. In some families, the seeds planted were made up of love, respect and independence. In other families, parents planted seeds of fear, obligation, guilt and restrictiveness of negative emotional expression. The study concluded that restricted expression of negative emotions, produced children with emotional problems and social skills deficits. They recommended that, parental restrictiveness should not be practiced as it resulted in maladaptive learning and unrealistic expectations, aspects that were not good for academic performance.

In a report by Hart (2017), helping children to develop good attitudes and values was far more important than giving them items. This was because different types of behavioral seeds planted by parents’ actions towards their children became consistent and dominant in children’s life. Toxic environments caused severe emotional damage to innocent children. In Maryland and South Carolina, USA, parents of truant students were made to attend school with their children. It was observed that when the parents’ attitude towards education changed, the children’s attitude and behavior also got modified (Bowen, 2019). These aspects of behavior are supported by the principles of Family Systems Theory by Bowen (2019) that guided this study.

A qualitative survey was conducted by Metz (2018) in Canton and Hamilton desegregated schools in U.S.A. Through interviews, the researcher established that students were more preoccupied with the factors that were sensitive to human decency and sense of fairness with which they were treated, than other aspects of school activities. The study also revealed that teacher-student conflicts were a result of authoritarian and coercive controls than teachers’ race. Maccoby (2017) conducted a study on students’ attitude towards teachers’ and the reasons behind the attitudes. The study established that harsh, discriminative and inconsistent implementation of school rules, standards and procedures made students come to logger heads with teachers and poor academic. The study concluded that home atmosphere also affected how children viewed teachers and how they performed in school academically, socially and even morally.

A study by Baumrind (2012) on parent-child relations and parenting styles on adolescent competences, revealed that there were three types of child rearing practices that were named democratic, autocratic and Laissez-faire. She correlated the practices to the competence, independence and responsibility. She noted that two kinds of parenting styles, autocratic parents and permissive parents, had negative effect on their children’s academic performance. She also noted that independence and orientation in girls was clearly associated with democratic upbringing. She further noted that parents who provided the most enriched environment were democratic parents, such children had the most purposive children.

A study by Walberg (2015) investigated many variables and came to a conclusion that academic achievements and outcomes were determined by psychological characteristics of individual students and their immediate environments. This was regardless of whether outcomes were cognitive, behavioral or attitudinal. A study by Mafla (2019). On influence of student’s self-efficacy on academic performance was conducted among Colombian Dental Students. The study established that academic efficacy was positively associated with academic performance. The study also revealed that female students had stronger association then male students. Another study by Tissingtons (2019), concluded that poverty in families directly affected students’ academic success. Low academic achievement had close relationship with low socio-economic status.

A study by (Hojo, 2012) in Japan investigated determinants of academic performance. The study established that family backgrounds had a strong influence on academic results, but was insignificant when the students were ranked on merit. Another study by Sothan (2018), in Cambodia used a multivariate regression analysis which indicated that entry grade, English ability, class attendance, study effort, academic efficacy and family socio-economic status were positively associated with academic performance. There was no evidence that age, gender, household location, parental education, parental involvement and teacher evaluation had any influence. The study established that term-time employments and family-size had an adverse impact on academic performance. The study concluded that personal backgrounds played potential role in predicting academic performance of students. In Turkey, a study by Kristo, Büşra, Öztag and Sikalidis (2020) investigated effects of eating habits on quality of scholastic performance among adolescents in high school. The study was conducted in 29 cities, and with a sample size of 298 participants. A correlation revealed some association between eating habits and scholastic scores. The study concluded that there was some association of quality of eating habits, although data was limited on the topic on quality of eating in Turkey.

In Africa, Ada and Anake (2015) investigated effects of child abuse on students’ academic performance in Nigeria. This was in light of concern that there existed alarming endless cries of students who had been hurt and maltreated in the society. The
result of the analysis revealed that child physical and sexual abuse were negatively related to students’ academic performance. The findings implied that children who were sexually and physically abused had low academic performance compared to students who were not abused. The findings concurred with Kashahu, Osmanaga and Bushati (2014) study on the relationship between parenting styles and students’ academic achievement in Tirana State, Nigeria. The study established that authoritarian parenting styles had negative effects on the students’ academic performance while authoritative parenting showed more successful results in terms of academic performance. Okango (2018) conducted a study in Uganda on effects of family conditions due to poverty on pre-school children’s academic performance, and found a strong relationship.

In Kenya, there has been a lot of interest in research regarding academic performance. For example, Wambui (2017) investigated factors that influenced boy child’s academic performance in Kirinyaga County in Kenya. The study investigated whether variables like family background, teacher-student ratio, peer pressure, availability of school resources and students’ attitude towards academics had influence on academic performance. The study established that teacher-student ratio and family background that included parental level of education, alcohol and drug abuse and poor role modeling affected academic performance negatively. Another study by Odude (2013), investigated factors influencing academic performance in KCSE in private schools in Westlands Division in Nairobi, Kenya. The study concluded that teachers’ experience had key influence on academic performance.

A study by Musyoka (2018) established that school based factors like physical facilities and supervisory role of head-teachers had significant relationship with academic performance of students. Njoroge (2014) investigated discipline as a factor that affects academic performance and established that lack of self-discipline among students resulted in poor academic performance.

Thus this study sought to investigate the relationship between toxic parenting and academic performance. The researchers hypothesized that there was a significant relationship between toxic parenting and academic performance. The aim of this study was to sensitize school administrators regarding toxic parenting. This knowledge would assist them not to over-rely on parents regarding improvement of their children’s academic performance. There was need for parents and students to aim at working hard towards self-employment than concentrating on getting grades for job-seeking. The research question was; what relationship existed between toxic parenting and academic performance of students in secondary schools.

III. STATEMENT OF THE PROBLEM

The researchers got concerned regarding continued poor academic performance among secondary school students (Matiangi & Makoha, 2017). The problem was that majority of parents in Kenya, went into extreme pains to make sure that their children passed national examinations (Ayiro, 2016). Some parents would join exam cheating and corrupt cartels who sold papers before due date to make their children pass exams (Matiangi, 2017). Other parents paid individuals to do exams for their children (Kweyu, 2018). Other parents used verbal, physical and psychological abuse to force their children to work harder to get better grades. Ironically, school administrators and teachers in majority of secondary schools in Kenya tended to over-rely on parents’ capacity to assist in improving their children’s academic performance. This assumption was based on the belief that all the parents possess the capacity to provide appropriate moral guidance and counselling (Ministry of Education, 2019).

The reviewed studies had been conducted in other countries (Mojo, 2012; Kristo, Busra, Oztag & Sikalidis, 2020 and Baumrind, 2012). Other studies were conducted in other geographical regions in Africa (Musyoka, 2018; Njoroge, 2014; Okango 2018) among others. Therefore, there existed literature gap on the topic of toxic parenting and academic performance. There was need to conduct an investigation into the relationship that existed between toxic parenting and students’ academic performance in secondary schools in Gishu County, Kenya. The study aimed at providing an explanation to the declining academic performance in spite of using parents to assist improve grades among secondary school students.

IV. RESEARCH METHODOLOGY

The study was carried out among secondary schools in Uasin Gishu County in the republic of Kenya. The researcher preferred the area because it has a total of 147 registered public secondary schools that belong to different types and categories. The study adopted correlational research design because all the variables were not manipulated. The study targeted a total of 9147 Form 3 students. They included 5292 boys and 3855 girls. The study employed stratified random sampling technique and simple random sampling technique to select a sample of 344 students to be involved in the study. Data were collected by the use of 24 items toxic parenting questionnaire, personal biographical form that had seven items and a document analysis schedule regarding test results lists. To establish the reliability of the questionnaire, a test re-test was conducted in a pilot study. Pilot study was done in three schools from Uasin Gishu. The reliability coefficient was determined using Pearson’s Product Moment Correlation Coefficient. The correlation coefficient obtained for toxic parenting questionnaire was $r = .80$. Ethical considerations were observed. The data was analyzed using Statistical Package for Social Science (SPSS). The descriptive statistics like frequencies were presented to explain the demographic characteristics of participants. Pearson’s product moment correlation ($r$) was the statistical test that was used to test the hypothesis. The mean score of toxic parenting and mean score of academic performance were computed and the results were established.

V. RESULTS

Demographic Description of Participants

The sample size for this study comprised 344 participants drawn from the selected 10 secondary schools (simple-sex boarding and mixed-day) from Uasin Gishu County, Kenya. Therefore, responses from 344 participants were analyzed in the study. The participants were Form 3 male and female students. The demographics of the participants are shown in Table 1.
The study established that male students were less compared to the number of female students. This was because the number of boys boarding schools were fewer than those of girls in Uasin Gishu County in Kenya. While in mixed-day schools boys were more than girls. Implying that parent’s preferred to take girls to boarding schools than they did boys. This could mean that girls were considered to be safer in boarding schools than in mixed day schools.

**Toxic Parenting and Students’ Academic Performance**

The study objective was to investigate the relationship between toxic parenting and students’ academic performance. The study hypothesis stated that there was a significant relationship between toxic parenting and academic performance. To test this hypothesis, the students’ toxic parenting questionnaire was administered to the participants and their responses were scored. The academic performance of the participants was calculated from the participants examination results recorded in the personal biographical form item seven and eight. The grades were converted into T-scores to standardize them. The scores of toxic parenting and students’ academic performance were correlated using Pearson’s Product Correlation Coefficient and the following results were established as shown in Table 2.

<table>
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<th>Type of School</th>
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<th>Female</th>
<th>Male</th>
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<tr>
<td>Single sex boarding</td>
<td>180</td>
<td>109</td>
<td>71</td>
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<tr>
<td>Mixed day</td>
<td>164</td>
<td>63</td>
<td>101</td>
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<tr>
<td>Total</td>
<td>344</td>
<td>172</td>
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From Table 2, the results show that there was a statistically significant relationship between toxic parenting and students’ academic performance, $r(342) = -.25, p = .000$. From the results, the null hypothesis was rejected. The implication of the results was that when the level of toxic parenting was high, the academic performance of the students was low. That was to say that the level of toxic parenting was inversely proportional to the academic performance of the students. Therefore students from families with high level of toxic parenting were disadvantaged in relation to academic performance. Students who did not experience toxic parenting had high scores in academics. The findings were supported by a study by Walberg (2015) that attributed academic performance to psychological characteristics of individual students and their immediate environments. The study finding also revealed that students who scored low on toxic parenting were emotionally and psychologically comfortable to concentrate in academic work at school.

The finding was also consistent with results of several other related studies (Hojo, 2012; Ada & Anake, 2015; Musyoka, 2018) the studies established that circumstances within families had relationship with academic performance. The findings supported results of Wenzlaff & Eisenberg (2018) that established that parental emotional restrictiveness resulted in thought suppression and deficits in learning of social skills. They concluded that parental restrictiveness of negative emotions leads to maladaptive learning and unrealistic expectations just like children of toxic parents. Toxic parents do not respect children’s feelings or abilities. These parents can encourage their children to cheat in exams (Kweyu, 2018). The finding was also supported by Kashahu et al (2014) who studied the relationship between parenting styles and students’ academic achievement. Their study established that students from parents with authoritative parenting style performed better compared to students who parents had authoritarian parenting style. However, this study differed with Musyoka (2018) who found that school factors and supervisory role of head teachers had greater influence on academic performance than family background. This study found that toxic parenting had adverse relationship with academic performance.

**VI. Conclusions**

The study concluded that toxic parenting had a significant relationship with academic performance. Students who scored high in toxic parenting scored low in academic performance. The students who scored low on toxic parenting, scored high on academic performance. This study concluded that toxic parenting adversely correlated with students’ academic performance in secondary schools. Such students did not develop interest in school or in school work and they also lacked motivation to work. The study recommended that the school administrators could use...
other methods like psychological counselling services to improve inadequate academic performance rather than to expect toxic parents to assist. A toxic parenting test could be ran before a student is sent home to bring a parent to school for scoring low in academic performance.

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Comparing Local Item Dependency from Inter-Item Correlation Matrix and Principal Component Analysis from Factor Analysis for Dimensionality of Multidimensional Dataset

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Abstract: This study compared the Local Item Dependency from Inter-Item Correlation Matrix and Principal Component Analysis from Factor Analysis for Dimensionality of Multidimensional Dataset. Exploratory research design was adopted for the study. A representative sample of six hundred (600) students were systematically sampled from Twelve (12) schools that participated in the study through multi-stage sampling technique. 2013 West African Senior School Certificate Examination (WASSCE) Financial Accounting Objective test items was adopted as instrument for the study. A retrieved Data gathered from the researchers’ previous work were analyzed using Inter-Item Correlation Matrix and Principal Component Analysis. The finding of the study revealed that the two approaches for testing dimensionality have consistent evidence for multidimensionality with Local Item Dependence of 44 items holding for 34 (77.3%) done through Inter-Item Correlation and PCA showing first and second factors having 37.848% and 26.306% of variance explained done using Factor Analysis. It was concluded that using Local Item Dependence from Inter-Item Correlation Matrix approach can give the same result with using PCA from Factor Analytic approach in Dimensionality Test (DIMTEST). It was also recommended to the statisticians and behavioral scientists that both approaches be used to checkmate dimensionality evidence of each other.

Keywords: Dimensionality, Local Item Dependence, Principal Component Analysis, Inter-Item Correlation, Factor Analysis

I. INTRODUCTION

Dimensionality is important consideration in educational assessments ranging from internal, school or teacher-made to external-standardized or certification, local examinations conducted by examination bodies and to international bodies responsible for certification, licensing and benchmarking. Dimensionality affects the administration, scoring, data analyses and reporting of the results of test. For example, in the United States of America (USA), National Assessment of Educational Progress (NAEP) subjects like Mathematics, Sciences and Reading Tests were subjected to dimensionality assessment. For the purpose of this study, a multidimensional data set of West African Senior School Certificate Examination June/July 2013 Objective Test in Financial Accounting was used.

According to Mislevy, Almond and Lukas (2008), dimensionality can be viewed in many different ways such as through the lens of aspects of assessment design in terms of the dimensions intended to be assessed or the analysis of observed responses to test item. Dimensionality in assessment concerns the number of abilities or constructs assessed by a test or a set of items. Stevina (2011) defined dimensional structure as the relationship between the items on the test and the latent proficiencies believed to be measured by the test. Stevina said that dimensionality in assessment concerns the number of abilities or constructs assessed by a test or a set of items. The basis of the functioning definition of dimensionality is the assumption of local independence and this assumption is based on the value of the conditional covariance between two items. One can therefore investigate dimensionality of a test by studying these conditional covariances.

Stout (1990) defined dimensionality to explain the procedure of evaluating dimensionality, the researcher regarded dimensionality of a test as the minimal dimensionality required for a possible vector-valued latent variable to produce a model that is both locally independent and monotone. The increasing monotonicity is achieved when the probability of a correct response increases as the ability increases. Local Independence (LI), also known as Strong Local Independence (SLI) states that the joint probability of the responses to the set of items comprising the test is equal to the product over items of conditional probabilities for all the item responses on a test given (Hattie, Krakowski, Roger & Swaminathan, 1996).
Also, if we have scores from set of items and the items are typically scored dichotomously, joint probability for all item responses on a test given is a product of each conditional probability separately. In other words, if we condition on a test, the response to any item is independent of the response to any other item. Strong Local Independence (SLI) is difficult to investigate. To support this view Svetina (2011) explored that Weak Local Independence (WLI), which deals with item pair rather than joint distribution of all items, is typically used in investigating Local Independence. Weak Local Independence (WLI) is the condition that for all unique item pairs and for all given test, the covariance between the item pairs, and the conditional on given test is zero.

McDonald (1994) argued that in cases of real data for which weak local independence holds, strong local independence holds approximately. In agreement to this, Zhang (2007) noted that higher-order dependencies are allowed among the items, but he gave a condition that although if weak local independence holds, it is unlikely that strong local independence would not hold. Thus, if one accepts that in cases where weak local independence holds, strong local independence will also hold approximately (and monotonicity is assumed), then evaluating weak local independence is sufficient for evaluating strong local independence and dimensionality.

But note, Local Independence and dimensionality assumption are related but are not identical; this was the assumption of (Svetina, 2011). Goldstein (1980) supported the assumption of Svetina (2011) by stating that if the data follow a model with a particular dimensional structure, and such a model is employed, Local Independence will hold. If the data follow a multidimensional structure, and we employ a unidimensional model, Local Independence will not hold. He further buttressed the point by stating that when tests are designed to measure a single construct (i.e. to be unidimensional), “minor” or “nuisance” proficiencies are likely to account for some inter-item dependencies, in addition to a single dominant construct.

According to Camilli, Wang and Fesq (1995) test dimensionality is the number of latent variables that account for the correlations among item responses in a particular data set. McDonald (1981) echoed Lord and Novick (1968) suggesting that the proper quantification of dimensionality in the data ought to be based on the strong Local Independence principle. i.e., the dimensionality of data is that which is needed to achieve strong local independence. In this line of reasoning, Hattie et.al (1996) suggested that, when the dimensionality is correct, then once trait values are fixed at a given value, the responses to items become statistically independent. As a result, to determine the dimensionality of a set of items, it is necessary and sufficient to identify the minimal set of traits such that at all fixed levels of these traits the item responses are independent.

Reckase (1999) stated that the first condition for testing unidimensionality is that the factor analysis on the inter-item correlation matrix should show that the first factor account for at least 20% of the total variance of the Unrotated Factor Matrix. As specified by Kpolovie (2011), that correlation coefficient of say 0.3 gave an evidence of relationship between two variables. Therefore correlations of between -0.3 to 0.3 were considered non-correlation boundaries which indicates items on which Local independence held. And correlations of above 0.3 and below -0.3 were considered as items which local dependence held.

Unlike in the typical factor analytical, where multiple dimensions operationalize different constructs in application of such latent class models Rupp and Templin (2008) suggested that dimensionality be broken down even further to elementary components and their interaction. Traditionally, a common approach to testing dimensionally has been through factor analysis methods. Kane (2006) emphasized that in classical linear factor analysis, a researcher seeks to identify a set of factors that can account for the observed pattern of correlations among the score.

In determining the number of factors, empirical criteria are frequently used to determine the number of factors that should be extracted, including Eigen values- greater than one criterion (Eigen value >1; Guttman, 1954; Kaiser, 1960). Various methods are used to assess test dimensionality; such methods include, Factor Analysis, Linear Factor Analysis, Non Linear Factor Analysis, Parallel Analysis, Modified Parallel Analysis, Structural Equation Modeling, Testfact, Nonparametric tests for essential unidimensionality, and the use of multidimensional IRT models. Using Inter-Item Correlation was largely left out of the mix. Factor Analysis is selected in many studies like Busari and Adewumi (2018), Adewumi (2016), Jiao (2004) Abedi (1997) because it can help provide evaluation of test dimensionality for better understanding of the constructs underlying the test. Principle component analysis has been used by researchers to assess dimensionality of a set of items (Abedi, 1997). Taiwo (2015) stated that assessing test dimensionality is one aspect of validating the internal structure of a test through the use of factor analysis to test the reliability of test items to see if the items making each sub-scale are similar because there may be high level of convergence between the scales. He went further to state that in order to look at the factor structure and dimensionality of tests, one needs to carry out internal consistency analysis. According to Clark and Watson (1995), Reliability and factor analysis data are generally considered evidence of internal structure. Scores intended to measure a single construct should yield homogenous results, whereas scores intended to measure multiple constructs should demonstrate heterogeneous responses in pattern predicted by the constructs. Kpolovie (2014) stated that if the various items or subtests of a test measure the same trait, scores obtained by test-takers on the different items or subtests of the test should positively correlate highly. He went further and said that the higher the inter-correlation among various parts or items in the test, the greater the content validity of the test instrument. This accounts for the homogeneity of the items in the test instrument.

Correlation with scores from another instrument or outcome for which correlation would be expected, or lack of correlation where it would not, supports interpretation consistently with the underlying construct (Foster & Cone, 1995). For example, correlation between scores from a questionnaire designed to assess the level of motivation of students and the performance of students would support validity of the intended inferences.
To this end, the study compared Dimensionality Test Approaches- Local Item Dependency and Principal Component Analysis of a Multidimensional Dataset of West African Senior School Certificate Examination June/July 2013 Objective Test in Financial Accounting.

The Purpose of this study was to compare the consistency of evidence of dimensionality of WASSCE June/July Multiple-choice Objective Tests in Financial Accounting in the year 2013 using Local Item Dependence from Inter-Item Correlation and Principal Component Analysis from Factor Analysis.

II. RESEARCH QUESTION

This study specifically sought answer to the research question

1. Is there consistency in the evidence of dimensionality of WASSCE June/July Multiple-choice Objective Tests in Financial Accounting in the year 2013 using Local Item Dependence and Principal Component Analysis?

III. METHODOLOGY

The research design adopted for this study was exploratory survey design. The population of this study consisted of all senior secondary school students (SSS) in all Two Hundred and Forty (240) public high schools in Osun State. The researcher made use of a retrieved dataset of WASSCE 2013 of the sample group of six hundred (600) Senior Secondary School Three (SSS.3) students that offered Financial Accounting selected from twelve (12) schools the three senatorial districts in Osun State, Nigeria and Multi-stage sampling technique was adopted in this study.

The data set of 2013 June/July series of the Senior School Certificate Examination (SSCE) was considered multidimensional from the researchers previous research. The instrument consisted of the year 2013 past questions of Senior School Certificate Examination (SSCE) conducted by West African Examination Council and consisted of Fifty (50) items. The researchers were of the opinion that both the validity and reliability of these tests have been determined by the said examination body before administration, hence the issue of validity and reliability estimation of these tests/ test items were not addressed.

Retrieved data were subjected to Inter-Item Correlation and Principal Component Analysis by Exploratory Factor Analysis with the use of SPSS software.

IV. RESULTS AND DISCUSSION

Research Question : Is there consistency in the evidence of dimensionality of WASSCE June/July Multiple-choice Objective Tests in Financial Accounting in the year 2013 using Local Item Dependence and Principal Component Analysis?

To answer the research question Communalities was done to have clear view of response patterns of 50 items and this gave the values that indicated that some variables (items) should be dropped from the analyses. These are items 8, 10, 11, 14, 30 and 47 (12%) of the total 50 items with .450, .536, .295, .499, .387 and .528 respectively. All had small values and indicated that the items did not fit well with the factor solution (loading).

A correlation analysis was done on responses to the fit 44 items across examinees through inter-item correlation for Local Item Dependencies.
### INTER-ITEM CORRELATION MATRIX OF WASSECE FINANCIAL ACCOUNTING 2013 OBJECTIVE TEST

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**INTER-ITEM CORRELATION MATRIX OF WASSCE FINANCIAL ACCOUNTING 2013 OBJECTIVE TEST (CONTINUED)**
Starred (*) items showed evidence of correlations amongst items in terms of response patterns across examinees
Result Summary

Local Item Dependency and Independency of 2013 WASSCE financial accounting

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The table above showed the Local Item Dependence of WASSCE 2013 financial accounting 44 items held for 34 (77.3%) of the total items and the Weak Local Item Dependence items constituted 3 (6.8%). With Local Independence holding for 7 (15.9%). This is a strong evidence of multidimensionality of the items of 2013 WASSCE financial accounting objective test. It means, there was sameness in the response or performance pattern of respondents to most of these items making these items scores multidimensional. This means that a good or bad performance on an item led to another good or bad performance on another item or items.

To compare the Inter-Item Correlation approach above with Factor Analytic approach, the exploratory approach of principal component analysis was conducted. One approach to determining the number of factors is to select those for which the Eigenvalues are greater than 1. This value means that these factors account for more than the mean of the total variance in the items. This is known as the Kaiser-Guttman rule (Guttman, 1954; Kaiser, 1960). Comrey and lee (1992) cautioned that if the instrument contains a large number of items, a large number of Eigenvalues will meet this rule.

Principal Component Analysis - Eigenvalue and Percentage of Variance Explained for WASSCE 2013 Financial Accounting

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Result Summary

The PCA reported the initial eigenvalues of components of which seven made the cut-off of Kaiser-Guttman rule of 1 (17.384, 11.220, 4.365, 2.191, 1.777, 1.121, 1.035), extraction sums of squared loadings, and rotation sums of squared loadings gave (37.848, 26.306, 9.475, 5.662, 4.279, 2.666, 2.616)% of variance accounted for by each component of the total variance in all of the items which is strong evidence of multidimensional. This is also the result of Inter-Item Correlation Matrix.

Discussion of Findings

Findings in Research question revealed that WASSCE financial accounting items of 2013 were multidimensional from Local Item Dependence. LID held for most items 34 (77.3%) in the test making the items multidimensional as there were significant correlation coefficients that existed between these homogeneous items. And as stated by Baghaei (2008) that LID affected Unidimensionality of the test and also the assumptions of Rasch model is Unidimensionality and Local Item Independence (the likelihood of the person correct answering to an item is independent from the other items in the test; (Green, 1996; Lee, 1997). Thus, multidimensionality is confirmed with evidence of Local Item Dependence. The finding is also consistent with the statement of Kpolovie (2011), that correlation coefficient of say 0.3 gave an evidence of relationship between two variables. Therefore correlations of between -0.3 to 0.3 were considered non-correlation boundaries which indicates items on which Local independence held. And correlations of above 0.3 and below -0.3 were considered as items which local dependence held.

The finding using PCA also reveals two factors that clearly exceeded that of third to the seventh factor with eigenvalues of 4.365. This is in line with what Reckase (1999) said about the second way for testing unidimensionality when he stated that the Eigen value of the first factor must clearly exceed that of the second factor. In this case the first two factors clearly exceeded the third and other factors, which is a sign of multidimensionality.

V. Conclusion and Recommendation

Based on the finding of this study, it was concluded that using Inter-Item Correlation Matrix approach can give the same result with using PCA approach in Dimensionality Test (DIMTEST). Though, using PCA Factor Analytic approach is widely accepted and most
popular of the approaches for Dimensionality Test, analyzing Local Item Independence or Dependence from Inter-Item correlation Matrix for testing dimensionality is an effective alternative approach. It was also concluded that using Inter-Item correlation Matrix for analyzing Local Item Independence or Dependence in detecting dimensionality is a simpler approach that gives the same dimensionality results with Factor Analytic PCA approach. It was finally concluded that both approaches can serve as checkmates on each other to confirm the evidence of dimensionality.

In the view of the finding and conclusion of this study, it was recommended that Inter-Item correlation Matrix for analyzing Local Item Independence or Dependence be used in detecting dimensionality or response patterns. It was also recommended to the statisticians and behavioral scientists that both approaches be used to checkmate dimensionality evidence of each other.

ACKNOWLEDGMENT

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Analysis of Indonesian Tax Authority Readiness in Taxation of Digital Economy in accordance with the OECD BEPS Action Plan 1 Recommendations

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The digital economy presents various new business models that open up many opportunities for tax avoidance schemes, so the OECD recommends an action plan on digital economics in the form of an Action Plan 1. Previously this recommendation has not been a priority yet for the Indonesian Tax Authority. On the other hand, DGT has not met the tax revenue target in the last five years, while it has been known that the transaction value of the digital economy is very large and has not been taxed. This condition is very urgent for Indonesia, especially the tax authorities to be able to implement taxation on the digital economy. For this reason, it is needed regulations and readiness of the Tax Authorities related to this matter. Taxation of the digital economy is stated in Law No. 2 of 2020. The purpose of this research was to analyze the readiness of the Indonesian Tax Authority in taxing the digital economy. The research approach used was a qualitative approach. The data collection technique used was through library and field researches by conducting in-depth interviews with key informants concerned. The results showed that the Indonesian Tax Authority in general was ready to carry out the policy, although it still needed improvements in terms of regulations and human resources.

Keywords: Digital economy, tax authority, readiness, action plan 1, e-commerce

I. INTRODUCTION

In the era of the industrial revolution 4.0, competition does not only occur between the big and the small, but also for the fast and the slow. It's not just a business problem, anyone who is responsive to technological advancements can win the competition compared to those who are late in adapting. It's the same in terms of taxation, when the authorities are unable to keep abreast of developments and advancements in digital trends, a nation will be disadvantaged by the huge risk of potential loss of state revenue. This is a challenge for the tax authorities given that the current tax regulations, at the time of their preparation did not take into account the impact of the digital revolution. Consequently, the old taxation law product will be easily handled by taxpayers who abuse the existing regulations. The Digital Revolution not only affects the patterns and forms of behavior of every human being, but is followed by the presence of many new forms of business today such as e-commerce, payment services, application services, online advertising, cloud computing, high frequency trading, participative networked platforms.

Digital technology that continues to grow at this time generally runs very fast in front of infrastructure development that has been carried out by the Indonesian Tax Authority, Directorate General of Tax (DGT). And all developments undertaken by DGT that are less visible to taxpayers and the wider community, such as Online DGT, electronic tax invoices (e-invoices) and electronic proof of cut (e-Bupot). Tax Authorities must be observant in looking at the taxpayer's business schemes and the development of taxpayers' technology as well as carefully conceptualizing tax regulations in response to the developments and challenges of this digital technology era (Gunadi, 2019).

Tax regulations on the digital economy that were just issued last March, it was Government Regulation in Lieu of Acts) Number 1 of 2020, regulates permanent establishments (PE), trade through electronic systems and imposition of value added tax on intangible taxable goods and taxable services, from the subject of foreign taxes related to digital services transactions. This regulation has followed the OECD BEPS Action Plan 1 recommendation, which is related to the establishment of permanent business forms based on significant economic presence, but it still requires technical guidance in its implementation and requires further refinement regarding how to determine profit allocation for Indonesia as the basis for taxation for Indonesia. Government Regulation in Lieu of Acts Number 1 of 2020 has then been changed to Law Number 2 of 2020.

In 2015, G20 in OECD has issued 15 action plans to deal with losses in BEPS in many countries related to the consequences of injustice in the taxation sector. The 15 (fifteen) action plans were specifically formed by the BEPS Inclusive Framework which consists of 129 countries, of which Indonesia is a member. John Hutagaol, Director of International Taxation, DGT, said that there are 4 (four) minimum standards that must be implemented, the four minimum standards are action plan 5, they are harmful tax practice in the presence of
Government Regulation in Lieu of Acts Number 1 of 2017 concerning access to Financial Information for Taxation Purposes and then action plan 6, it is misuse of Tax Treaty then action plan 13, it is transfer pricing documentation by issuing PMK-213/PMK.03/2016 and finally action plan 14, it is settlement of international tax disputes. Indonesia has implemented the 4 (four) minimum standards, although not all of the minimum standard action plans are productive in the sense of generating state revenue. The BEPS OECD action plan beyond the minimum standards that has not yet been implemented in Indonesia is the BEPS 1 action plan which is related to the taxation of the digital economy, even though it is well known that taxation of the digital economy is very important and should be a priority because it has a very large tax potential to boost the achievement of tax revenue. This should be made a breakthrough by the Indonesian Tax Authority to explore the enormous potential of state revenue from the digital economy. Over the past five years the DGT has not reached the state revenue target set according to graph 1 below:

Graph 1

Projection of the Value of The Digital Economy in Southeast Asian Countries 2019 and 2025

Based on Google's research, Temasek and Bain & Company, according to graph 2, it is predicted that the potential of the Indonesian digital economy in 2025 will be 133 billion dollars, which when exchanged with an average exchange rate of 1 US S is 14 thousand rupiahs is 1.862 trillion rupiahs, so that it is clear that the potential for VAT on the digital economy can be calculated to reach 186.2 trillion rupiahs, excluding the income tax aspect. This digital economy has not been taxed in Indonesia. This potential tax excavation should be made a breakthrough by DGT to obtain state revenue. For this reason, Indonesia is in dire need of readiness in a number of things including regulatory support, the readiness of the Tax Authorities, Taxpayers and other stakeholders to implement the OECD BEPS Action Plan 1 recommendations. The large number of multinational companies that avoid tax by utilizing the tax regulation loophole is one of the implications of the absence of tax policy on the digital economy. If it is calculated, in 2025 Indonesian digital economic transactions according to Google's research, Temasek and Bain & Company can generate tax potential in the form of Value Added Tax which is very large, which is approximately 186.2 trillion rupiahs (calculated according to VAT rates, which is 10 percent of the transaction value amounting to 1,862 trillion rupiahs) or has a portion of 11.78 percent of the 2019 tax revenue target last year which amounted to 1,580 trillion rupiahs. Based on the problem, the implications and the large portion of the potential portion of the tax on the digital economy encourages researchers to conduct in-depth research on DGT's readiness in taxation of the digital economy in accordance with international readiness and taxation theory combined with OECD BEPS Action Plan 1 recommendations.

Graph 2

Source : www.kemenkeu.go.id
II. RESEARCH ELABORATIONS

According to Tapscott (Tapscott, 1996), digital economy is a social phenomenon that affects economic systems, where the phenomenon has a characteristic as an intelligence space, consisting of information, some access to information instruments, information capacity and information processing. The components of a successful digital economy were initially identified as e-commerce activities, the digital distribution of goods and services and the information technology (ICT) industry. According to Zimmerman (Zimmerman, 2000), the digital economy is a concept that is often used to describe the global impact on the rapid development of information and communication technology that has an impact on socioeconomic conditions. Areas that are affected are the fields of product and service product development (research), production, sales or supply depending on the reach of digital technology. According to Bloch (Bloch et al., 2006), in the digital economy, their service companies are in accordance with certain services according to certain specific requests or special offers, offers have been characterized as private and individual or private offers that trade globally and cut intermediary chain.

The social phenomenon of the effects of the rapid development of information and communication technology (ICT) certainly affects changes in the pattern of individual and organizational business. An organization that tries to respond to changes or dynamics of the internal and external environment is often referred to as organizational readiness. The readiness in this study relates to how an organization (Indonesian Tax Authority) responds to changes. In the internal and external environment of the organization changes occur that lead to an organizational response, whether an organization can respond positively and be able to adapt well to changes that occur in that particular environment, or even even tend to respond to negative things and stay with the conditions in the organization. According to Lubis and Huseini (2009), various forms of changes in the environment that occur today are inevitable for organizations to become adaptable and move dynamically for the existence and sustainability of the organization. Vakola (2013) states that changes in an organization are considered as an integral part of an organization's life.

An organization that tries to respond to changes or dynamics of the internal and external environment is often referred to as organizational readiness. It is necessary to understand the understanding of readiness and organization as a separate entity, before understanding what organizational readiness is as a unitary entity. Understanding readiness in various organizational management literature has been conveyed by various experts including: 1) readiness is a cognitive initial indicator (cognitive precursor) of the form of resistance or support from efforts to change. Basically, readiness to change may act to precede resistance to change, increasing the potential for more effective change efforts. Readiness is described in terms of the beliefs, behavior, and intentions of the members of the organization. The essence of change readiness is the involvement of individuals’ cognition among employees (Armenakis et al., 1993); 2) the concept of readiness is related to change. Readiness can be based on subjective feelings or perceived abilities. A statement in which an individual or organization is considered “ready or not ready” to perceive a form of readiness (Mrayyan, 2008); 3) the degree of readiness which means a dichotomy conceptualizes a readiness. Readiness is not only stated by the term “ready” or not “ready”, but is measured by the level of readiness of individuals, teams, work units/departments, or organizations that can be observed from each level of the organization (Lokuge, 2018).

Readiness in this research related to how an organization responds to changes. Some experts have defined the organization as follows: 1) organization as a player in a rule of the game (institutional), can be in the form of individuals or groups involved in achieving certain goals. An organization is bound by the rules, values and norms that exist and can force individuals/groups (North, 1992); 2) Lubis and Huseini provide organizational understanding from Barnard and Davis, it is: “A social unity of groups of individuals (people) who interact with each other according to a structured pattern in a certain way so that each member of the organization has its own duties and functions, and as a unity certain objectives, and also have transparent boundaries, so that organizations can be separated clearly and firmly from their environment” (Lubis and Huseini, 2009).

The two definitions of readiness and organization above provide important points relating to organizational readiness, it is the presence of preventive efforts, effective change, the involvement of an individual/group, restrictions with certain rules/norms, and the achievement of common goals. To reinforce the understanding of organizational readiness, the following is presented an understanding of organizational readiness from several experts, they are: 1) organizational readiness is an existing trust in individuals (employees) stating that the organization can not only make a change by itself without involving employees in a change process which can be called successful (Cinite, 2009); 2) the classic definition conveyed by Weiner, et.al. that organizational readiness is basically an organization’s ability to undergo soft (non-radical) transformation in responding to the hopes and needs of the internal and external environment (Narayananamurthy, 2018); 3) organizational readiness refers to existing mechanisms, then processes that can encourage or disrupt changes such as organizational structure, culture, climate, leadership commitment, and others. Hierarchy of organizational structure and forms of communication that are not flexible, can inhibit a change in the organization (Vakola, 2013).

Researchers provide an understanding of organizational readiness based on the explanation of the concept above is the ability of an organization to respond to various changes both in the internal and external environment, involving the role of individuals and groups, which aims to reduce resistance and to achieve the desired organizational changes in accordance with the values /rules in the organization. Then the readiness of the organization appears in the forms, ways, and processes of an organization in responding to a change.
There are 5 (five) elements in the formation of readiness systems in organizations, including messages, interpersonal and social dynamics, influential strategies, attributes of change agents, and judgments (Armenakis, 1993), they are: 1) messages, the main elements of readiness in change between members of the organization are “Message of change”. There are 2 (two) messages, consisting of: a) the need to change (discrepancy), it is the difference between the desired goal and the current conditions, and b) the ability of individuals and/or groups to change (efficacy). The message discrepancy aspect communicates information about a constant need to change such as competition, changes in government policy; 2) interpersonal and social dynamics, change is an effort that requires beliefs from groups of individuals who interact to change beliefs, behaviors, and intentions based on aspects of message discrepancy and efficacy. Change agents must understand the differences of individual and group readiness and what factors influence individual and group interpretations of the message; 3) influential communication strategies, to influence individual cognition are appropriate for creating readiness for organizational change: persuasive communication (both oral and written) and active participation. The third strategy is managing external information sources; 4) the agent of change agents, the effectiveness of the change strategy depends on the agent of change with certain attributes, it is the factors of credibility, trust, friendliness, and expertise of change agents; 5) assessment, basically the assessment of the readiness of individuals, teams and organizations, will greatly depend on the availability of time, funds, expertise, and the importance of the assessment carried out. Readiness is assessed by methods such as surveys, interviews, questionnaires, or observations and according to the reliability and validity of the data.

On the other hand, the imposition of taxes on the digital economy will not be separated from the term of permanent business form (PE), the following concepts that make a digital transaction into a PE have been submitted by several experts, among which are as follows; a) the concept of a server as PE, some taxation experts argue that the server can be categorized as PE because it is a physical facility used to carry out sales transactions. Vink (1998: 67) asserts that PE arises if the company not only provides the machine but also operates and maintains the machine for their own account; b) the concept of Virtual PE, the concept of Virtual PE that was initiated by Hinnekens as quoted from Bohorquez (2016, 94) states that the physical presence in taxes for e-commerce will be more clearly seen in significant commercial activities on a continuous basis related to non-business activities to the existence of a place of business in the source country.

III. RESEARCH METHOD

This study is conducted using qualitative approach as this study will provide a comprehensive overview of the phenomenon discussed. The data collection technique used in this research is literature studies and field research through interviews with key informants namely people that are competent in understanding the issues discussed in this study. The informant group includes the following: officials of the Ministry of Finance which includes the Directorate General of Tax (DGT) and the Fiscal Policy Agency (FPA), Ministry of Economic Coordinators, Ministry of Trade, Central Statistics Agency (CSA), Ministry of Communication and Information, Bank Indonesia (BI) associated with the theme, tax consultants and practitioners, taxpayers and academicians.

IV. RESULT

A. OECD Recommendation

OECD provides several recommendations related to the digital economy. Important points of the recommendation were written by the OECD in the form of 2018 interim report whose contents are as follows: first, it elaborates on digitalization, business models, and their relationship to the process of value creation.

Second, in the 2018 OECD interim report, a summary was given of the development of the implementation of the BEPS package related to the digital economy. Some of the summary points include: (i) preventing the avoidance of Permanent Establishment (PE) status (Action 7), (ii) guaranteeing the application of value creation in transfer pricing (Action 8-10), (iii) strengthening the provisions of the CFC (Action 3), to (iv) progress in the Multilateral Instrument (MLI) (Action 15).

Third, regarding the imposition of cross-border digital economic business tax, which is classified in 4 (four) groups, they are: 1) efforts to modify PE threshold; 2) unilateral action with a mechanism withholding tax; 3) countries that impose a final tax (turnover tax); 4) countries that have a special taxation regime targeting large multinational companies. There are 3 (three) things that can be learned from various ‘unilateral’ policies, consisting of: (i) aiming to protect and expand the tax base where the customer or user is located; (ii) using elements related to the market as a tax base, for example: sales, places of consumption; and (iii) reflecting dissatisfaction with the profit allocation model of the current international tax system.

Fourth, members of the inclusive framework have diverse views in responding to the development of the digital economy, particularly regarding the need to change the international tax system and the extent to which these changes need to be made. This report states that there are still differences of opinion. There are groups of countries that speak out about the inconsistencies between the jurisdictions where profits are taxed and the jurisdictions where values (profits) are formed.

Fifth, there is no agreement between members of the inclusive framework regarding the benefits or the need for initial measures before the 2020 final report. A number of countries actually oppose the initial measures because they pose a risk to the prospect of consensus building. However, for countries which agree to the existence of measures that are temporary can carry out unilateral policies by taking
into account the following considerations: 1) must be in accordance with international agreements; 2) must be temporary and must be changed based on global consensus, if it already exists; 3) must target precisely (targeted) and does not apply generally; 4) not giving excessive tax burden; 5) as much as possible does not affect the start-up business, the establishment of new businesses and small businesses; 6) does not add compliance costs and provide complexity.

Sixth, explore further the impact of digitalization on the tax system. For example, the presence of an online platform (apartment rental sites, online taxis, etc.) can actually encourage the growth of gig and sharing economies, which in turn will facilitate economic growth and increase income. Therefore, the government needs to ensure that there is an equal tax treatment and ensure there is no specific tax regime for the business model. In addition, the challenges of the digital economy can also be overcome through taxpayer education aimed at increasing compliance and the collaboration between authorities and online platforms in collecting transaction value data. From the administrative side, the existence of the digital economy can also create the effectiveness of compliance services, reduce compliance costs, and improve services to taxpayers.

Seventh, the proposal for a “unified approach” and “Globe”, the inclusive framework publishes policy notes on handling the challenges of tax digitizing the economy. In this policy note, the inclusive framework recommends two pillars they are: 1) pillar one (proposal of unified approach), discusses the allocation of taxation rights between jurisdictions and explains proposals for new profit allocation and nexus rules based on the concept of “significant economy presence” and exploitation of the user participation “and” intangible marketing “in jurisdictions; 2) pillar two (proposal of “GloBE”) calls for the development of a coordinated set of rules to address the on going risk of structures that allow MNEs to transfer profits to jurisdictions where they are not subject to tax or very low taxes.

B. Indonesian Tax Authority Readiness
Indonesia as one of the G20 member countries will follow the OECD recommendations, especially in this research related to the digital economy. To carry out these recommendations requires readiness in terms of tax regulations and the HR side of the tax authority. Related to the digital economy, how is the ability of the Indonesian tax authorities in responding to various changes that occur both within the authority environment both internal and external. Regarding readiness both individually, groups and organizations, researchers use the readiness theory of Armenakis (Armenakis et.al., 1993), Armenakis states that there are 5 (five) elements in the formation of readiness systems in organizations, including messages, interpersonal and social dynamics, strategies influential, change agent attributes, and judgment.

The main mechanism for creating readiness for change among organizational members is the message for change. Then the researcher starts this analysis from the first element of readiness, message, the main element of readiness in change between organizational members is the “message of change”. There are 2 (two) messages, they are: a) the need to change (discrepancy); and b) the ability of individuals and/or groups to change (efficacy). The Indonesian Tax Authority responds to this digital economic phenomenon by taking the following actions: 1) forming a Digital Economy Task Force. This Task Force involves several directorates within the DGT; 2) changing the PE definition through Multilateral Instrument (MLI). The Minister of Finance signed the MLI in February; 3) there has been support from the leadership, with the issuance of unilateral regulation in the form of Government Regulation in Lieu of Acts No. 1 of 2020 which later became Law No. 2 of 2020 which partially regulates the contents of the digital economy.

Regarding aspects of Value Added Tax, Indonesia follows the OECD recommendations in the 2018 interim report, fifth point, regarding the benefits or the need for initial/unilateral measures before the final report 2020. This action is allowed for countries that are pro to the existence of measures that are temporary, by meeting the following considerations: 1) according to international agreements; 2) are temporary; 3) targeting precisely (targeted); 4) not giving excessive tax burden; 5) has no impact on start-up businesses, new business establishment, and small businesses; 6) does not add compliance costs and is not complicated. Indonesia carries out these unilateral measures with Law Number 2 of 2020 which was later reduced to the Minister of Finance Regulation Number PMK-48/PMK.03/2020 concerning Procedures for Appointment of Collection, Collection and Deposit, as well as Reporting Value Added Tax on Utilization of Affected Goods Intangible Taxes and/or Taxable Services from Outside the Customs Area within the Customs Area through Trade through the Electronic System. Indonesia issued a unilateral regulation aimed at: 1) collecting state revenue; 2) creating a fair playing field; 3) preparing a pre global consensus policy.

In accordance with the Armenakis journal (Armenakis et.al., 1993), discrepancy is the belief that the necessary changes requiring the workings (mechanisms) of organizations are different from the desired end goal which emphasizes the importance of changes in external contextual factors in justifying the needs in organizational change. While aspects of efficacy affect the mindset, actions, and emotions of individuals and/or groups that are used to overcome differences of opinion related to change. The researcher analyzes that both of these are related to awareness factors of differences that can produce positive energy in building a spirit of change in this case tax regulation on the digital economy and the factor of confidence as efficacy can be seen as a perceived ability to overcome differences, differences here are related before they exist regulations and after regulations and conditions both institutionally and individually (employees). All tax authority employees are very confident and aware of the importance and urgency of the imposition of this digital economic tax. This awareness and belief must be disseminated to external parties both to taxpayers, tax consultants, taxation academics, business associations, ministries and related institutions.
The second element of readiness is the element of interpersonal and social dynamics. The efforts of the Indonesian tax authority readiness to involve and convince all employees who interact socially to change beliefs, attitudes, and intentions in accordance with differences in understanding and ability and aspects of the benefits of the message of change (Armenakis, et.al., 1993), agents of change in this case DGT employees must understand the difference between individual and group/organizational readiness, and what influences the group/organizational interpretation of the readiness message. With the issuance of regulations that can be easily understood by all parties, including taxpayers, DGT employees, and other relevant stakeholders, and followed by dissemination and dissemination on target, it is hoped that this regulation on digital economic taxation in Indonesia can later be implemented by all relevant parties properly. The stages that have been carried out include: 1) Indonesia has received assistance from the OECD, IBFD, ITO, training and Focus Group Discussion (FGD) on the digital economy. DGT and FPA have always been involved in several OECD working parties related to the digital economy; 2) not all DGT employees understand about this digital economy. This has only been understood by employees within the Directorate of International Taxation, some employees within the Large Taxpayer Regional Tax Office and the Special Jakarta Regional Tax Office.

In the near future, DGT will need to develop employee competencies, such as programmed and continuous training on international taxation especially digital economy, interpretation of tax treaty and transfer pricing. It is hoped that the DGT will immediately create a road map for the DGT employee competencies, how DGT has a strategy to improve employee competency in a good and sustainable manner. So that employees have good analytical skills and standards regarding international taxation.

The third element of readiness, the influence strategy, which includes active participation, persuasive communication and external information management. Conceptualizing the dynamics of tax authority readiness, how change agents could naturally intervene in the flow of social information processes that occur among authority employees to increase readiness for change. Two strategies offered by Bandura (1977) and Fishbein and Azjen (1975) in the Armenakis journal (Armenakis et.al.,1993) in influencing individual cognition are to create readiness in changing tax authority: persuasive communication (both oral and written) and active participation. The third strategy is the management of tax authority information sources to external parties. Actions that have been taken by the Indonesian tax authorities include: 1) DGT is always involved and expresses opinions in working parties and other task force meetings; 2) Luckily DGT got 1 (one) representative from OECD, it is Mr. Andrew Aurbach, who can help to communicate DGT with the OECD and inclusive framework; 3) On the other hand, DGT has coordinated within the Ministry of Finance with FPA and external Ministry of Finance institutions with the Ministry of Communication and Information, Ministry of Trade, Central Statistical Agency, Bank Indonesia and with other external stakeholders; 4) DGT needs to immediately prepare an information technology (IT) system related to digital economic taxation, DGT needs to immediately have data to validate corporate data both domestic and foreign; 5) in accordance with Government Regulation PP No. 80 of 2019 in which businesses are required to report their business regularly, then it is decided in a coordination meeting in the economic field that Central Statistical Agency (CSA) is given authority in the collection of digital economic data.

Regarding external information management, DGT coordinates with other agencies, in accordance with Presidential Regulation Number 74 of 2017 concerning the Road Map of the Electronic-Based National Trading System (Road Map of E-Commerce). Specifically, for the taxation program, the agency responsible for compliance with the presidential regulation is the Coordinating Ministry for the Economy, which acts as the coordinating agency. The members are the Ministry of Finance (in charge), the Ministry of Trade, the Ministry of Communication and Information, Bank Indonesia (B1) and the Central Statistics Agency (CSA). The implementation of Perpres Number 74 of 2017 is regulated further into Government Regulation PP Number 80 Year 2019. Then PP Number 80 of 2019 then has 2 (two) implementing rules, they are Ministry of Trade Regulation Number 50 of 2020 and Head of CSA Regulation which still in the process of preparation.

The coordination of DGT with the Ministry of Communication and Information is related to the business registration system on the internet. In accordance with Law No. 19 of 2016 concerning information and electronic transactions (ITE), it is regulated regarding the electronic system, about who is organizing it and about the registration procedure of the electronic system organizer. The Ministry of Communication and Information receives registration of both public and private services. In this case there is coordination between ministries and institutions, for example fintech can obtain a business license if it has registered with the Ministry of Communication and Information. So, if they have not registered their business with the Ministry of Communication and Information, the Financial Services Authority will not issue the fintech operating license. Several other sectors have also required suppliers/users to register at the Ministry of Communication and Information. For over the top companies like Google, Yahoo should be the same as an electronic system organizer. So that the business actor (supplier/user) before registering the business with the guiding institution according to the relevant sector must register with the Ministry of Communication and Information. In addition, according to Regulation of the Minister of Trade No. 50 of 2020, a clause is stipulated that the marketplace must provide a link to One Single Submission (OSS), each business actor must register. Researchers assess both systems and procedures are very good to continue to prioritize the coordination system of ministries and institutions.
The most important coordination with DGT’s external parties is with Central Statistical Agency, because this coordination is related to the e-commerce data recording system. Later the e-commerce business actor reporting system will be built and developed by Central Statistical Agency. The policy that was designed, related to the collection of this data is being conceptualized at Central Statistical Agency. In terms of infrastructure and human resources, Central Statistical Agency is ready to carry out this task. The concept brought beforehand separates the types of formal and informal businesses, formal businesses such as those using the marketplace and websites, while the informal ones are those who trade using social media. It is hoped that this informal business will soon be known. Regarding the reporting of business actors, formal businesses are required to report on a monthly basis, while for informal businesses are required to report annually. Reporting by the system/machine/FTP (File Transfer Protocol) is made of two reporting models, first, for the marketplace requested daily transactions, which are reported monthly. Second, non-marketplaces are asked for only monthly transaction data, which is reported annually. In addition, for the marketplace requested daily transaction data along with commodity details. There are two types of data that are requested from business actors, first, company data (profile) on an annual basis and second, daily transaction data that is reported monthly.

It should be noted that previously Bank Indonesia had collected data on the four largest marketplaces in Indonesia. In short, in the future raw data from the marketplace and business players will be directly accessible to DGT and Bank Indonesia. Specifically, the DGT requires marketplace data and business actors to add data on the population registration number, telephone number and Taxpayer Identification Number for which data can only be accessed by the DGT only. And any other party is not allowed to access the data, even though Central Statistical Agency is the developer of this system. In detail, the business actor will be encoded with the Identification Data (ID) only, may not include the name, the identity details are unknown. With this condition Central Statistical Agency did not violate Law 16 of 1997 concerning Statistics. Because it does not provide individual data. Central Statistical Agency is also designing systems for non-marketplaces, such as vertical classified: jobstreet, horizontal classified like Olx, Kaskus. This classification was carried out by Indonesian e-Commerce Association (IDEA). For Tokedia, Lazada, Bukalapak, shoppee already has a non disclosure agreement (NDA) with Bank Indonesia. Whereas DGT has entered into agreements with 13 marketplace companies. Related to this system, it is targeted if this Central Statistical Agency Regulation global draft is completed in June 2020, then in July 2020 it will be finalized. The system will soon be developed. It is recommended that the concept of data transfer of business actors to Central Statistical Agency for the marketplace use FTP, while non-marketplaces use online input.

The fourth element of readiness is the agent of change. It is about the factors of credibility, trust, friendliness and expertise. The effectiveness of the influence strategy (the fourth element of readiness) depends on the change agent that uses it. Attributes, such as the credibility, trust, friendliness, and expertise of change agents are obtained from what people know about the agent and/or the general reputation of the agent (Armenakis et.al., 1993). Clearly, messages that create readiness will have more influence if change agents produce messages that have a good reputation about the digital economy. Conversely, when these attributes are not liked, the ability of change agents to create readiness for change will be hampered.

For this reason, related to the elements of the agents of change, DGT and FPA continue to strive to achieve these four attributes such as credibility, trust, friendliness and expertise, both domestically and internationally. DGT and FPA always strive to improve the ability of employees. Meanwhile, the preparedness of the DGT is not only about digital economy taxation. The issue of credibility, trust, friendliness and expertise is about the big picture of the institution. Talking about OECD BEPS Action Plan 1 recommendations is indeed more inclined to the digital giant. If only employees in special units who understand and master the digital economy are considered to be no problem, but in the future, it is expected to also look at the wider DGT employee coverage. Trust regarding the balance of rights with obligations, then friendliness, friendliness and responsiveness must be put forward especially for complaints or questions of taxpayers.

Regarding the expertise of change agents, it is demanded that the will and ability to learn continuously, learning teams need to be formed at each level of leadership in the context of synergy and innovation methods of socialization according to the times. And about this expertise received input and complaints from external tax authorities who complained about the unevenness and lack of knowledge and ability of some tax authority employees, especially regarding international taxation, namely the digital economy, interpretation of tax treaty and transfer pricing. This is related to the Indonesian tax authority which does not yet have a program to carry out continuous personal development improvement. It is proposed that a road map be made to improve employee competency as a whole, in a continuous and programmed manner which is certainly synergized with programs from related agencies such as the Financial Education and Training Agency and FPA.

The final element of readiness, the fifth is readiness assessment. It is related to the aspects of expertise, funding, time and assessment. To guide efforts to build readiness is very useful for assessing organizational readiness. An assessment of perceived difference and target efficacy will be carried out in measuring the state of readiness. This provides evidence that readiness can be assessed through a Research methodology survey. The methodological assessment can include the use of questionnaires, interviews, and observation methods. Whatever method is used in sensing readiness, change agents must respect the importance of the reliability and validity issues (Armenakis, et.al., 1993).
Researchers conducted interviews with relevant and competent informants in the field of digital economy to assess the readiness of the tax authority according to the fifth element of readiness. The informants convey the following matters: 1) preparation of the organization in accordance with Law Number 2 of 2020, has been carried out by the DGT to immediately form a Digital Economy Task Force. Cooperation between directorates within the DGT and between the DGT and FPA within the Ministry of Finance has also been quite effective and quite good, the readiness of each individual tax authorities, DGT team and organization to be able to formulate taxation on the digital economy has also been done well; 2) assessed in terms of expertise, please note that DGT has sent many employees to study international tax and digital economy. Then in terms of funding, this is a challenge, it needs good IT (information technology) capabilities, it needs a lot of investment, this IT was developed not only for digital economy, but for all administrative purposes this DGT has led to digitalization. So that taxpayers do not need to report physically anymore. Related to this element of readiness assessment in terms of resources, DGT is able, staying political will or commitment from the leadership, because this is also very important; 3) it needs to be long-term to deal with this digital economic phenomenon, and a model or roadmap for employee competency development is needed. This is related to the training material to be delivered related to digital economy, who will be the instructor and who will be the participant. Then the training model through the training of trainer (TOT) mechanism, whose targets are employees at the Large Taxpayer Regional Tax Office and the Special Jakarta Regional Tax Office may be applicable.

V. CONCLUSION

The Indonesian Tax Authority in general can be said to be ready in taxing the digital economy, although there are some things that still need to be improved and refined. Some things that can be categorized as ready include: 1) The Minister of Finance has signed a Multilateral Instrument (MLI) related to changes in defining PE and the Ministry of Finance has always been involved in several OECD working parties related to the digital economy; 2) great support from the country’s leadership by issuing a unilateral regulation, Law No. 2 of 2020 concerning the imposition of taxes on the digital economy; 3) DGT and FPA have received assistance and training from international institutions such as OECD and IBFD; 4) DGT has coordinated and continues to establish data exchange cooperation with Ministries, Institutions and other parties related to digital economy.

It is recommended to the tax authority to immediately determine the taxation instrument in terms of a tax policy scheme that is appropriate and easy. And this must be immediately followed by rapid and appropriate dissemination and training. Equally important, a roadmap for developing employee competency development that is programmable and beneficial for the DGT and FPA should be immediately made, especially in the field of international taxation which includes transfer pricing, interpretation of tax treaty and digital economy. And in a broader scope to put forward the involvement of all taxation stakeholders in each preparation of tax regulations.

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Impact of Development Projects on Displaced Residents: A Case Study of Mwomboshi Dam in Chisamba District, Zambia.

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Abstract- This study aimed at exploring and examining the extent to which the Mwomboshi Dam Project impacted on the displaced residents’ livelihood. It utilized a case study approach which incorporated a qualitative paradigm. Using purposive sampling technique, a total of fifty (50) participants out of the 402 displaced persons representing 72 homes were selected for the study to constitute a representative sample. Data were collected through semi-structured interview guides and subjected to content analysis in which recurrent themes and categories of information were identified and analysed. Three major themes were analysed and these were the actual effects of the displacement scheme on the residents, form of compensation given to the displaced residents, and whether government took interest in monitoring the welfare of the residents post their displacement. Firstly, results showed that displacement of the people resulted into their homelessness due to loss of land, inadequate land for cultivation, increased poverty due to cut off in their daily activities such as gardening, children drop out of school due to long distances from school. Secondly, it was also ascertained that the major form of compensation for the displaced persons was in monetary form and according to the participants, the amounts were not adequate to guarantee quality livelihood. Finally, findings further established that government officials responsible for resettlement schemes had never visited the displaced community since the inception of the project - not even through representatives. Therefore, based on these findings, the study recommended that before any such development project is implemented, people must be informed in advance so that sustainable alternatives devoid of excruciating impact can be sought. Government together with project owners must compensate victims adequately so as not to interfere with their daily livelihood and the form of compensation must be equal to the land lost. Government must also make sure that the condition of these people is closely monitored after the displacement has taken place as a hallmark of any meaningful development initiative.

Index Terms- Development Project, Displaced Residents, Impact, Mwomboshi Dam.

Socio economic development is the primary pre-occupation of any nation globally in trying to enhance human welfare through various econometric strategies, techniques and measures in order to guarantee the provision and accessibility to basic needs such as food, shelter, clothing, health care, education, clean and safe drinking water, among others. It should, however, be stressed that development projects as being among many other strategies for attaining meaningful livelihoods for the citizens of nations through job creation, poverty reduction and inequality minimization come with inherent challenges which in some cases have ended up worsening socio economic situations of intended beneficiaries. Development projects often involve the introduction of direct control by a developer over land previously occupied by another group. Natural resource extraction, urban renewal or development programs, industrial parks, and infrastructure projects (such as highways, bridges, irrigation canals, and dams) all require land, often in large quantity. One common consequence of such projects is the upheaval and displacement of communities. Scholars and activists consider development displaces to be those persons who are forced to move as a result of losing their homes to development projects. However, wider considerations of ‘project-impacted persons’ have been advocated. Scudder (1996;1999;1996) suggests that our conception of project-impacted persons should include not only those directly displaced by loss of home, but also the host population that takes in displaced persons who are neither directly displaced, nor hosts, yet who live in the vicinity of the project; and project immigrants. The latter group includes those tasked with planning, designing, and implementing the project, as well as those who later move to the region to take advantage of project-related opportunities, these, Scudder notes, are often beneficiaries of the project, whereas the two former groups are often adversely affected by projects.

Development projects often involve the introduction of direct control by a developer over land previously occupied by another group. In the aftermath of colonial rule in Zambia, development became synonymous with economic growth and industrialization (Lawson, 1982). Development categories included large dams, irrigation projects, urban infrastructure, transportation, power plants, mining, parks and forest reserves, agricultural expansion.
and population redistribution schemes. While these categories may be beneficial in the broad development paradigm, it has resulted in fostering social and economic inequalities, serving the interests of narrow elite, destroying the environment, displacing and impoverishing people dependent on land.

While it may have as many meanings as people who invoke its name, development generally has positive, though perhaps ambiguous, connotations. Uneven development is a bad thing and sustainable development is a good thing but, for the most part, under-developed countries and communities seek to become more developed, whether that is through improving health and livelihoods, expanding educational opportunities, or building infrastructure. Nevertheless, as the citations above suggest, development does not benefit everyone equally and for millions of people around the world, development has cost them their homes, their livelihoods, their health, and even their very lives. The suffering of those displaced by development projects can be as severe, and the numbers as large, as those displaced either internally or internationally by conflict and violence. Most large dams are built to provide power or water to people other than those who have to make the sacrifices necessary for the dams to be built. The people who lose their land and perhaps their homes, their communities, their jobs, the graves of their ancestors, and the abodes of their spirits seldom enjoy the benefits, and suffer many of the inconveniences, of these projects. The resettlement and compensation of the losers have generally been regarded by the responsible authorities as an awkward necessity, to be undertaken at the lowest possible cost. The water harnessed by these dams, and the land occupied by the project, are often, under the law, considered to be national resources to which the local residents have only secondary rights. For political and economic reasons, large dam projects are often regarded by their proponents and by governments to be in the national interest and therefore to take precedence over any local interests. It is, therefore, against this background that this study seeks to establish the impact of development projects on the victims as regards to the Zambian context (Lawson, 1982) by focusing on the often-overlooked phenomenon of development-induced displacement, consequences, challenges of the community and the efficacy of government mechanisms to guarantee quality sustainable livelihood of displacees (Phiri, 2009) (emphasis supplied).

1.1. Problem Statement

The involuntary resettlement of established rural populations to make way for a macro development project is usually disastrous for at least some of the people concerned, hardly less painful and disruptive than war or flood. According to UN (2004) report, attempts to soften the blow of forced removals by resettling whole communities, with a view to providing mutual support in re-establishing the normal activities and relationships of the rural families, have seldom worked. Resettlement is usually the occasion for a dispersal of traditionally cohesive communities. The very poor, the elderly, and the disadvantaged mostly cannot or do not wish to make a new life in the place designated by the planners for them. On the other hand, the strong, the wealthy, and the enterprising may actually welcome the opportunity provided by compensation payments and resettlement entitlements to move out of an economic backwater and seek their fortunes elsewhere, free of the encumbrance of dependent relatives. Even this positive outcome may have its darker side, as neighbours and kin who cannot follow them are deprived of their energy, ideas, and enterprise. The idea that a resettlement program can be undertaken as a development program has become a part of the standard expression of project preparation, though nothing is usually done by both project implementers and government officials in notifying the victims way in advance for them to prepare fully. Against this background, therefore, to what extent does the Mwomboshi Dam Project reflect the ethos of sustainable development, actual intentions and actions of the authorities, and can the re-settlers themselves use the opportunities provided by compensation and other entitlements to improve their own lives?

1.2. Study Objectives

(i) To explore the effects of the Mwomboshi Dam Project on the displaced residents.
(ii) To establish the efficacy of compensation schemes in bettering the lives of the displaced persons.
(iii) To critique post implementation mechanisms undertaken by government officials after the resettlement of displaced residents in Mwomboshi.

II. LITERATURE REVIEW

1.3. Effects of Dam Projects on Displaced Persons

The literature on large dams and their economic, environmental, and social impacts is vast. McCully’s book (2001) and the WCD report (2000) provide comprehensive overviews of the impacts of large dam projects, including direct displacement and resettlement, but also other impacts that could lead to indirect displacement. These include: the inundation of valuable farmland and animal habitat; the capturing of sediment by dams, leading to erosion and soil degradation downstream; the endangerment of freshwater habitats, leading to the extinction or threatening of riverine and wetland life forms; reservoir-induced seismicity; the spread of diseases by insects that thrive in stagnant reservoir water; and environmental destruction and human death as a result of dam failure or collapse. The report by Bartolome et al. (2000), prepared to inform the WCD report-writing process, offers a comprehensive discussion of recent practices concerning the displacement, resettlement, rehabilitation, and development of people adversely affected by dam projects. It also suggests a number of ways to improve accountability and facilitate negotiation in future resettlement schemes.

Moreover, Colchester’s paper (2000) provides an overview of the impact of development projects such as dams throughout the world on indigenous populations and ethnic minorities. It highlights that these groups make up a disproportionately large percentage of those whose livelihoods are adversely affected by development projects, for example, despite constituting only 8 per cent of India’s population, Adivasis (tribal peoples) are estimated to make up 40-50 per cent of those displaced by development projects in the country. Colchester’s paper points out that the experience of indigenous peoples with dams has been characterized by cultural alienation, dispossession of land and resources, lack of consultation, insufficient or a complete lack of compensation, human rights abuses, and a lowering of living standards. The specific and strong cultural connection that many indigenous groups have with the land on which, and the
environment in which, they live makes their physical dislocation potentially more harmful than is often the case for other groups. According to Kumar (2005), the Dam building is one of the most important causes for development related displacement. According to a report, ‘during the last fifty years, some 3,300 big dams have been constructed in India. Many of them have led to large-scale forced eviction of vulnerable groups. The situation of the tribal people is of special concern as they constitute 40 to 50 per cent of the displaced population’ (Kumar, 2005). The brutality of displacement due to the building of dams was dramatically highlighted during the agitation over the Sardar Sarovar Dam. It has been called ‘India’s most controversial dam project’. For children, Cernea (2000) notes that resettlement often interrupts schooling. In many households, owing to drops in income and living standards, children may never return to school, instead being drafted into the labour market earlier than might otherwise have occurred. Other groups, such as the elderly and the disabled, might also face higher risk intensities in the displacement and resettlement processes, although, as for the other groups, the conditions of the project, resettlement procedure, and resettlement site play a role in determining which groups, if any, experience different and more intense risks.

1.4. Compensation Schemes and Mechanisms

In general, the issue of gender disparities in compensation resettlement operations has been ignored in the literature. A small number of studies have shown that women often experience the adverse consequences of forced resettlement more strongly than men. For example, compensation payments are usually paid to the heads of households, which can concentrate the cash value of family assets in male hands, leaving women and children at higher risk of deprivation. Agnihotri’s chapter (1996) exposes another form of gender discrimination in compensation criteria in Orissa, where entitlement to land compensation for unmarried persons is set at age 18 for men and age 30 for women. Other research has shown that, in urban development projects, women can be harder hit by displacement because they are more likely to derive income from small businesses located at or near their residences. In rural areas, women can be more adversely affected because they are often more dependent than men on common property resources for income sources.

Participatory methods of resettlement planning can also expose the ways in which women can be prevented from shaping and/or benefiting from projects and compensation schemes. For example, Guggenheim’s (1993) discussion of Mexico’s Zimapan Dam Project highlights that, at first, women were common participants in community consultations because their husbands were working away from home for the agricultural harvest. The women’s demands changed resettlement plans to include not only land compensation but also credit to open sewing and baking enterprises. However, once the consultations began producing tangible results, men began attending in place of their wives.

Findings further show that villagers are often not properly informed of the details of their displacement and there is lack of resources and access to alternative housing. New mega-projects displace already resettled communities; in some districts the population has been displaced several times in just a few decades. The utter casualness with which those displaced are sometimes subjected to multiple displacements is described in the Bargi Tribunal report. The plots allocated to the oustees for construction of new homes were chosen in cavalier fashion by the authorities. This becomes apparent when one learns of the fact that their carefully reestablished homes such as they were fell victim to submergence once more without the slightest hint of a warning from the engineers and planners of the dam. Traumatized once, the loss of their security for the second time was unimaginable. For this second displacement, no compensation was paid, compounding several times over the original injustice of Working Papers Center on Migration, Citizenship and Development forcing them to occupy plots barely one-tenth the size of their original holdings. The villagers had no choice but to put up the money to re-house themselves as they had no alternate shelter, or place to stock provisions and stores safe from the vagaries of weather’. To impose the trauma of forced relocation on any population once is grave enough. To do it again and again merely because of casualness or slippshod advance planning or lack of coordination by engineers and project officials reflects bureaucratic insensitivity and callousness at its nadir (Hemadri and Mander, 1999).


Government through relevant ministries expressly links the resettlement implementation process to the civil works. No Project Unit will initiate construction until the relevant officer of the ESU has certified that all of the DPs have received the agreed upon compensation and other assistance and the land or access to it lies free of claim with government. If in the course of implementation, any additional resettlement or income restoration activities prove to be necessary; government through relevant authorities will consult with the local communities on the alignment of the project and access roads or the location of the substation (or the area for any expansion). On the basis of these discussions and the consultations, implementers will define a compensation and resettlement plan that will be submitted to the financing agency, if any, for approval. In such an instance, they will insure that all agreed-upon resettlement activities are completed before initiating those improvements in the project.

According to Phiri (2009), lack of National resettlement policy has increased illegal settlements and land conflict in resettlement areas. It takes a lot of resources to plan and implement a program such as the dam resettlement program; involvement of other NGOs could help make resettlement areas more viable communities. Need to strengthen the collaborative mechanisms with various stakeholders (private sector, NGOs) to enhance service provision. Need to handle the concern of the amount of planning beforehand and the need for proper infrastructure in the resettlement areas. Poorly implemented livelihood and support programs and investment in skills training and income generation activities delayed resettlement compensation, relocation, flooded area affected resettlers livelihoods increased investment in Zambia's resources means displacement of rural poor exacerbated by poor consultation processes (Munshifwa, 2007).

1.1. Development Projects and Displacement Synopsis in Zambia

Colson’s detailed study (1971) of the impacts of the Kariba resettlement scheme on the Gwembe Tonga is a classic work, not just of the literature on displacement but also of the field of anthropology. The WCD case study by Soils Incorporated and Chalo Environmental and Sustainable Development Consultants
(2000) also assesses the Kariba Dam project in Zambia, which displaced approximately 57,000 people. Findings show that victims reported being landless. Development dam projects such as Kariba removes the main foundation upon which people’s productive systems, commercial activities and livelihoods are constructed. Homelessness is yet another major end. Results of these surveys found out that loss of shelter tends to be only temporary for many victims of the project; but for some, homelessness or a worsening in their housing standards remains a lasting condition. In a broader cultural sense, loss of a family’s individual home and the loss of a group’s cultural space tend to result in alienation and status deprivation.

According to Government of Zambia (2013) Strategic Plan 2013 - First Quantum Minerals (FQM) Trident Mine project in Solwezi, Zambia’s largest single mine - 600 households were displaced and resettled at Shinenge resettlement scheme. Evidence has shown that the livelihood of these residents were insecure. Moreover, the Government Republic of Zambia (1995) Profile of the Department of Resettlement paper shows that in 1994, 2,000 people in North - Western Province in Solwezi faced displacement due to Chisola Dam construction by Kalumbila Mine in Solwezi. The main impact was a negative environmental impact which affected the health of these residents. Additionally, research shows that these residents were deprived of their freedom of expression and their livelihood compromised. Furthermore, Munali Nickel Mining in Mazabuka acquired 3,000 hectares of land in 2008 plus an additional 2,100 hectares for mine extension and this displaced about 125 families and needed resettlement. This resulted in a negative impact on food security, legality and the socioeconomic standing of the victims.

1.2. Theoretical Framework
The Scudder–Colson and Cernea’s Impoverishment Risks and Reconstruction (IRR) Models

In the early 1980s, building upon earlier approaches that dealt primarily with the processes of voluntary resettlement, Scudder and Colson proposed a four-stage model of how people and socio-cultural systems respond to resettlement. The stages were labeled recruitment, transition, potential development, and handing over or incorporation. In the recruitment phase; policy-makers and/or developers formulate development and resettlement plans, often without informing those to be displaced. During transition; people learn about their future displacement, which heightens the level of stress experienced. Potential development occurs after physical relocation has occurred in which displaced persons begin the process of rebuilding their economy and social networks. Handing over or incorporation refers to the handing over of local production systems and community leadership to a second generation of residents that identifies with and feels at home in the community. Once this stage has been achieved, resettlement is deemed a success. The Scudder–Colson model focused on the different behavioral tendencies common to each of a series of stages through which resettlers passed. At first, the model was formulated to explain the stages of voluntary settlement, and was only later applied to some cases of involuntary resettlement (i.e., those ‘successful’ cases that passed through all four stages). In the 1980s and 1990s, the mounting evidence of involuntary resettlement schemes that failed to pass through all four stages suggested that a new model was necessary to explain the consequences of involuntary relocation. In particular, it was recognized that a new theory was necessary to model what was increasingly seen as predictable impoverishment in forced resettlement schemes and Cernea’s Impoverishment Risks and Reconstruction (IRR) became handy.

Cernea’s Impoverishment Risks and Reconstruction (IRR) model arose in the 1990s in response to this recognition. In contrast to the Scudder–Colson model, the IRR model does not attempt to identify different stages of relocation, but rather aims to identify the impoverishment risks intrinsic to forced resettlement and the processes necessary for reconstructing the livelihoods of the displaced. In particular, it stresses that, unless specifically addressed by targeted policies, forced displacement can cause impoverishment among the displaced by bringing about landlessness, joblessness, homelessness, marginalization, food insecurity, loss of access to common property resources, increased morbidity and mortality, and community disarticulation. To these risks, Downing and others have added: loss of access to public services, disruption of formal education activities, and loss of civil and human rights. The model also recognizes risks to the host population, which, while not identical to those of the displaced, can also result in impoverishment.

Not all of these processes necessarily occur in each case of forced resettlement and not all displaced households are necessarily affected in the same way by each process. Rather, the model notes that, when taken together, these processes capture the reasons behind many failed resettlement operations. Aside from distinguishing risks, the IRR model serves several other functions: as a predictor of impoverishment; as a guide for formulating research hypotheses and conducting theory-led field investigations research; and as a compass for risk reversal, advocating targeted resettlement policies, such as land-based (as opposed to mere cash-based) resettlement, job creation, health and nutritional safeguards, and social network rebuilding

1.1. Conceptual Framework
The conceptual framework is the system of concepts, assumptions, expectations, beliefs, and theories that support and informs research. The study’s conceptual framework in Figure 1 below is depicted by Emergency displacement, Inadequate Compensation and Weak Monitoring and Evaluation mechanisms as independent variables (IV) which automatically impact on displaced persons’ sustainable livelihoods as Dependent Variable (DV). Emergency displacement may reflect inadequate public policy framework on communicating to the affected persons on the impending development projects within their localities which directly affect them while compensation implies the extent to which the relocation schemes / packages cover all necessities as immunity against any unforeseen internal or external shocks in new locations. The M&E mechanisms depict the post implementation interventions government or developers put in place to guarantee improved livelihood of the displaced persons beyond mere compensations given.

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III. METHODOLOGY

This study utilized a case study approach which largely incorporated a qualitative paradigm. According to Merriam (2009: 13), “qualitative researchers are interested in understanding the meanings people have constructed, that is, how people make sense of their world and the experiences they have in the world”. This means that qualitative researchers study things in their natural settings, attempting to make sense of, or to interpret phenomena in terms of the meanings people bring to them. Therefore, this approach proved most suitable for this study because it is valuable in providing rich descriptions of complex phenomena under investigation.

The target population of the study was Mwomboshi rural community residents who were displaced as a result of the construction of the dam in 2016 which was commissioned by the then Republican President of Zambia, Mr. Edgar Chagwa Lungu. According to key informants and project implementers, a total of 72 homes were displaced with a total of about 402 residents who occupied the area then. The study purposively sampled 50 participants representing 72 households as sufficient sample size for the study. Data were collected through semi-structured interview guides and subjected to content analysis in which recurrent themes and categories of information were identified and analysed. Three major themes were analysed and these were the actual effects of the displacement scheme on the residents, form of compensation given to the displaced residents, and whether government took interest in monitoring the welfare of the residents post their displacement.

IV. FINDINGS AND DISCUSSION

In line with the research questions, the following were the study’s findings and the discussion assigned.

1.1. Effects of Mwomboshi Development Project on the Displaced Persons

The first research question of the study was to ascertain the effects of the resettlement on the victims of the Mwomboshi dam development project. Results show that the effects of Mwomboshi dam project include, increase in poverty levels among the displaced persons, inadequate land for cultivation, children dropping out of school due to long distances from the resettlement area and loss of daily livelihood such as gardening. Before the inception of the project, victims had a stable life at their level, children could easily go to school, their livelihood was not as bad as after the project was implemented. This was due to the disruption in activities such as gardening and the grabbing of land for cultivation, which was said to be their main source of survival. Participants complained that they were not given full information on time for them to prepare for the relocation and this made their lives difficult because it was urgent. Therefore, affected people should be fully informed and closely consulted on resettlement and compensation options. Where adversely affected people are particularly vulnerable, resettlement and compensation decisions should be preceded by a social preparation phase to build up the capacity of the vulnerable people to deal with the issues. Social preparation would so be necessary to obtain cooperation for the project to proceed in cases where there is likely to be significant social resistance. These findings are also consistent with Mathur’s (2011) findings in his similar study. According to (Mathur, 2011), in the past 5 decades it has become clear that grand-scale infrastructure and development projects do not necessarily result in general good. The adverse impacts of such projects on the environment and population are now documented although a lot still needs to be unearthed. Participants in this study reported an increase in poverty levels among the victims. Consistent with empirical review by Cochester and Mathur, it is correct to argue that large-scale displacement of people and inadequate resettlement programs have resulted in the economic and sociocultural impoverishment of communities, which has left them psychologically and culturally traumatized which is also supported by tribal and rural communities which constitute the majority of such affected populations. Living at the margins of the society, these groups often lack the voice and capacity to protect their interests, and are thus overrun by the march of development.

One of the male participants had the following to say; therefore, if a household ran out of food, another household in the village would help out. Another female participant testified that:

“In our village not everyone had enough land. The poor people were often dependent on well-off households. Someone would come to our house and would say my grandchildren or children have not eaten. In such an instance, whatever I had in my house, rice, coarse grain, maize or anything, I would give them a portion so that they too could eat a meal. The person whom I helped might come at a later point to do some work voluntarily at my house or in my field. Moreover, it was not considered good if someone in the village went hungry when you stored food in your house. But now everything is new, new life, new people, new interaction, this has increased our poverty levels and we are not happy.”

In recent times, displaced communities have become more vocal, and in some cases have resisted forced displacement. In the case of the Mwomboshi Dam, the affected people opposed the construction of the dam from the beginning of the project. They had a strong sense of attachment to their native villages and saw displacement not only as a process of uprooting but also as a threat
to their survival. However, following the government’s approval of the project, these residents had no option but to vacate the land.

1.1. Form of Compensation
Compensation is a payment for a loss. In land law, compensation is defined as the amount of money required to make the owner no better or worse off than if no land had been acquired from him or her. In the context of involuntary displacement and resettlement, compensation takes two key forms: cash for land and land for land. In case of cash-for-land compensation, it is the amount of cash that the owner of lost asset needs to replace it. This is not the market value of the lost property; but the money the property owner needs to buy a property of equal productivity or value. If compensation is given as land for land, the land received in lieu of the acquired land must be of equal value or productivity. A vital difference between cash for land and land for land is that in land-for-land compensation, the loser is given replacement land by the project authorities, while in cash-for-land compensation; the loser has the option either to invest the money received in land or to use it as he or she wishes.

The second research question of the study was to find out the form of compensation that was given to those displaced by the construction of Mwomboshi dam. 27 participants reported being compensated with money. Amount of between K6,000.00 to K9,000.00 (which averages US$ 833) was given to each displaced resident depending on the size of the land. Compensation has to go beyond market value of land and assets. The basis of compensation must not be value in exchange but the totality of the rights that are extinguished or negatively affected by the project. This has two implications: the compensation of assets like houses as well as on the basis of their replacement, and the compensation for the customary and legal rights of use that will be compromised by the project. Compensation must include customary and legal rights and the future value that the land may generate for the community as a whole. To this end not only individuals but also whole communities are eligible for compensation, which means, not just monetary value but alternative resource bases for the loss of common property resources, submergence of forests, etc. In other words, the basic principle must be rights for rights, just like land for land compensation; the loser is given replacement land. There should be transparent and justifiable mechanisms to calculate the replacement value of all assets, and the date for calculation should not be the date of original notification, but instead the date on which the compensation is actually disbursed.

On the other hand, 23 participants reported being compensated with land. According to them, land was better than money although it was smaller than the land they had lost. Therefore, it is worth noting that cash compensation must not be minimal, except where it is a preferred option of the people. All assets must be replaced and the cash component must be in the name of the oldest male and female member or the male and female heads of household. People who are to be relocated must be fully compensated before physical relocation from land, house, or livelihood is executed. The resettlement plan must provide for full disbursement of compensation a year prior to any physical dislocation. If the relocation is delayed, then there must be a provision to pay interest on the compensation that is made in order to account for inflation and other escalations in cost of replacement. All negatively affected persons must have the right to obtain land for land compensation. These findings were supported by the study conducted in India in which very similar results were obtained in 1999, (India Report, 1999).

As a matter of fact, some sociologists argue that the affected people have a right to be compensated with equity shares so that they receive a share of the returns from the project that has taken their homes and lands (Mexico Report, 1999). This approach seeks to emphasise the point that the negatively affected people are actually investees and as they have contributed a factor of production, namely the land for storing the waters/building the canals etc, they are entitled to a share in the returns on the investment. However, some fundamental objections have been raised to this approach. One is that it makes the well-being of the affected people dependent on the economic performance of the project and the stock market in general. The general lack of private sector interest in dam projects suggests that even experienced investors do not regard dams as profitable investments.

1.2. Government Post Implementation Activities
The third research question of the study was to establish the efforts made by government officials to ensure improvement of the welfare among the displaced persons since the inception of the project. All the participants reported that not even government representatives had gone there to see how their condition was since inception of the project. Resettlement planning and implementation are the responsibility of the government (Tan, 2008). The government encourages self-reliance among resettlers and helps them restore their pre-project living standards and livelihoods. The Land Administration Law establishes general resettlement principles, leaving the development of detailed regulations to individual sectors, and made provincial and local administrations accountable for the application of the law and its regulations.

Government, project authorities and other project developers must take responsibility and enter into binding enforceable contracts for compensation and resettlement programmes both prior and post implementation periods. These contracts must be properly negotiated and agreed upon with affected communities (Maphalala, 1999). This is a policy measure that has become increasingly necessary in the light of frequent violations of promises made by project proponents and the State to displaced people. Before land acquisition proceedings are initiated, a legal covenant has to be mandatory between the negatively affected people (individually or collectively) and the project authorities, the State (if the project proponent is not the State itself), and the primary funders of the project. The agreement must cover all aspects of the resettlement and development plan.

V. CONCLUSION
This study has established the daunting effects of the Mwomboshi Dam project on the displaced people. The psychological, economic, socio-cultural and environmental shocks are among the paramount effects of this development project as people no longer lead the normal life they used to prior to their displacement. Clearly, the form of compensation offered could not alone for the life time investment they had made in their ancestral land, which actually worsened the whole scenario. There
is need for pragmatic and humanitarian policy framework from government to ensure adequate prior and post sensitization of the affected persons by such development, including appropriation of sufficient social safety nets to these communities throughout the transition which should be legally binding between and/or among parties (social contracts).

REFERENCES


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Abstract- In every organization, the productivity and performance of the employees are important to increase the effectiveness of the organization in the environment it is operating. However, the rewards and other incentives given to the employees can increase the productivity, commitment and effectiveness in their performance. The purpose of the study was to explore the impact of reward systems on employee performance at Brentwood suppliers Ltd; Assess the effectiveness of existing reward system and whether there was a correlation between reward system in the organization and an increase in the performance of the employees. This was an empirical study. The non-probability and probability sampling technique were used i.e. random and purposive sampling were the criteria involved to ensure sample representativeness and therefore validity, reliability and generalizability of findings. The sample size used was 30 out of a population of 50 employees. In this study the inductive approach was used due to the fact that the data was collected and analysed before drawing to conclusions and recommendations. Using both the primary and secondary methods of data collection as analysed using SPSS, the findings revealed that the existing reward system of Brentwood suppliers was ineffective and must be revised; there was a relationship between rewards systems and employee performance. Study recommended that Management should harmonize the reward system in the company, Reward packages should be modified periodically as a response to the changing environmental needs of the workers as well as the world as a whole in an employer-employee participatory manner.

Index Terms- Organizational Performance, Impact, Reward Systems

I. INTRODUCTION

Money has long been viewed as a reward and increment of salary to the employee is the best reward every employee longs for, at least for some people, it is more important than anything else their organization can give them. Take for instance some of the complaints being raised from employees of Brentwood suppliers Ltd, who viewed money as the as a solution to solve the current problem even after management promising to increase salaries, organizational performance has not improved and absenteeism has increased. Some surveys of employees rank money at the top of their list of motivators and others rank it lower. It seems to vary widely with the individual and the industry. Goldman Sachs (2000) noted that “Nobody refuses it, nobody returns it, and people who have more than they could ever use do dreadful things to get more.” Desired performance can only be achieved efficiently and effectively, if employee gets a sense of mutual gain of organization as well as of themselves, with the attainment of that defined target or goal. Good remuneration has been found over the years to be one of the policies the organization can adopt to increase their workers’ performance and thereby increase the organizations productivity. An organization must carefully set the rewards system to evaluate the employee’s performance at all levels and them rewarding them whether visible pay for performance of invisible satisfaction. The concept of performance management has given a rewards system which contains; needs and goals alignment between organization and employees, rewarding employee both extrinsically and intrinsically. In addition, the purpose of reward systems is to provide a systematic way to deliver positive consequences. Fundamental purpose is to provide positive consequences for contributions to desired performance (Wilson, 2003). The only way employees will fulfil the employers dream is to share in their dream (Kotelnikov, 2010). Reward systems are the mechanisms that make this happen. They can include awards and other forms of recognition, promotions, reassignments, non-monetary bonuses like vacations or a simple thank–you.

Thus the main thrust of this study is to analyse the impact of rewards systems on workers’ performance and to give recommendations to their current performance based reward system.

1.1. Problem Statement

Rewards are one of the most important elements to motivate employees for contributing their best effort to generate innovative ideas that lead to better business functionality and further improve company performance in both financial and non-financial terms (Serena Aktar, Muhammad Kamruzzaman Sachu & Md. Emran Ali,2012). According to Baratton (1999), rewards refer to all form of financial returns and tangible services and benefits an employee receives as part of an employment relationship. “Rewards are benefits that arise from performing a task, rendering a service or discharging a responsibility” (Colin, 1995). Furthermore, Ajila and Abiola (2004) revealed that reward packages can influence on employee performance. Based on their findings they concluded that reward systems help to increase employee performance by enhancing employee skills, knowledge and abilities in order to achieve organizational objectives (Waruni Ayeshia Edirisooriya; 2014). In the world today customer relationship, management style and employee performance in companies, firm or
organisations is a cardinal issues. According to Dewhurst et al. (2010), there are other means to reward employees that do not just focus on financial compensation. Some of these include the praise that employees are able to acquire from their managers, the opportunity to take on important projects or tasks, and even leadership attention. The latter refers to the treatment of the employees by their managers in such a manner that the employees are also considered to be as leaders as well. Take for instance Brentwood Suppliers Limited which is a Lusaka based company incorporated in the Republic of Zambia and its core business is supplying to private and government entities in construction sector. The company was founded on the premises to provide high quality products and services to both private and public institutions. Its Vision is to provide high quality products and services to its esteemed customers. It has 50 employees and of late the company’s sales have gone down and management is speculating a lot of reasons. Some workers claim that the reward system has a problem and it needs to be evaluated, while a few others were more concerned about salary increment and were cited saying ‘we just want more money’. Despite Brentwood Suppliers Limited promising salary increment, organizational performance has not improved and absenteeism among employees has increased. Some workers are even threatening to down tools. Thus, it is against this indictment and/or background that this study was of essence and relevance.

1.2. Study Objectives
1.2.1. Main Objective
To evaluate the impact of reward system on workers’ performance at Brentwood Suppliers Limited.

1.2.2 Specific Objectives
- To assess the effectiveness of existing reward system at Brentwood Suppliers Ltd.
- To find out whether there is a relationship between reward system in the organization and an increase in the performance of the employees.

II. LITERATURE REVIEW

1.1. Overview
The impact of rewards on employees’ performance is well known phenomenon in the available literature of human resources. A large number of studies have verified that proper reward systems is a powerful tool to enhance employee behaviours leading to performance improvement.

According to Searle (1990), rewards can be categorized into two broad areas, namely; extrinsic rewards and intrinsic rewards (Waruni Ayesha Edirisooriya; 2014). Rewards and compensation systems motivate employees to give their maximum efforts towards assigned work. Schaufeli et al. (2002) stress on the importance of rewards in order to combat burnout, which is typically experienced by most employees on the job. Individuals who experience burnout in their work, typically do not feel fulfilled. They also tend to have stress. Vroom (2000) supported the assumption that workers tend to perform more effectively if their wages are related to performance which is not based on personal bias or prejudice, but on objective evaluation of an employee’s merit. Though several techniques of measuring job performance have been developed, in general the specific technique chosen varies with the type of work. All these issues call for research efforts so as to bring to focus how an appropriate reward package can jeer up or influence workers to develop positive attitude towards their job and thereby increase their productivity. Possibly the best means of understanding workers’ motivation is to consider the social meaning of work. In this respect, short-term goals and long-term goals of employees and employers may affect production variably. Accordingly, giving attention to the manner in which rewards given to workers are perceived, is preferable to assuming that reward means the same thing to all negative outlooks, and they also approach the tasks at hand with less vigour and dedication.

1.1. Theoretical Review of Literature
Reward systems are one of the basic components of a performance management system and a reward system is a broad term and it encompasses all organizational components linked to rewards including people, processes, rules, regulations, procedures and decision making processes that are involved in allocating the benefits and compensation among employees in return for the contribution that have made to the organization in terms of the work achieved (Griffin and Moorhead, 2009)

Many studies in creativity literature have shown that a company’s reward system plays a critical role in motivating employees to perform creatively. In an effort to stimulate employees’ creativity, many managers have used extrinsic rewards (e.g. monetary incentives and recognition) to motivate their employees (Rashmi et al., 2017). While empirical research has also shown that extrinsic rewards help enhance individuals’ creative performance, the literature is still divided when it comes to its effects on individuals’ creativity. Azasu in his “Principal-agency” theory suggested that most people are opportunist and are always motivated through monetary rewards while the socioeconomic theorists argue that people are neither inclined towards monetary rewards nor do they have a homogeneous approach but might be fascinated by the cocktail of monetary and non-monetary rewards that have the potential to enhance their motivation and commitment. (Tahira Nazir, Syed Fida Hussain Shah and Khalid Zaman; 2012). Serena Aktar1, Muhammad Kamruzzaman Sachu, Md. Emran Ali (2012) in their study revealed that the effectiveness of skilled employees is likely to be limited if they are not motivated to perform. One of the means that organizations can use to enhance employee motivation and performance is to provide performance-related compensation (Delaney and Huselid, 1996). A reward and compensation system is based on the expectancy theory which suggests that employees are more likely to be motivated to perform when they perceive that there is a strong link between their performance and the reward they receive (Fey and Bjorkman, 2001; Guest, 2002; Mendonca, 2002). In other words, the compensation system (e.g. profit sharing) contributes to performance by linking the interest of employees to those of the team and the organization thereby enhancing effort and performance (Kalleberg and Moody, 1994; Huselid, 1995; Kling, 1995).

Furthermore, Expectancy theory (Vroom, 1964) focuses on the link between rewards and behaviours (instrumentality perceptions), although it emphasizes expected (rather than
experienced) rewards (i.e., incentives). Vroom suggested that individuals will choose behaviours they believe will result in the achievement of specific outcomes they value. In deciding how much effort to put into work behaviour, individual are likely to consider three things; valence, instrumentality and expectancy (W. L. Njanja, R. N. Maina, L. K. Kibet & Kageni Njagi:2013)

Ajila and Abiola (2004) revealed that reward package can influence on employee performance. Based on their findings they concluded that reward system helps to increase employee performance by enhancing employee skills, knowledge and abilities in order to achieve organizational objectives. According to the Allen and Kilmann (2001), reward practices play a vital role in improving employee performance and to achieve organizational goals. As mentioned earlier, many researchers have identified that employee rewards directly attach to employee performance. According to the available literature (Eisenberger, 2011: Heng, 2012), they identify, if organization fails to reward employees, it will directly affect or decrease employee performance and an efficient reward system can be a good motivator but an inefficient reward system can lead to demotivation of employees in terms of low productivity, internal conflicts, absenteeism, high turnover, lack of commitment and loyalty, lateness and felling grievances. Therefore, organizations need to develop strategic reward systems for employees in order to retain competent employees which result into sustainable competitive advantage of an organization (Edirisooriyaa, 2014).

Samuel Azasu (2009) also conducted a study and revealed in his investigation that there was a relationship between increases in sales and efficient reward system. Similarly, Ryan and Deci (2005) conducted a study to determine the impact of reward on motivation of employees and found that there was a direct relationship between the level of rewards and intrinsic motivation, the higher the reward, the more will be the extrinsic motivation. Another study was also conducted that endeavoured to inspect the relationship between rewards and employee motivation and revealed that there is a statistically significant impact of payment, promotion, recognition, benefits on employee motivation (Khan, Farooq and Imran Ullah, 2010). Roberts (2005) also supports this and his findings reveal that the better the reward and recognition systems the higher the levels of motivation and satisfaction among employees and therefore higher levels of performance and productivity. These facts revealed by various comparative studies emphasize the importance of determining the relationship between reward systems and employee motivation and motivation affects the productivity of the employees and therefore has serious implications for the company.

Johnson et al (2010) established the effects of presenting organisational information through implicit and explicit rules on sales-related target behaviours in a retail setting. Results indicated that when organisational information was presented in a specific form, productivity was increased and maintained longer than when presented in other forms. The effectiveness of skilled employees is likely to be limited if they are not motivated to perform. One of the means that organizations can use to enhance employee motivation and performance is to provide performance-related compensation (Delaney and Huselid, 1996).

1.1. Conceptual Framework

A reward and compensation system is based on the expectancy theory, which suggests that employees are more likely to be motivated to perform when they perceive that there is a strong link between their performance and the reward they receive (Fey and Bjorkman, 2001; Guest, 2002; Mendonca, 2002). In other words, the compensation system (e.g. profit sharing) contributes to performance by linking the interest of employees to those of the team and the organization, thereby enhancing effort and performance (kalleberg and Moody, 1994; Huselid, 1995; Kling, 1995). This study is guided by the following conceptual model of rewards systems and employees’ performance as depicted in Figure 1 below:

Reward Systems:

These are intrinsic and extrinsic rewards as independent variables while employees’ performance involves employees’ output as dependent variable. In dependent variable, employee performance encompasses dimensions such as effectiveness, efficiency, productivity, job quality and job accomplishment, dedication and commitment.
III. METHODOLOGY

The current chapter presents the methodology that has been used in the study. The justification for the use of the research approach is explained. This research was based on empirical study rather than on reflection on theories and concepts. The non-probability and probability sampling technique was used in particular purposive and random sampling. The sample size used was 30 out of a population of 50 employees. In this study the inductive approach was used due to the fact that the data was collected and analysed before drawing to conclusion and recommendations. Alternatives theories were used to refer to and suggested to explain certain events. However, the deductive approach was used also to provide relevance and practical applications.

Data collection which were used in the research included secondary and primary data. Primary data gathering was conducted through the use of a questionnaire. To be able to build a comprehensive background of the study, the researcher gathered material from books, journals, and online references. Data was analysed using tables and figures that were gathered from the information through questionnaires collected from the study. The Statistical Package for Social Sciences (SPSS) was employed to analyse the data obtained from questionnaires. However, the study encountered one limitation i.e. the interview which was scheduled to take place with the Manager of Brentwood Suppliers did not take place. The Manager was attending seminars at that time. This was a limitation in that the data collected may not be a true reflection of what is happening on the ground; as such false generalizations may be made from untrue data collected from the sample.

IV. ANALYSIS AND DISCUSSION OF FINDINGS

From the data collected, out of the 30 respondents 73.3% were males and 26.6% were females. The data suggests that there was a difference between the number of males and females used for this research. It was realized from the study that there were many men who have been employed to work at Brentwood Private Limited Company. This further indicates that, majority of the employees were of the ages ranging from 26-35 (53.3%) years whilst 10 (33.3%) out of the 30 respondents used for the research were ranging between the ages of 36-40 years. It also depicts the fact that 4 (13.3%) of the employees were between the ages of 40-45 years. However, it was also found from the studies that majority of the respondents were young ranging between the ages of 26-35 years. Generally, human needs and wants changes as one grows older. This is also in line with a study that was conducted by (Nosheen Khan, Hafiz Waqas, & Rizwan Muneer, 2017) which showed similar characteristics of composition of human needs. This affects the kind of reward packages that organizations must design. This can be attested by Gouldner (1960), who conducted a study and cited Maslow’s Hierarchy of needs and raised questions such as ‘why people or employees behave in certain ways have always been a mystery to us’. Maslow’s motivation theory states that man’s behaviour is controlled by both internal and external factors. He also emphasizes that humans have the unique ability to make choices and exercise free will. His studies led him to believe that people have certain needs which are unchanging and genetic.

### Independent Variables

<table>
<thead>
<tr>
<th>REWARDS</th>
<th>Variables</th>
<th>Employee performance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intrinsic</strong></td>
<td>- Recognition</td>
<td>- Effectiveness</td>
</tr>
<tr>
<td></td>
<td>- Learning opportunities</td>
<td>- Efficiency</td>
</tr>
<tr>
<td></td>
<td>- Challenging work</td>
<td>- Less absenteeism</td>
</tr>
<tr>
<td></td>
<td>- Career advancements</td>
<td>- High Productivity</td>
</tr>
<tr>
<td><strong>Extrinsic</strong></td>
<td>- Basic pay</td>
<td>- Job quality and</td>
</tr>
<tr>
<td></td>
<td>- Bonus</td>
<td>accomplishment</td>
</tr>
<tr>
<td></td>
<td>- Merit Pay</td>
<td>- Dedication</td>
</tr>
<tr>
<td></td>
<td>- Performance benefits</td>
<td>- Commitment</td>
</tr>
</tbody>
</table>

Figure 1: Conceptual Framework

Source: Author’s Construction (2020)
in origin. What may be considered as a good reward package for a young employee may be seen as otherwise by staff with children in school or nearing retirement. The majority of these employees had worked for the company between the periods of 2 years-5 years. In an attempt to find out what are the components of the Reward Packages in the Organization, 74% responded that is was only basic salary, 3% fuel and overtime allowance, 2% commission, 3% car maintenance and 10% achievement benefits. This leads to the question as to whether the employees were happy with the current reward packages, 93% of these employees were not happy as indicated below.

Table 4.1: Are you happy with the Current Reward Package?

<table>
<thead>
<tr>
<th>Reward package</th>
<th>COUNT</th>
<th>PERCENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>No</td>
<td>28</td>
<td>93</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Field data (2020)

Table 4.2: Is there a relationship between the reward system of the company and your performance?

<table>
<thead>
<tr>
<th>Relationship between rewards systems</th>
<th>COUNT</th>
<th>PERCENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>22</td>
<td>73.3</td>
</tr>
<tr>
<td>No</td>
<td>8</td>
<td>26.6</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Field data (2020)

This clearly indicated that there existed a relationship between the reward system of the company and employees’ performance as shown (22) 73.3%. This is similar to Kikoito (2014) who examined the impact of reward systems on organisational performance in commercial banks in Mwanza city, Tanzania and concluded that there was a significant impact on reward systems and performance of the banks. In order to establish the bases for rewarding employees (20) 57% of the employees agreed that the bases for rewarding them by the company are mainly profits while (9) 33% said productivity of the company and (1) 10% said it’s dependent upon the number of customers you bring to the company.

To further understand how highly employees, place rewards as a basis to giving off they best, the table below indicates that 20 (67%) of the employees responded very highly were as (8) 23% are motivated highly and 2 (10%) are average. This information clearly indicated that employees in an organization perform to their level best with very high reward systems. This gives management the challenge to identify what else will catapult these kinds of employees to give off their best. It also highlights the fact that human beings as it were have different expectations and demands and it is imperative on the employer to know their employees to get the best out of them.

Tables 4.3: How highly do you Place rewards as a basis for giving off your best?

<table>
<thead>
<tr>
<th></th>
<th>COUNT</th>
<th>PERCENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Highly</td>
<td>20</td>
<td>67</td>
</tr>
<tr>
<td>Highly</td>
<td>7</td>
<td>30</td>
</tr>
</tbody>
</table>

Source: Field data (2020)

To find out what employees would rather wish they had as part of their total reward package, (4) 13% of the employees wished they had more money as part of your total reward package; another (4) 13% wished they had transport allowance where as (11) 37% of the employees wished they had both medical and housing allowances. This clearly indicates that the employees would do their best to ensure that the company achieves its intended objectives if such fringe benefits were made available.

To illustrate as to whether employees would increase performance if rewarded or receive a higher reward to enable them perform better, the following results from the findings were garnered; (23) 77% of the employees would do better if they were paid or rewarded better, (5) 17% would not while (3) 6% were not sure. And to find out whether employees have an input in their reward system, (25) 83% of the employees responded by saying that they do not make an input the reward system. This clearly shows that most of the decisions are made by management. According to Lawler (2003), a truly motivational reward system must be designed with a few parameters in mind. It must motivate employees to perform through valued and truly sufficient rewards, provide them with However, Wilson (1994) argues that a reward system needs to have a positive impact on behaviour a clear line of sight, give them the power to influence their performance, and deliver on its promise. (Marlisa Abdul Rahim & Wan Norhayate Wan Daud; 2012). The performance of an organisation is highly dependent on the employees’ level of motivation (Rashmi Ranjan & Dr. Umesh Mishra; 2017). This perhaps could be some of the reason the company is facing challenges. In this study in order to understand how highly rewards motivate employees to give off your best, (20) 67% of the employees are very highly motivated by the rewards the company offers were as (7) 23% are motivated highly and (3) 10% are average. This information clearly indicated that employees in an organization perform their level best with very high reward systems. Marlisa Abdul Rahim & Wan Norhayate Wan Daud (2012) states that, sometimes management pays more attention to extrinsic rewards but intrinsic rewards are equally important in employee motivation. Intangible or psychological rewards like appreciation and recognition plays a vital role in motivating employee and increasing his or her performance. From the study by Badrinarayan and Tilekar (2011), it found that job security, career advancement opportunity has a very positive impact on motivation. There was a positive relationship between rewards, recognition and motivation (Roberts, 2005). However, Andrew (2004) concludes that commitment of employees is based on rewards and recognition. This brings back to Brentwood Suppliers Ltd where management observed lack of commitment among their employees.

V. CONCLUSION AND RECOMMENDATIONS

Human resources are the most important assets among all the resources an organization owns. To retain efficient, qualified, dedicated, committed and experienced workforce in an
organization is very crucial in overall performance of an organization. Reward management system is a core function of human resource discipline and is a strategic partner with company managements. Besides, it has an important role on work outcomes. Based on the analysis of the findings on the impact of rewards system on organisational performance using Brentwood suppliers Limited in Lusaka-Zambia, it was revealed that, the existing reward system of Brentwood suppliers was ineffective and needed to be revised; there was a relationship between rewards systems which had an impact on employee performance. Thus a conclusion can be drawn that rewards have an impact on the performance of the organisation and the above recommendation must be implemented.

The study recommended to management to improve employee performance by harmonizing the reward system in the company, reward packages should be modified periodically as a response to the changing environmental needs of the workers as well as the world as a whole. And also incentives should be designed and administered with the full participation of employees or their representatives as well as reward packages should be linked to employee satisfaction.

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Perception of Adolescents on Sexual and Reproductive Health Services (SRHS) in Chipata Township, Lusaka-Zambia.

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Abstract- This study was purposed to establish the perception of adolescents on sexual and reproductive health services (SRH) in Chipata Township of Lusaka district in Zambia. The study focused on three main thematic areas, including; identification of factors leading to adolescents' taking up of sexual and reproductive health services; determination of barriers to accessing and utilizing SRH services among adolescents, and identification of the role of guardians/parents and health care providers in the access of SRH services by adolescents. As a case study analysis, the study used a qualitative research approach with purposive and convenient sampling as techniques in which 32 participants who were adolescents’ boys and girls, health service providers and parents/guardians featured. Research instruments used included in-depth structured interviews. The data were analysed through thematic and content coding of emerging pertinent commonalities in views of participants. The study revealed that among the several factors which lead adolescents to access the sexual and reproductive health services were: fear of getting pregnant; postponement of early marriages, and finding someone to talk and to know more about sexuality. Contrariwise, among the key barriers to service accessibility were negative attitude by health service providers; lack of information on the services and their availability; long waiting hours and long distances to the health centers; lack of confidentiality among health service providers which lead to lack of trust; non-availability of most essential contraceptives in health centers (method mix); cultural norms which prevent adolescents from accessing contraceptives e.g. no sex before marriage and providers being adults only. The study further established that parents and health care service providers play critical roles such as providing and promoting SRH information and offer curative services respectively. The study recommends that government through the Ministry of Health should strengthen training programs in adolescent health for service providers; adolescents and young people should be involved in program planning, service delivery, and information dissemination; strengthening community structures for supportive environment and use of innovative approaches such as social media in delivering social and behavioral change communication (SBCC) rather than the traditional information, education and communication (IEC) materials.

Index Terms- Adolescents, Perception, Reproductive Health Services, Sexual.

I. INTRODUCTION

Zambia is a landlocked country with a youthful population in which the youth comprises 68% of the population according to the National Youth Policy (2015). This population is faced with a lot of sexual and reproductive health (SRH) challenges such as teenage pregnancies, early and child marriages, Sexually Transmitted Infections (STI) and Human Immunodeficiency Virus (HIV), unsafe abortions, and Drugs and Substance abuse among others. Despite Zambia being a signatory to many global, international and regional commitments that seek to advance the sexual and reproductive health of the general population i.e. women, men and young people, these challenges still pose a huge burden on the majority Zambians compounded with poverty. Among the many commitments / conventions signed and domesticated by Zambia include; the East and Southern Africa (ESA) Commitment of 2013 which seeks to advance youth friendly health services; the Africa Union Continental Policy on Sexual and Reproductive Health 2010 that seeks to address maternal mortality; and the sexual and reproductive health of the general population including adolescents; The Campaign to Accelerate Reduction of Maternal Mortality in Africa (CARMMA) 2010, and the International Conference on Population and Development (ICPD) which seek to ensure universal Access to reproductive Health Care for the general populous. Additionally, the United Nations Millennium Development Goals (MDGs 2000 – 2015) sought to address maternal mortality, gender equality and access to education. There are several interventions by the government of the Republic of Zambia complimented by cooperating partners and other civil society organizations, yet the sexual and reproductive health trends among adolescents are not changing significantly. For example, in 2014 according to the ZDHS, the teenage pregnancy rate was at 28% while in 2018 it went up to 29%. This research, therefore, sought to explore perceptions among adolescents on sexual and reproductive health information and services poised to explore major reasons as to why young people do not take up sexual and reproductive health services despite so many multimillion interventions sponsored by the government and the
donor community. The findings should help shape the programming perspective for better responses to the ADH needs.

1.1. Problem Statement
Sexual and reproductive health service utilization by the adolescents is pathetic. This is reflected in the ill health of young people among many other issues. Adolescent pregnancies are on the increase as the number of schools’ dropouts are very high year in year out among adolescent girls. For example, the Ministry of Education through its Statistical Bulletin indicated that 13,640 girls dropped out of school in 2017 due to unplanned adolescent pregnancies. In 2018 according to the ZDHS, child marriages increased from 28% to 29%. Utilization of contraceptives or modern family planning methods is also low among young people in Zambia. Low condom use contributes to transmission of sexually transmitted infections including HIV/AIDS and unplanned pregnancies. In order to address the various barriers responsible for these indicators, there is need to effectively understand and further engage the different actors especially at the community level on social and gender norms.

1.2. Study Objectives
1.2.1. Main Objective
To establish the perception of adolescents on sexual and reproductive health services (SRH).

1.2.2 Specific Objectives
i. To identify factors which lead adolescents to take up SRH services, particularly contraception services.
ii. To determine barriers to accessing and utilizing SRH services among adolescents
iii. To ascertain the role of guardians/parents and health care providers in addressing adolescents’ access to SRH services.

II. LITERATURE REVIEW
1.2. Background
Globally, adolescents face different sexual and reproductive health challenges such as lack of access to quality SRH information and services, teenage pregnancy, drugs and substance abuse, sexual abuse, rape, defilement, unsafe abortions, STIs and HIV among other. This is because most adolescents are sexually active. Similar trends are happening in Zambia as well. About 32% of adolescents aged 15 to 17 years and 60% of those aged 18-19 years are sexually active in Zambia; but only 40% of adolescents report regular condom use (ZDHS 2018). The adolescent girls who are not using condoms or contraceptives are at greater risk of contracting HIV and other STIs and having unplanned pregnancies with some of them ending in maternal mortality caused by unsafe abortions or because their bodies are not fully developed to go through delivery. According to the ZDHS (2018), about 6 Girls who give birth during adolescent years have a greater risk of death than women who have children in their early 20s, and their babies are at a higher risk of negative health outcomes or complications such as low birth weight and greater risk of neonatal death. Almost 1 in 5 adolescent girls aged 15 to 19 is already married (compared to only 1 in 100 adolescent boys). One (1) out of every 4 girls aged 17 is either pregnant or already has a child; by age 19, this figure is 6 out of every 10 girls. Many of these pregnancies are unplanned; 25% of married adolescents have an unmet need for contraceptives, and this figure is likely higher among unmarried adolescent girls. Between a period of 5 years i.e. 2013 and 2018, Zambia recorded an increase in the number of teenage who have begun child bearing. According to ZDHS 2013/14, 28% of teenage girls had started bearing children while in 2018 it was at 29%. Adolescents are also affected by HIV and AIDS. According to the ZDHS (2018), HIV prevalence among youth aged 15-24 who have had sexual intercourse in the past year, 3.8% are HIV positive. The trend is that HIV prevalence among youth is higher in urban areas (5.3%) than in rural areas (2.6%). HIV prevalence is higher among young women than young men (5.6% versus 1.8%). This is the reason why it was important to investigate factors that prevents adolescent girls from accessing SRH services. The perception also affects the service uptake. Understanding the adolescents’ perception is key in determining the nature of interventions needed in order to help rescue the situation.

1.1. Contraceptives Utilization and Barriers among Adolescents and Young People
Family planning represents a ‘best buy’ in global efforts to achieve sustainable development and attain improvements in sexual and reproductive health. Ensuring access is amongst key transformative strategies that underpin health and sustainable development. It confers fertility choices on women and couples within a human rights framework. By meeting contraceptive needs of all women, significant public health impact and development gains accrue. At the same time, governments face the complex challenge of allocating finite resources to competing priorities, each of which presents known and unknown challenges and opportunities. As such, there is a need to carefully consider the estimated costs and benefits for each proposed investment in health, education, social welfare, and security. Zambia has experienced a slow but steady increase in contraceptive prevalence, with slight decline in total fertility rate (TFR), over the past 20 years. Increasing voluntary modern contraceptive use among women offers opportunities to reduce unintended pregnancy while effectively harnessing the demographic dividend in order to bolster socioeconomic outcomes for households and communities.

The African Union in 2017 declared a theme dubbed harnessing demographic dividend through investing in the youth identified family planning as one of the key pillars of investments. This means reduction in maternal mortality and encouraging economic independence as most investment will be in education instead of family responsibilities. Therefore, making investments in voluntary family planning (FP), underpinned by a human rights framework as a pillar for accelerating development and socioeconomic advancement is of paramount importance. Through multilevel interventions aimed at averting unintended pregnancies, Zambia – and other low- and middle-income countries – can reduce their age dependency ratios and harness economic growth opportunities awarded by the demographic dividend while improving the health and quality of life of the population.

Among the goals set by the global community for sustainable development is Goal 3.7, “By 2030 ensure universal access to sexual and reproductive health care services,
including family planning (FP) information and education, and the integration of reproductive health into national strategies and programs.” Meeting all contraceptive and maternal and newborn health care needs would result in substantial health and development gains, yielding dramatic reductions of unintended pregnancy, safe and unsafe abortions, maternal deaths, and newborn deaths. Investments in family planning offers benefits beyond fertility, further downstream of the maternal and newborn care continuum. Low-income countries with high fertility rates are at risk of having poor maternal and child health, economic stagnation, environmental degradation, and political unrest. Countries in general that do not utilize FP have been trapped in a vicious poverty cycle, with women bearing a disproportionate burden.

Despite the greater investments in family planning in Zambia, Adolescents’ access to the services is not appealing. Data from the 2018 Zambia Demographic and Health Survey (DHS) reveal that 20% of women of childbearing age have an unmet need for FP, meaning that about 20% of married women of childbearing age wish to prevent or delay childbearing but are not using any form of family planning. In addressing unmet needs, efforts to expand FP access may focus either on the concerns and needs of women who have never used or women who discontinued the use due to stock-outs, side-effects, partner preferences, or other reasons.

In addition to having high levels of unmet needs, Zambian women commence childbearing early, with more than one-third reporting they gave birth before their 18th birthday and more than 50% by age 20. Among adolescent girls aged 15–19, 29% had given birth or been pregnant, with a median age of 19.1 years for first birth. While child marriage in Zambia has declined in recent years, over 30% of girls aged 20–24 reported being married before age 18, one of the highest rates in the world. The culmination of early childbearing and unmet needs for FP contribute to a high birth rate in Zambia, at 40 per 1,000 populations per year, by contrast with the worldwide average of 19 per 1,000. The Government of the Republic of Zambia (GRZ) has been actively working to generate demand, expand dialogue on FP, and improve FP access and quality in a coordinated effort guided by the national costed implementation plan. This plan emerged in response to the 2012 London Summit on Family Planning, where the government articulated several commitments to improving contraceptive outcomes by 2020, including a commitment to increasing voluntary FP access for those in need by doubling its budget for FP commodities and enhancing community-based outreach, with the goal of reaching a modern contraceptive prevalence rate of 58%. As of August 2016, GRZ reported substantial progress in securing FP commodities and building provider capacity, as well as engaging traditional and religious leaders in dialogues surrounding child marriage and adolescent pregnancy.

GRZ’s focus on adolescents and rural women is critical, since these groups have historically lagged in contraceptive uptake. Strategies to engage adolescents include continued support of comprehensive sexuality education in schools through capacity strengthening of teachers and peer educators, identifying youth-friendly service access points and address existing stigma at health facilities inhibiting youth FP uptake, and clarifying age of consent regulations to improve youth access. In addition to FP demand generation and securing FP commodities for these groups, it is also important to combine FP efforts with other policy interventions, particularly those aimed at reducing early marriage and promoting school retention for girls.

Decades of research have clearly established the benefits of voluntary FP services as a health, development, and human rights priority. It has a direct impact on women’s health and socio-economic development. There is a pressing need to invest more in voluntary FP services in general and, specific to the Zambian context, to realize the development potential associated with high and sustained contraceptive use. This requires the engagement of diverse stakeholders, economic and planning decision-makers, as well as traditional and religious leaders. With proper planning and investments in FP and related supportive programs the country is poised for improved health among its citizens especially the adolescents’ girls, spurring long-term economic growth and continued improvements in education, and overall quality of life.

In order to address the various barriers responsible for these indicators i.e. teenage and unplanned pregnancies, maternal mortality, sexual transmitted infections, HIV, abortion among other, there is need to effectively understand and further engage the different actors especially the adolescents themselves and communities in order to address social and gender norms. Health system efficiencies and effective prioritization is key to attaining improved health outcomes for the Zambian population particularly adolescents. While a clear process for planning and budgeting is routinely followed and theoretically guides prioritization of health service delivery, guidance for administrators and clinicians in optimizing the impact of their programmatic decision making is insufficient especially due to absence of the data regarding adolescents perceptions of the intended program focus. Providing sufficient data-driven evidence and guidance to optimize programmatic decision making requires a systematic approach to strengthening systems and building capacity. It is therefore imperative to interrogate adolescents’ perceptions of the SRH services as well so as not to be shooting in the air with the programs.

In relation to fertility, according to the Zambia Demographic Health Survey of 2018, Zambia has one of the highest total fertility rates in the world (4.7 children per woman), urban areas have a lower TFR (3.4) than rural areas (5.8). This could be attributed to different reasons including lack of access to modern contraceptives, sexual gender-based violence, early marriages and teenage pregnancy. The percentage of women aged 15-19 who have begun childbearing increases with age, from 6% among those age 15 to 53% among those age 19. In Zambia currently about 20% of women in reproductive age group have unmet needs for modern contraceptives. The low utilization of contraceptives also contributes to the high fertility rate.

Adolescent fertility comes with its own challenges. The physiological, educational, or economic consequences of adolescent fertility do not occur in a social vacuum. Social contexts shape the consequences of physiological and demographic events in subtle yet profound ways. One much-discussed example of how biology and society interact is the “biosocial gap” between menarche and socially sanctioned childbearing. The wider this gap, the greater the likelihood of conceiving an unsanctioned child. More generally, society shapes key values that dictate when young women begin bearing children and how their giving birth is regarded by their families as well as
by health and welfare services. For very young married women living in rural areas, where society may define early childbearing as normal and even desirable, the social and economic risks of not bearing children probably outweigh the physical risks of bearing children. By contrast with remote rural areas, urban areas have better health care facilities, not to mention long-term educational and training opportunities—factors that should, in theory, improve health outcomes for young women and their children. The government through the Ministry of Health has made marked efforts to provide primary health care and maternity services for mothers and young girls in the past years. Yet although many of the risks of adolescent pregnancy can be offset by affordable prenatal care and the use of contraceptives, adolescents often avoid public medical facilities where their presence would expose the fact that they were engaging in illicit sexual activities.

Access to health services at the health centers by adolescents has a lot of issues such as the crowdedness of the facilities. It is a good idea to have all services available at the center, yet the popularity of clinics is also a drawback to adolescents. The consulting area offers little privacy, especially, as is often the case, if it is separated from the waiting area only by a thin cloth. The crowded waiting room is constantly buzzing with gossip: whose child has been sent to secondary school, who was seen alone with whom, who may be pregnant, who is leaving her husband, and so on. The sheer lack of privacy surfaces in other ways as well. Clients know that records are written down and kept and that clinic staff are frequently their neighbors or relatives. It becomes more difficult if the pregnant adolescent with no sanctioned attachment to a man to fare in such a setting. Many pairs of eyes shrewdly appraise her condition and exchange contemptuous looks. Some women actually make comments, and all ears are trained to the consulting area as she enters. While being attended to, she is likely to be chastised by the attending staff for her condition, and her morals are likely to be loudly questioned.

Reducing adolescent fertility and addressing the multiple factors underlying it are essential for improving sexual and reproductive health and the social and economic well-being of adolescents. There is substantial agreement in the literature that women who become pregnant and give birth very early in their reproductive lives are subject to higher risks of complications or death during pregnancy and birth than their peers, and their children are also at greater risk of morbidity and death than children born to older women. Therefore, preventing births very early in a woman’s life is an important measure to improve maternal health and reduce infant mortality. Furthermore, having children at an early age curtails a woman’s opportunities for socio-economic improvement, particularly because young mothers are less likely to keep on studying and, if she needs to work, may find it especially difficult to combine family and work responsibilities. The adolescent birth rate also provides indirect evidence of young people’s access to health services since youth, in particular unmarried adolescent women, often experience difficulties in access to sexual and reproductive health services.

1.1. Gaps in Literature

The absence of studies on the perspective of adolescents on sexual and reproductive health services was identified as a potential data gap. Although most studies have been done regarding adolescents’ teenage pregnancy, factors affecting teenage pregnancy, effective adolescent health programming, evaluation of school re-entry policy and health consequences of early sexual debut, none of the studies have been able to dig deeper and get the perspective of adolescents and young people on how they feel about the adolescent sexual and reproductive health services along with the role of parents/guardians and health care providers in addressing their plight. Most programs are designed and implemented to help address the sexual and reproductive health of adolescents and young people and yet the situation seems not to be changing for example teenage pregnancies still remain high at 29% according to the demographic health survey of 2018 (ZDHS 2018) which is a 1% increase from 2014 studies. School dropouts have also continued to increase. One wonders whether interventions are working or are not being executed to deal with the specific issues. Therefore, this research sought to explore the perspective of adolescents and young people on sexual and reproductive health services.

1.1. Theoretical Framework

Access to Health care services by adolescent and young people is dependent on a number of factors including attitude of the service providers, availability of the services, distance to the service delivery points and also awareness on the services. It is also the issue of behavioral change. This study was anchored on the behavior change theory by Piotrow et al. (1997) which claims that behavior change is a process and thus it must go through 5 stages. The professed stages are i.e. Knowledge, Approval, Intention, Practice and Advocacy (KAIPA). This model is believed to transform and facilitate behavior change in that it proposes that before change in practice and attitude, there is need for Knowledge. After acquiring knowledge, it must be approved, then intention to act develops, from intention they move to practice and then advocate for the issues. It is indeed difficulty for a person to adopt new behavior. This theory will be tested in relation to adolescents’ uptake of the sexual and reproductive health services.

Crucially, it is professed that sexual and reproductive health and rights (SRH) are essential for sustainable development because of their links to gender equality and women’s wellbeing, their impact on maternal, newborn, child, and adolescent health, and their roles in shaping future economic development and environmental sustainability (www.government.nl ). Yet, in many parts of the world, sexual and reproductive health and rights (SRH), are not universally protected, promoted and fulfilled because of weak political commitment, inadequate resources, persistent discrimination against women and girls, and an unwillingness to address issues related to sexuality openly and comprehensively. As a result, many people have inadequate sexual and reproductive health services over the course of their lives. The many manifestations of this lack of SRH include a high number of unwanted (teenage) pregnancies, many unsafe abortions, high maternal mortality and morbidity, a continuation of the HIV-epidemic.

It is assumed that young people face disproportionately large obstacles when it comes to their SRH. With the biggest cohort of young people ever, SRH for all cannot be achieved without taking the needs and aspirations of young people seriously and without informing them on their possibilities and available choices. If young people are better informed about their options,
and if this translates to change in attitude and behavior, they may be better equipped to make healthy choices. If, at the same time services are if addresses specific needs, the number of unwanted pregnancies, the number of (unsafe) abortions and the number of STI’s, including HIV, and maternal mortality will decline. This will also contribute to gender equality, justice and generational equality on the longer run.

1.2. Conceptual Framework

Adolescent and young people whether male or female need sexual and reproductive health information and services in order to lead carefree lifestyles. However, the gender, sex and education levels have a bearing on their behavior according to how they are socialized. This can also affect their self-esteem which can be low, moderate or high. The upbringing compounded with the attitude of the service providers can affect their perception of the adolescent sexual and reproductive health information and services. This may also have effect on the utilization of the sexual and reproductive health information and services. Figure 1 below depicts the study’s conceptual model in which information / service availability, attitude of service providers, bio data and literacy levels (independent variables) are causal to effective utilization of sexual and reproductive health services (dependent variable). The perception of adolescents on sexual and reproductive health information and services is depicted as a moderating variable.

The study was targeted at the adolescents and young people in Lusaka’s Chipata Compound which has a total population of about 45,000 people of which about 9,000 (20%) are adolescent and young people aged 15 – 24 year. The study was targeted at both girls’ and boys’ adolescents and young people in the compound. The sample was drawn from the adolescents and young people who frequent Chipata Health Centre through the youth friendly health corner as the main target group. Other secondary audience included the health care providers at the health center and adult parents through the neighborhood health committee (NHC) which is found at the Clinic. The neighborhood health committee of the clinic comprise different people from the communities where a clinic is. There main duties include governance of the community-based health programs such as health promotion and demand creation. The study sample size was purposively and conveniently sampled from this group based on the arguments by Altunisik et al., (2004) that a sample size between 30 and 500 at 5% confidence level is generally enough for a qualitative research. The data collection tools included in-depth interviews with health care providers, adolescents, parents/guardians and monkey methods to a limited degree. In order to come to a conclusion of the findings, the study

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**Figure 1:** Study’s Conceptual Framework  
**Source:** Researcher’s Construction (2020)

**Table**: Independent valuables
- Information on SRH Services  
- Attitude of the service providers i.e. Judgmental, authoritative,  
- Availability of the services  
- Age, Sex and Gender  
- Literacy levels

**Diagram**: Dependent variable
- Perception of adolescents on Sexual and reproductive Health information and Services  
- Utilization of Sexual and Reproductive Health information and Service

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**III. METHODOLOGY**

The study utilized the Case study research type. Yin (1984:23) defines the case study research method “as an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used. According to Block (1986) the detailed qualitative accounts often produced in case studies not only help to explore or describe the data in real-life environment, but also help to explain the complexities of real life situations which may not be captured through experimental or survey research. Although case study methods remain a controversial approach to data collection, they are widely recognised in many social science studies especially when in-depth explanations of a social behaviour are sought after (Yin, 1994). The target population for this study was the adolescent and young people aged between 16 years to 24 years. According to the world health organization adolescents and young people are defined as people aged between 10 – 24 years, www.who.int.
IV. FINDINGS AND DISCUSSION

1.1. Adolescents Perception of SRH Services

Generally, the study established that there is an understanding of what sexual and reproductive health is among most adolescents. Even though most adolescents could not give a precise definition as per World Health Organization, they were able to state what it implies including giving examples. It was commonly understood as a complete wellbeing of an individual in relation to reproductive health process. “Sexual and reproductive health is a state of physical, mental and social well-being in relation to sexuality. Reproductive health is the complete state of physical, mental and social well-being and not merely the absence of disease or infirmity with relation to the reproductive system”, stated one participant. Another participant indicated that it is a holistic state of health which encompasses not only the physical but the mental and social state relating to the reproductive system of a human being. According to Amnesty international (Amnestyus.org), Sexual and reproductive health (SRH) is an essential component of the universal right to the highest attainable standard of physical and mental health enshrined in the Universal Declaration of Human Rights and in other international human rights conventions, declarations, and consensus agreements. Sexual and reproductive health needs must be met for both men and women.

On the other hand, most adolescents and young people indicated that trained adolescents or young people should provide the SRH services. This is because they can relate at personal level. “I can express myself very well because they are able to relate to my situation than adults who only lecture you”, adolescent girl.” Others stressed that peer educators or someone who is trained in ADH can be best suited to render such services as they are free to interact with them. It’s easier for adolescents to talk to a fellow youth on matters affecting them even in the case of accessing SRH services. There is no judgmental tone from fellow young people especially those that are SRH activist as earlier mentioned. A young advocate who can render services to fellow young people in a user-friendly manner is of utmost significance to them. Nevertheless, others still felt that trained health care workers such as nurses, clinical officers and counsellors can also make good providers including teachers, trained health personnel should be the best service providers, reason being they will give accurate and correct information once an adolescent want to access a service.

1.3. SRH services which Adolescents Seek and Why

Adolescents seek several sexual and reproductive health services. The services should be provided on a need basis. Among the many services that adolescents seek, the following were prominently stressed: Contraceptives such as condoms, pill, implants and injectables; menstrual health management, sex education, HIV information and testing services, emergency contraception, circumcision, family planning and IEC on SRHR, mental health, safe abortion services, counseling services including on alcohol and substance abuse, screening and treatment for sexually transmitted infections and access to information on how to use modern contraceptives. Indeed, adolescents equally have the right to health care services (IPPF, 2008) and their privacy must be respected. Human rights standards require states to respect, protect, and fulfill the right to sexual and reproductive health, and states must also ensure that individuals have the opportunity to actively participate in the development of health care policy and in individual care decisions according to Amnesty International US (Amnestyus.org).

Furthermore, the study established many reasons why adolescents and young people seek out the SRH services. Prominent among them being: to prevent pregnancies; to prevent STIs; curiosity; peer pressure e.g. testing for HIV because others have tested; HIV/AIDS prevention; voluntary medical male circumcision; seeking information for decision making around their reproductive health. To gain more knowledge on sexual reproductive health while others it’s because they feel they are of age to seek information on certain service’s so that they get well informed. An adolescent would seek for an SRH service to get informed on the effects and use of condoms. So in short they seek SRH services in order to be well informed on service and the desire to be healthy.

1.4. Critical barriers to seeking or utilizing SRH services by adolescents

There are several factors that hinder adolescents and young people from accessing the sexual and reproductive health services. Lack of trust in services providers, lack of confidentiality and privacy by service providers, inadequate knowledge of where the services are provided, lack of youth friendly facilities, lack of information on SRH rights, Stigma and discrimination and negative cultural norms that prevent adolescents from freely talking about sex and anything related to reproductive health are some of the fundamental reasons that hinder adolescents from accessing the sexual and reproductive health services. Some adolescents are shy while others lack awareness and lack of sexuality education. The negative attitude from the health workers, fear and even the location of the facilities and the fees at which those services are being provided are also a barrier. Other barriers include “Judgmental tone from the service providers. You find that a young person goes to a clinic to access contraceptives. Then they find a friend to their mother/father/guardian. It becomes so difficult for them to access services because mostly they are judged and told “ you’re still young to access such a service.” As a result, such an adolescent will never go back to that health center.
The other barrier is the age gap between the adolescent and Service providers. Service providers might be free and flexible but it gets tough for an adolescent to confidently talk to someone older than them especially when accessing services like the IUDs, Condoms etc.

1.1. Roles of Parents/Guardians and Health Care Providers in ADH

Parents and guardians are major stakeholders in the adolescent sexual and reproductive health and their roles cannot be over emphasized according to the responses. Their roles stem from information provision to care and support. Parents and guardians are the first contacts for any adolescents hence they should be the first informational contact for adolescents. The parents are expected to train and teach their children about sexual health, the dos and don’ts because most children listen to parents first. Parents and guardians can also take part in talking to their children about sex and the options they have in order to prevent pregnancy and other sexually transmitted infections including HIV. Parents need to be talking to the adolescents especially when they notice that they are becoming very active, create a safe space for them. The talks should also include academics, health education such as practicing good hygiene and drugs and substance abuse. Parents and guardians can also encourage adolescents to seek sexual and reproductive health information and services. When parents are closed, adolescents and young people may end up getting information from their friends and sometimes may not even be the correct information regarding their sexuality. Open communication between parents and young people can unlock their potential and help them discover their true self. It also helps build their self-esteem. It is, therefore, important that parents develop skills that will enable them to communicate with their children amicably without infiltrating cultural values. Puberty and menarche may be difficult stages for adolescents’ emotional and physical development therefore parents and guardians need to be extra skilled to handle the pressure that comes along with these developments.

On the other hand, health care providers are very important in adolescent health services provision. They may hinder or promote access to health services by adolescents and young people. The following are some responses regarding the role of health care services providers in adolescent health. Their role is to ensure they provide information and services to adolescents without prejudice. They should ensure confidentiality and privacy to adolescents who need information and services. Their role should also be to ensure a welcoming and assuring environment to adolescents – in order to encourage those who might be scared and not confident enough to approach them. Health care services providers can also stop discriminating and stigmatizing adolescents rather they can try to empathize with them to offer better advice and the tailored services the adolescent requires.

“Since they are health care workers, they know the human body and how it functions, apart from parents, best advice comes from them because they have vast knowledge about sexual health”, adolescent girl. The information they provide should include how adolescents and young people should keep their bodies, understanding body changes, ensuring they are less vulnerable on sexual & reproductive health risks with an open heart because sometimes they can be rude. To a large extent, nurses are said to have a negative attitude towards adolescents, if they change they can make greater impact in the lives of the adolescents.

V. CONCLUSION AND RECOMMENDATION(S)

The study on the perception of adolescents on sexual and reproductive health has really given pertinent insights into the factors which contribute to adolescents and young people to seek adolescent sexual and reproductive health information and services. The factors include; fear of getting pregnant by adolescent girls, to postponed early marriages, to be healthy, to be free from STIs, to access condoms, to find someone to talk to and to know more about sexuality. This can help the programmers including stakeholders involved in sexual and reproductive health to refocus their efforts in reprogramming in order to respond to adolescent health problems in a more holistic and pragmatic manner. Besides, it is also important to address the identified barriers to adolescents’ seeking for services such as negative attitude by service providers, lack of information on the services and their availability, long waiting hours and long distances to the health centers, lack of confidentiality among service providers which lead to lack of trust, non-availability of most essential contraceptives in health centers (Method mix), cultural norms which prevent adolescents from accessing contraceptives e.g. no sex before marriage and providers being adults only. Parents, Guardians and health service providers are essential stakeholders in adolescent health. Parents and guardians are part of the supportive community structures that adolescents need in order to access the sexual and reproductive health services while health service providers should provide curative services as well as promote and respect sexual and reproductive health rights of adolescents without any aorta of prejudice, discrimination and stigma.

Finally, the involvement of adolescents and young people in any efforts aimed at bettering their plight vis-à-vis in SRH should be of utmost significance among policy-makers, planners, politicians and civil society organisations if meaningful results are to be attained from the discrepancies noted in this study. Their involvement should stem from planning, designing, implementation, monitoring and evaluation of the programs.

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A Review on Ayurvedic Nutraceutics

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Abstract- Nutraceutic is applied to products that are isolated from herbal products, dietary supplements, specific diets, processed food that, other than nutrition are also used as medicines. Considering the burgeoning diseases due to the fast-paced lifestyles, the huge health care costs and the unavoidable side effects associated with modern medicine, the world is gradually shifting towards a preventive and holistic approach. In Ayurved, the health and immunity of the healthy individual is to be preserved through diet, lifestyle, drugs while the ones suffering from ailments are treated holistically with Rasayan chikitsa as the final leg of therapy. Myriad nutraceutical references are available from ailments are treated holistically with Rasayan chikitsa as the final leg of therapy. Myriad nutraceutical references are available in the classical Ayurvedic texts like balya, shramahar, bruhan, medhya, rasayan which needs to be grouped and analyzed as per the indications. An elucidated analysis of the Nutraceutics is discussed in the paper below.

Index Terms- Nutraceutic, Balya, Rasayan, Medhya, Bruhan.

I. INTRODUCTION

Nutraceutical is a product isolated, derived or processed from natural sources and sold in the medicinal form (powder, tablet, capsules, etc.) The term is applied to products that are isolated from herbal products, dietary supplements, specific diets, processed food that other than nutrition are also used as medicines. Nutraceuticals are be used to improve health and immunity, delay the aging process, prevent chronic diseases, increase the life expectancy, support the structure and function of the body. The types mainly consist of –

1. Nutrients: Substances which have nutritional foods e.g. Vitamins, Minerals, Amino acids, Fatty acids.
2. Herbals/ phytochemicals: Derived from herbal, botanical sources.
3. Dietary Supplements: e.g. Probiotics, Pre-biotics, Anti-oxidants , Enzymes.

II. AIMS AND OBJECTIVES

To review the nutraceutical references in Ayurved. To comment on the applications of nutraceuticals as a potential palliative and preventive treatment.

III. METHODOLOGY

All the literature associated with Ayurvedic nutraceuticals were procured, reviewed and classified according to the guna and karma. A wide variety of nutraceutical references are found in Ayurveda like Balya, bruhan, jeevaniya, Medhya, ojovardhak, Rasayan which fits into the mould concept of holistic nutrition.

1. Balya

The drugs specified in this group are Aindri, Kapikacchu, Shatavari, Ksheervidari, Maashparni, Ashwangandha, Shaali parni, Katurohini, Bala, Atibala. Sushrut in Sutrasthan has mentioned Gokshur, Bruhati, Kantkari, Vidaarigandh as balya

Rasa-tikta, Madhur Vipaka – Madhur Veerya- sheet, ushna Guna- guru, snigdha, sthir

The concept of balya in Ayurved is not merely as strength promoter. Bala is a function of Prakrut kapha.

Decreased bala is related to the aggravation of vaat and pitta and since vitiation of Agni is the root cause of all disorders, bala is the function of agni. Maamsa, meda dhatu, purisha. Balya drugs due to tikta , laghu guna cause dhaatwagni deepan , srotoshodhan which results in optimal formation of rasa and other dhaatus progressively due to proper dhatuposhan. In atipravrutti of purisha (diarrhoea), especially in diseases like raajyakshma, tikta, ushna guna causes a grhni effect protecting the bala, prana of the patient. Stanya is an updhatu of Rasa. These drugs with Madhur ras, vipaka, Sheet potency lead to dhatu poshan and rasa vriddhi thereby acting as galactogogues.

2. Bruhan

The drugs under this group are ksheervidari, dugdhika, ashwagandha, kakoli, ksheerkakoli, Shweta bala, peet bala, vidarikanka, ruudhdaara, vankarpas

Vidarigandhaadi, Kakolyaadi Gana-Bruhan

Vidaryaadi – Bruhan Gana


The bruhan drug should have the following properties

Guru, sheet, mridu, snigdha, bahal, sthook, picchil, manda, sthira, slakshna. The above mentioned guna helps to pacify vaat pitta and increase kapha. The two dhaatus responsible for ‘Bulk promotion’ are Maamsa and Meda. Maamsa is responsible for shariripushtri (sustenance of the body) and Meda dhatu begets pushti as well as dridhtva (sustenance, sturdiness of...
body). The drugs specified under bruhan with their aforementioned gunas are analogous with the gunas of Maamsa and Meda.

APPLICATION

Bruhan is a recommended therapy in all types of vaatvyadadi, hikka, shwaas since these arise mainly due to the aggravated vaat dosha. It is also indicated in grishma ritu, in individual debility post any infection or disease like raajyakshma, in the postpartum period. In cases of prolonged usage of bruhan drugs, care must be taken since bruhan drugs due to its properties causes Agnisaat (diminished Agni).

3. Shramhar (Anti-fatigue)

The drugs under this group are Draaksha, daadim, kharjur, priyaal, mushali, parushak, ikshu, yava, shastika. Parushakaadi Gana Rasa-Madhur, Amla, Kashay Vipaka-Madhur Veerya-Sheet Guna-Snigdha, guru/ laghu, mridu, sara.

Shrama or Fatigue is a symptom associated to diminution of rasa, shukra and asthi dhaatu. It is one of the prodromal symptom of Pandu rog and commonly seen due to intense or over-exercising i.e ativyayam. The drugs specified under this group by the virtue of sara guna causes doshanuloman, vaatanuloman, curbs vitiated vaat in koshtha. Madhur, sheet, snigdha guna causes pittashaman and a specific action of tarpan of all rasaadi dhaatus.

APPLICATION

This mode of action can further be applied clinically in some conditions of jwar or post-febrile conditions like trushna (excessive thirst), daaha (burning sensation), aruchi (anorexia), daurbalya (weakness), shosh (emaciation), which indicates that the drugs can be utilized either for a quick rejuvenation of dhaatus or through a prolonged usage called as abhyas tarpan. The table below is denoted for specific action of the drug on dosha-dhaatu.

<table>
<thead>
<tr>
<th>DOSHA</th>
<th>DHAATU</th>
<th>DRUG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vaat</td>
<td>Rasa</td>
<td>Draaksha</td>
</tr>
<tr>
<td>Vaat</td>
<td>Rakta</td>
<td>Daadim</td>
</tr>
<tr>
<td>Vaat</td>
<td>Maamsa</td>
<td>Kharjur</td>
</tr>
<tr>
<td>Vaat</td>
<td>Asthi-Majja</td>
<td>Priyaal</td>
</tr>
<tr>
<td>Vaat</td>
<td>Shukra</td>
<td>Mushali</td>
</tr>
<tr>
<td>Pitta</td>
<td>Rasa</td>
<td>Parushak</td>
</tr>
<tr>
<td>Pitta</td>
<td>Rakta</td>
<td>Ikshu</td>
</tr>
<tr>
<td>Tridosh(vaat, pitta, kapha)</td>
<td>Balya, Sthairyakrut</td>
<td>Yava, Shashtika</td>
</tr>
</tbody>
</table>

4. Medhya (Neuro-nutrient / Brain tonic)

Juice of Mandukparni, Yashtimadhu choorna with milk, Shankhapushpi kalka are some of the examples. Rasa-Tikta pradhaan, kashay, Madhur. Vipaka-Madhur Veerya-Sheet / Ushna Guna- Guru/ laghu, Snigdha, Picchil

Medhya rasayan as described above by charak are a group of drugs which act on intellect, memory, and other faculties of brain function by action of Prabhava. Medha consists of 1. Dhi (intellect) 2. Dhruti (power, retention) 3. Smriti (Memory). Medhya drugs decrease the level of catecholamines in the body and theses drugs possess anti-stress, anti-anxiety, and adaptogenic effect. In broader sense, the drug distribution can be done as follows:

<table>
<thead>
<tr>
<th>Buddhi (Intellec)</th>
<th>Smruti (Memory)</th>
<th>Medha (Brain tonic)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jyotishmati</td>
<td>Shankhapushpi</td>
<td>Haritaki</td>
</tr>
<tr>
<td>Brahmi</td>
<td>Mandukparni</td>
<td>Bhallata</td>
</tr>
<tr>
<td>Haritaki</td>
<td>Ghrita</td>
<td>Kashmari</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Jeerk</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Jatamaansi</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Shatavari</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vruddhdaru</td>
</tr>
</tbody>
</table>

APPLICATION

They are used for the treatment of psychological and psychosomatic disorders like unmada (delirium), apasmaar (epilepsy), buddhibhrasamsa (impaired intellect), visham buddhi (anxiety/distress) etc. Brahmi acts as a Nootropic. Mandukparni as a psychotropick, shankapsphi as a memory booster, anti-depressant, anti-convulsant.

The function of Udaan Vayu is related to dhi, dhruti, smruti, bodhan. Prana Vayu is also functionally important for Buddhi, Chittadhruk while Saadhak Pitta plays a role in Buddhi, Medha aspect. Mandukparni, Yashtimadhu, Jatamansi, Jyotishmati, Guduchi are useful in udaan vayu vitiation. Vacha, Karpur, Jeerak, Daadim, Haritaki, Shatavari can be used in Prana Vayu vitiation while Shatavari, Aparaajita, Yashtimadhu, Kushmaand can be used in Saadhak pitta vitiation.

5. Rasayan

Rasayan usage in appropriate condition with specific dosage and regimen gives results which is the base of Apunarbhava chikitsa (eliminating a disease without recurrence). Rasayan includes an appropriated, optimum nourishment leading to improved biological functions. This can be compared with anti-oxidant, regenerative, immune-modulatory, adaptogenic actions.

Rasayan drugs essentially fulfill two functions- deepan and bruhan. Deepan of Jatharagni, dhatvagni ensures proper digestion and metabolism of the Poshak Rasa which promotes the formation of prashasta dhaatus (quality tissues). They also act on Srotas, cleansing the channels which creates better microcirculation of nutrients. Rasayan drugs improve the longevity, memory, health, complexion, lustre, strength, youthfulness. The prescription of Rasayan therapy includes diets e.g habit of consuming milk and ghi is called an excellent rasayan by Acharya Charak; herbal drugs and formulations and mineral compounds. This diversised concept of rasayan is to be applied according to an individual, their age, gender, disease, organ-specific, desired effect as well as prakriti as mentioned below.

<table>
<thead>
<tr>
<th>Dhaatu</th>
<th>Drug of choice</th>
<th>Rasayan formulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rasa</td>
<td>Guduchi, Vidaari</td>
<td>Kushmanda Rasayan</td>
</tr>
<tr>
<td>Rakta</td>
<td>Pippali, Guduchi</td>
<td>Chyawanprasha Avaleha</td>
</tr>
<tr>
<td>Maansa</td>
<td>Shatavari, Bala, Naagbala</td>
<td>Naagbala Rasayan, Amrutprash Ghrita</td>
</tr>
</tbody>
</table>
6. Ritu Haritaki

Haritaki as a single drug is used against many diseases where srotovibandha (obstruction of channels) is present. It is a rasayan in itself and the main component of many formulations due to its anti-oxidant and restorative effect. It is given with in conjunction with some particular dravyas as Anupaan in the 6 different seasons mentioned in Ayurveda [29]. This helps in maintaining the physiology of the body due to change in the circadian rhythm of different seasons. In Varsha ritu, vaat dosha is aggravated with accumulation of pitta and decreased Agni capacity. Haritaki (Terminalia chebula) with Saindhava salt (Madhur vipaka, snigdha guna) enhances agni and alleviates vaat pitta. In Sharad ritu, there is aggravation of Pitta. According to Bhavaprakash, Haritaki given with Shankara (sugar) due to its Madhur vipaka and sheet veerya alleviates pitta and prevents its further vitiation. In Hemant ritu, the cold environment vitiates the vaat with kapha accumulation. Haritaki with its katu,tikta rasa and ushna virya, laghu guna along with Shuntas (dried ginger) as Anupaan mitigates Kapha – Vaat and enhances agni further. In Shishir ritu, the intensity of cold increases thereby increasing ruksha guna (dryness) Haritaki with Anupaan of Pippali (Piper longum) due to its katu rasa, ushna veerya, tiksha guna mitigates Kapha, snigdha guna of pippali counters the excessive ruksha (dryness). In Vasant ritu, there is aggravation of kapha with decreased strength of Agni. Kashay rasa, laghu, ruksha guna of Haritaki and the Kashay , ruksha, chedhan (ablation) of Madhu (Honey) mitigates kapha and revives Agni. Grishma ritu marks the accumulation of vaat with decreased overall bala. Madhur vipaka, ushna veerya of Haritaki with Madhur rasa, vipaka, guris, snigdha guna of Guda (jaggery) alleviates vaat and increases the bala.

7. Ksheer Kalpana (Medicated milk)

This is a type of formulation in which the herbal drug is boiled with milk and water in the ratio of 1:8:32 until the water part gets completely evaporated [29]. This medicated milk is easy assimilated by the body. Milk in itself acts as jeevaniya, preenan, balya, bruhan, medhya,deepaniya due to Madhur, snigdha guna.

APPLICATION

Ksheerpaka kalpana are prescribed according to different conditions e.g Bhallatak Ksheer for delayed ageing [30], Rason Ksheer [31] for cardio protection, sciatic pain; Gokshur Ksheer for constipation, dysuria. It is suitable for all patient types and age groups.

Better palatability due to Madhur rasa leads to better patient compliance with the drug dose regimen. The Tikshna, ushna guna of the drug used gets reduced (e.g.pippali, lashun) A larger dose can be given for desired effect since it is boiled with milk and water. With gradual increase in temperature, solubility increases which improves the extraction of relevant active constituents.

IV. DISCUSSION

Ayurvedic nutraceutics have a three way focus on prevention, cure, post-illness care inclusive of dietetics, therapeutics, and immunity enhancers. The concept of Rasayan given in an appropriate manner specific to the disease forms the base of avoidance of its recurrence. Ayurvedic nutraceutics provides a unique and better drug delivery system through formulations which ensure maximum absorption of active principles. Concept of Ritu Rasayan helps to maintain the physiological equilibrium due to seasonal variation thus keeping illness and infections at bay.

A holistic, individualistic protocol of nutraceutics according to the age, disease condition or post convalescent period is available. A fixed dosage for a specific time period with a specific vehicle (anupaan) curbs any unwarranted ill effects like in case of bulk promoters freely available in market which have a high content of saturated fatty acids proving detrimental in the long run.

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**Patient Data Management Using Blockchain**

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Abstract- The conventional system of patient-data management has several issues. The system includes information being stored as unstructured records presented as paper prescriptions, files and other traditional forms of storage. All the important data pertaining to the patient is stored by the centralized hospital authorities or the concerned medical practitioners. Reproducibility of this data when it comes to second – opinions or for the judgment of medical history, is a mammoth task. Even if there is a disease which is common, the treatment will mostly be not common for each individual as there should be considered the fact that there is a certain level of uniqueness with each patient. If a treatment strategy works on one patient, that does not mean it will work for all because there will be differences between each patient. Thus, the entire medical record history should be accessed so as to give the treatment which is best suited for the particular individual. Commonly, when a patient visits a new doctor, the doctor might recommend performing tests that have been previously performed. This might be because the proof of the previously conducted test cannot be produced as the test results might have been lost. This project deals with how Blockchain can be used to beat the odds faced by the conventional centralized system that greatly lacks interoperability. With the help of Blockchain, the patient’s data can be managed into a single record owned by the patient. The patient’s details pertaining to all healthcare services he/she has received will be managed into an easily accessible format for use anytime and anywhere. The project also deals with other aspects improving the interaction between the application and the patient, such as, real-world token tracking for appointments, appointment booking and so on. With the help of Blockchain, the current system can be completely disrupted and revolutionized, allowing for better transparency and ownership of the sensitive data thereby promoting and transforming the healthcare industries.

Index Terms- Blockchain, Ethereum, Ganache, Transaction, Truffle.

I. INTRODUCTION

The traditional approach to managing health records have been and inconvenient since its dawn. The amount of effort, time and space used up by traditional health information management systems are so massive that there is a great sense of wonder as to why a better system has not been introduced and implemented on a large scale. There are additional problems associated with the traditional paper-based management which include redundancy, proneness to loss of record, and so on. The use of technology in Blockchain is the health industry has the potential to have finest utility of Blockchain, since it involves store, use and transfer of sensitive information pertaining to any individual. Surprisingly, there has been little to no works or experiments done on this field as it comes up with many difficulties like scalability and awareness. A distributed platform providing technology like Blockchain, if utilized in health sector, and utilized properly, can yield amazing results in many aspects. The basic idea of our product is to minimize the effort and to overcome the aforementioned difficulties by making use of electronic health records to store and maintain the health information of every person. For the secure storage and transmission of sensitive health information, the blockchain technology, which is currently on an upsurge, is used.

II. LITERATURE REVIEW

Blockchain is a relatively new technology, which was conceptualized only in 2008 by a person or a group of people by the name of Satoshi Nakamoto. So, as the concept is relatively new, most of the individuals and even organizations focus on the one standout feature presented by Blockchain technology, which is crypto currency. Bitcoins and other forms of crypto currencies are still worth a lot and many individuals and organizations are still looking to invest in those crypto currencies and make tremendous profit from them. Other aspects to Blockchain technology are not yet fully discovered. This review dwells into the field of management of medical records which are electronic and which have the primary oversight on the efficiency of the system during emergency and catastrophic situations. A major part of the literature is based on software frameworks and other techniques introduced prior to blockchain and its capabilities of smart contracts. With the introduction of the ability to represent complicated data on the chain with the help of a language that is Turing-complete helped start a new field of distribution and p2p mode of communication. After the introduction of Ethereum, new software-frameworks that can use and employ blockchain have been developed by academic institutions and the IT-industry. Electronic Health Records and Electronic Medical Records are not the same thing. These terms are sometimes interchanged, but there is a big difference in the
records containing medical information, stored digitally. An electronic medical record is the digital or electronic equivalent of the paper-records maintained by a patient and the doctor. It contains the history of the patient and other diagnostic and treatment details. The first system to use blockchain for Health records used a modular method for the sake of integration purposes. For the sake of scalability, the actual records are stored off-chain which is the provider’s RDB.

blockchain contains the meta-data and other location information. In simple terms, a smart contract manages all the interaction between the participants of the system and defines the access matrix or access rules and other data-pointers. The pointers will contain tuples along with a query that will run on both the machines of the provider and the host. The health record software is designed according to the protocols of the network designed as Ethereum and the public as well as the private keys will have to decide which parties (network participants who act as miners of the system) get the permission. This means that every participant must have a node associated to the blockchain for interacting with the network. The concerning drawback of this kind of system is that every participant has to maintain a copy of the data. The other drawback would be the scalability issues because of the consensus mechanism used. If the host does not specify any limit, it is still possible to put a maximum transaction count per second of sixty. The projects were completed by focusing on data-sharing, access-controls and integration mechanism.

The research also focused on the patient-side, on how to ensure security constraints in the patient-data while aggregating the system. The various frameworks and blockchain software’s that have been developed so far can be categorized as two permissioned and the permissioned. In a permissioned network, since the participants know each there, it is possible to take advantage of the consensus mechanisms and any network interaction lag can be evaded from while also ensuring security, privacy and transparency. It is not associated to any cryptocurrency models, so the system does not need to be incentivized. This software-framework is most suitable for 2 or more organizations that know each other and want to transfer sensitive information.

III. PROPOSED APPROACH

Prior to the introduction of Blockchain and its Smart Contract-capabilities, the most widely discussed topic on Electronic Health Records was “How to store EMRs” whether to use a cloud based platform for storage or to use the localized systems itself. This meant centralization of information which indicated that every Health care Provider and hospital has to maintain all information pertaining to the patient records in their own premise that is the locally maintained storage and databases. The centralized model for storing patient record information has several issues associated with it, they are:

a. **Not patient-driven:** The patients do not have any control over the data as it is not owned by the patient. A patient’s data should be owned and controlled by the respective patient. As all records are made and stored in the hospital or healthcare service provider, the data is not technically owned by the patient. In order to improve privacy and security one should own one’s own healthcare data. A patient-centric model can disrupt the centralized manner of sensitive health care data storage.

b. **Scattering of records:** The manner in which a patient receives treatment can varied and in different structures and this might cause the replicating of records.

c. **Limitation in the interoperability of systems:** All hospitals and healthcare service providers have different systems and methods for storing data. This will lead to issues in the sharing and viewing of data between the different healthcare service providers. A particular hospital’s system will only be equipped to view the details of that particular hospital. Patient transfers between hospitals may lead to redundant overheads.

d. **Inconvenient secure sharing:** The conventional ways and methods in which health care data is shared can be very complicated and time consuming. For example, Direct is an e-mail standard that allows physicians to transfer data via e-mail in a secure manner. It encrypts the transmission between the physician and the receiver.

The solutions brought forward seemed to solve a lot of the early specified issues, but they suffered some form of vulnerability which led to the search of a better solution in the centralized lines leaving some or the other drawbacks unsolved, such as privacy, data-ownership and transparency. Furthermore, in scenarios like a disaster, the centralized model seemed to really suffer as the response is generally disorganized and any harm to the central storage can leverage a lot of important data. Even though natural calamities are events that are rare, the field of healthcare can greatly be leveraged by them by means of replication and sharing of the concerned information, the network grows powerful in the lines of reliability and robustness even in cases of huge failures. Also, peer to peer networks can allow ownership of data because sensitive data can be requested and stored only to the concerned system-node. A multiple number of such nodes can improve the accessibility of the stored information. Anyhow, this task of achieving consensus while maintaining privacy, security and anonymity can be extremely challenging. Blockchain technology has made it possible to achieve all these challenges in addition to improving transparency and reliability. Blockchain is a structure that stores data in a singly linked list manner as a sequence where every block is connected to the following block forming a chain. Breaching such a system will require rechaining all the blocks while maintaining consensus which is close to impossible.
IV. DESIGN

1. Ethereum

**Figure 1: Ethereum**

Ethereum is the second largest platform for cryptocurrency, falling second to the bitcoin network. It is an open source and decentralized platform that provides the tools and requirements to build smart contracts. As reward for validating the transactions, the miners receive ether, which is the incentive of the system. Today, Ethereum is the platform for lakhs of cryptocurrencies, including three of the top leading cryptocurrencies.

Ethereum network contains an Ethereum virtual machine that compiles scripts using a network of nodes connected internationally. The network also uses an internal transaction unit called gas that is used to allocate resources on the network. Ethereum platform was developed by Vitalik Buterin who is a cryptocurrency-researcher. In 2016 due to an exploitation in the smart contract of the DAO project and the theft of millions of dollars, Ethereum split into two different blockchains - ETH and ETC. The ETH had the theft reversed while the ETC continued along the same lines. Proof Of Work and the Proof Of Stake are the most widely used consensus algorithms in Ethereum. The POS consensus algorithm checks to see if the participant has high enough stakes of the concerned currency - this is a drawback as it opens the door to Monopoly, but POS has its own way to control it which is selecting a random stake holder on subsequent rounds.

2. Web3

**Figure 2: Web3**

In order to communicate with the components in the chain, validations of the transactions should be done in chain. For a participant in the network of some other offline framework to create and validate a transaction, it has to relay it to the p2p network which is the underlying network. It also contains a library collection that facilitates the communication between the Ethereum nodes and the in-chain components. It is used in the server side for applications developed in Node.js.

It connects to the Ethereum network with the help of an Ethereum-node using an HTTP connection. This can be a node in the local system provided by Infura or HD wallet. The integration of Ethereum and the web application can be done using Metamask which is an in-browser extension that allows to operate from Ethereum accounts. Metamask is an Ethereum wallet present in the browser that introduces the browser to a Web3 provider object. A Web3 provider provides a link to Ethereum nodes which are publicly accessible and is also a data-structure. With the help of metamask, a user can use, store and manage public and private keys which is unique to the account. The combination of Ethereum, metamask and web3js along with a web interface makes back end-front end communication very easy.

3. Ganache

**Figure 3: Ganache**

Ganache is a local blockchain for the rapid development distributed applications on Ethereum. Ganache can be used throughout the development cycle so as to deploy, develop and test DAPPS in a deterministic and secure environment.

Ganache User Interface is desktop app that supports both: Ethereum and Corda technology. Ethereum is also available as a command line version: Ganache-cli.

4. Truffle
Figure 4: Truffle

It is a powerful developing environment for Ethereum Virtual Machine (EVM) using blockchains and also acts as an asset pipeline and a test network/framework to the same. This component provides the following:

- The compiling, linking and development of smart contracts and the maintenance of binary dependencies.
- Automated smart contract test environment.
- Scriptable, extensible deployment & migrations framework.
- Management of Packages.
- Communication with Contracts directly.
- Build pipeline which are configurable with tight integration support. Truffle environment to run scripts.

5. Smart Contract

The smart contract used in Medicare makes the project patient-centric. The patient is able to make all decisions pertaining to which medical practitioner can view and edit the record. On the patient’s end, there are 5 operations that correspond to the patient’s record: Permissioning and Revoking of View and Write Permissions to the Medical practitioner. The record details added by the medical practitioner will be stored in the blockchain. This acts as proof of existence for the recorded data. Only a validated practitioner can add recorded data and not any other network participant. The smart contract specifies the functionality for the access control. Access to a patient’s record can only be controlled by the patient.

6. Patient Flowchart

The patient’s has mainly four operations to perform are:

a. **Give View Permission:** Permissions a Doctor/Practitioner to view the record. This function takes the doctor’s Address as input which is shared to the patient offline. The address is unique to the practitioner which maps to the corresponding Ethereum account.

b. **Give Write Permission:** Permissions a Doctor/Practitioner to Write to the record. This function takes the doctor’s Address as input which is shared to the patient offline. The address is unique to the practitioner which maps to the corresponding Ethereum account. Only a permissioned practitioner can write to the record.

c. **Revoke View Permission:** Revokes View permission from a practitioner who was earlier given permission to view the record, by the patient. Permission can only be revoked from a practitioner who had the View Permission already. The practitioner will no longer be a participant in the patient’s private chain unless permissioned by the patient.

d. **Revoke Write Permission:** Revokes Write permission from a practitioner who was earlier given permission to write to the record, by the patient. Permission can only be revoked from a practitioner who had the Write Permission already. This function will deny the doctor/practitioner from adding any further record details to the patient’s private chain. The practitioner will no longer be a participant in the patient’s private chain unless permissioned by the patient.
The practitioner can also be a patient to another doctor/practitioner. Along with all the functions included in the patient-end, the practitioner has two additional functions are:

a. **Write to Record**: The practitioner can write to the patient’s record. All this information will be stored in the private chain of the patient. A doctor can, at a time, be permissioned to multiple patient-accounts depending on the number of patient the doctor can tend to.

b. **Emergency Access**: In case of an emergency situation where the patient is incapacitated or for any other reason the patient is unable to provide view permission to the doctor, the doctor can invoke emergency access to view lifesaving and sensitive information about the permission that will help with the treatment of the patient. When such an access has been invoked, an alert will be sent to the patient’s account which can be viewed by the patient whenever the patient is able to do so. The patient can then further authorize the permission or revoke it. If the access was illegitimate, the doctor’s permission will be revoked by the patient and this can be used as proof for any law-proceedings.

10. **Use Case**

The use-case of this application has two main entities as actors, one is the patient and the other is the doctor. Now, it is to be noted that emergency access, which is a special feature given to the doctor is also included in the list of operations. Out of the seven of the list of operations, five can be accessed by the patient while the doctor has access to all of the seven operations. The operation which can bring a change in the block data once accessed is write to patient’s record operation which can be done only by the doctor. Giving and revoking view or write permissions can affect the network in a way that changes the corresponding doctor’s view of access to the corresponding operations. The Figure 7 represents the Use case diagram.
VI. CONCLUSION

The traditional system for maintaining the records in medical sector is difficult and it requires large space to store the results of medical test for all patients. In previously used systems the data is in unstructured manner and it is difficult to exchange the data. So, for solving the above issues we plan on implementing the given model for managing health records in block chain using Medicare.

The EHR using blockchain is a revolution in the medical industry. It solves most challenges which exist today just in the name of trust in the medical sector. It not only provides a reliable platform for patient data exchange, but also a faster and empowering system. The time and effort expended in managing patient data, can be greatly minimized using EHR with effective and efficient results.

REFERENCE


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Stressful Life Events, Coping, Social Support, Subjective Well-Being and Burnout in Primary Key Caregivers of Patients with Schizophrenia and Bipolar Affective Disorder in Relapse

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Abstract- A primary caregiver is a person who consistently assumes the responsibility for the housing, health or safety of the patient. Caregivers are facing problems such as stress, burden, anxiety, frustration, feeling the pressure of increased dependency and etc. Care activities for schizophrenia and bipolar affective disorder patients affect on the general and mental health of caregivers (Reinhard, 1994). Life stressors are often described as negative events (the death of a loved one, loss of a job, divorce, etc.); however, positive changes in life (marriage, birth, moving, a new job, etc.) Caregiver burnout is a state of physical, emotional and mental exhaustion that can be accompanied by a change in attitude - from positive and caring to negative and unconcerned.

Aim: To assess stressful life events, coping, social support, subjective well-being and burnout in primary key caregivers of patients with schizophrenia and bipolar affective disorder in relapse.

METHODS AND MATERIAL:
Paper was based on a cross sectional among patients in relapse with schizophrenia and bipolar affective disorder in the respective In/Out patients department of Central Institute of Psychiatry, Ranchi, India. Total sample size will consist of 60 respondents, 30 patients with schizophrenia who have relapse and 30 patients with bipolar affective disorder who have relapse. According to the type of data appropriate statistical analyses was done using SPSS version 20.0.

RESULTS: The study sample has two group i.e. 30 primary key care givers of patient with bipolar affective disorder in relapse and 30 primary key care givers of patient with schizophrenia in relapse. The socio demographic profile revealed that there is no significant different found in the terms of age, sex, marital status, religion, education, residence, occupation, family income, family type, total no. of families, family history on both the group of primary key care giver of patient with bipolar affective disorder and schizophrenia in relapse except in duration of stay of primary key care givers of both the group. Life event was noted, were the primary key care givers of schizophrenia in relapse has higher stressful life event than bipolar affective disorder in relapse were as coping and social support were found to be similar in both the group. Subjective well-being and burnout of both the group has found to be similar.

CONCLUSION: Care giving can be a rewarding opportunity for many family caregivers this labor of love can put individuals at risk for substantial stressors, including financial, physical, and psychological hardship. Overall the research suggest that care giving, highlights the interactions between regarding Stress, coping, support, subjective wellbeing and burnout of caregiver health.

Index Terms- Stressful, Life event, coping, social support, subjective well-being, burnout, primary key care givers, Patient, relapse.
I. INTRODUCTION

Several definitions for caregiving and family caregiver have been proposed in literature. The first recorded use of the term “caregiving” was in 1966. Etymology (origin of particular word), the word care comes from the old English term wicim, which means mental suffering, mourning, sorrow, or trouble. Caregiving as the integration of the two origin meanings, is the action/process of helping those who are suffering, caregiving is facilitated by certain characteristic traits, emotions, skills, knowledge, time, and an emotional connection with the care recipient (Hermanns & Mastel-Smith, 2012). Sociologists hardly define caregivers as unpaid workers such as family members, friends, and neighbors as well as individuals associated with religious institutions (Drentea, 2007).

The important aim of care giving is to make the care recipient more independent by restoring his / her most functional state, both physical and psychological (Bridges, 1995). Family caregivers / informal caregivers provide care and assistance to the care recipient without getting paid, for instance, a daughter or a son, a wife or a husband (McConnell & Riggs, 1994; Haley, 2003). Family dynamics are highly affected when it comes to caring for someone with a mental or physical disability, since most of the time and energy of the caregiver is invested in taking care of patients (Vitaliano, Zhang & Scanlan, 2003). Frequently, the family is solicited as soon as the patient is discharged; even though he or she is often still in a fragile state, and the responsibility for medication often falls on the family members, more and more is expected of family caregivers, who have become a pillar in the recovery of the patient alongside formal caregivers (Jungbauer et al., 2003).

In India, as well as in most of the nonwestern world, and to a lesser extent in other parts of the world, families have been the mainstay of care giving for persons with mental illnesses. The family caregivers take care of the day-to-day needs of the patients, monitoring the mental state, identify the early signs of illness, relapse and deterioration, and help the patient in accessing services. The family caregiver also supervises treatment and provides emotional support to the patient.

Reinhard (1994): Caregivers are facing problems such as stress, burden, anxiety, frustration, feeling the pressure of increased dependency and etc. Care activities for schizophrenia and bipolar affective disorder patients affect on the general and mental health of caregivers. Nolan, (2001): Family caregivers can also have positive experiences such as growth in competence, finding inner strength, closer family relationships, etc. These positive caregiving experiences contrast the dominance of the stress-burden model that focuses on the negative aspects of caring. Families are the oldest expression of all human relationships (Brennan, 2004) which are fundamental to our well-being as individuals and as a society, and “is the cradle of generations to come. Hammen, C., Shih, J. H., & Brennan, P. A. (2004).

Kwan (2000) caregivers must fill the gap between deinstitutionalization and the shortage of community resources it is necessary to pay more attention to their burdens and difficulties and to examine effective means of support to, at least, avoid illness due to caregiver stress. It is estimated that 50%–90% of people with chronic psychiatric illness live with their families or friends and informal caregivers provide an important service by reducing the need for formal care and burden upon healthcare systems (Gater et al., 2014). Physical accessibility such as improper transport to the mental health centers, long distance to the facilities, long intervals between visits, and waiting time for the consultations are the main problems (Forouzan et al., 2013). Dore G, Romans SE (2001): Bipolar disorder can have a severe impact on the patient's family and caregivers. During episodes, partners can have significant problems in their relationships with patients, and these difficulties affect caregivers' own employment, legal matters, finances, and social relationships, including parenting. Gallagher SK, Mechanic D (1996): Sharing a household with a person with bipolar disorder affects the physical health of family members, too. When other predictors of health were controlled for, people living with a person with bipolar disorder, regardless of the severity of the condition, reported poorer physical health, more limited activity, and greater health service utilization compared with others.

II. NEED OF THE STUDY:

Caregiving can be a rewarding opportunity for many family caregiver this labor of love can put individuals at risk for substantial stressors, including financial, physical, and psychological hardship. Research indicates that caregivers may put their own health and well-being at risk while assisting loved ones (Burton et al. 1997; Tang and Chen 2002). The strain of caregiving demands has been linked to poor health outcomes including depression, physical illness, anxiety, and poor sleep habits (Schulz et al. 1997). Beach et al. (2000): On the other hand, there is also evidence that suggests that caregiving, if not overly strenuous, can actually be associated with mental health benefits to the caregiver there is an increasing body of research regarding the relationship between caregiving, physical health, and mental health. Although the literature in this area is still emerging, there currently exists significant evidence to support the potential for both positive and negative health effects of key caregiving. The present research is trying to provides
an overview of some of the issues related to the physical and mental health consequences of caregiving, highlights the interactions between regarding stress, coping, support, subjective well-being and burnout of caregiver health. Also identifies methodological challenges in the caregiving literature, and outlines future directions for caregiving research.

III. METHODOLOGY:

AIM

To assess stressful life events, coping, social support, subjective well-being and burnout in primary key caregivers of patients with schizophrenia and bipolar affective disorder experiencing relapse.

OBJECTIVE

✓ To compare stressful life events, coping, social support, subjective well-being and burnout between primary key caregivers of patients with schizophrenia and bipolar affective disorder in relapse.

✓ To assess relationship among stressful life events, coping, social support, subjective well-being and burnout in primary key caregivers of patients with schizophrenia and bipolar affective disorder in relapse.

HYPOTHESES

✓ There will be no significant difference in stressful life events, coping, social support, subjective well-being and burnout in primary key caregivers of patients with schizophrenia and bipolar affective disorder who are relapse.

✓ There will be no significant correlation between stressful life events, coping, social support, subjective well-being and burnout in primary key caregivers of patients with schizophrenia who are relapse.

✓ There will be no significant correlation between stressful life events, coping, social support, subjective well-being and burnout in primary key caregivers of patients with bipolar affective disorder who are relapse.

IV. RESEARCH DESIGN AND METHODOLOGY

Universe of the study: The study was conducted among patients in relapse with schizophrenia and bipolar affective disorder in the respective Inpatient/Out patients department of Central Institute of Psychiatry, Ranchi, India.

Research approach: Quantitative approach.

Research Design: Exploratory in nature

Samples: Primary key caregivers of patient with Bipolar affective disorder and schizophrenia disorder in relapse.

Sample Size: Total sample size was consisting of 60 respondents, 30 patients with schizophrenia disorder who have relapse and 30 patients with bipolar affective disorder who have relapse.

Sampling method: Criteria based purposive sampling
INCLUSION CRITERIA FOR SCHIZOPHRENIA GROUP
- Person diagnosed with Schizophrenia as per ICD-10 Diagnostic criteria for research (WHO 1993).
- At least 5 years of duration of illness.
- Patients who in relapse.
- Age between 18-60 both sexes.

EXCLUSION CRITERIA FOR SCHIZOPHRENIA GROUP
- History of any chronic physical/mental illness other than schizophrenia and bipolar disorder, organic brain syndromes, and substance abuse/dependence, personality disorder.
- Age below 18 or above 60.
- Un-cooperative patients.

INCLUSION CRITERIA FOR KEY CAREGIVERS OF SCHIZOPHRENIA PATIENTS
- Who are living with the patients for at least two years.

EXCLUSION CRITERIA FOR KEY CAREGIVERS OF SCHIZOPHRENIA PATIENTS
- History of any chronic physical/mental illness, organic brain syndromes and substance abuse/dependence.

INCLUSION CRITERIA FOR BIPOLAR AFFECTIVE DISORDER GROUP
- Person diagnosed with bipolar affective disorder as per ICD-10 Diagnostic criteria for research (WHO 1993).
- At least 5 years of duration of illness.
- Patients in relapse.
- Age between 18-60 both sexes.
- Co-operative patients.

EXCLUSION CRITERIA FOR BIPOLAR AFFECTIVE DISORDER GROUP
- History of any chronic physical illness, mental illness other than schizophrenia and Bipolar disorder, organic brain syndromes, substance abuse/dependence, personality disorder.
- Un-cooperative patients.

INCLUSION CRITERIA FOR KEY CAREGIVERS OF BIPOLAR AFFECTIVE DISORDER PATIENTS
- Who are living with the patients for at least two years.

EXCLUSION CRITERIA FOR CAREGIVERS OF BIPOLAR AFFECTIVE DISORDER PATIENTS
- History of any chronic physical/mental illness, organic brain syndromes and substance abuse/dependence.

DESCRIPTION OF THE TOOLS:
1. Socio-demographic and clinical data sheet:
   A socio-demographic and clinical data sheet will specially designed for the present study to record the demographic variables and clinical variables such as age, sex, age education, religions and miles.

   The PANSS, developed by SR Kay et al. is a 30-item rating scale that is specifically developed to assess individuals with schizophrenia and is used widely in research settings. The PANSS is an adaptation from earlier psychopathology scales, including the Brief Psychiatric Rating Scale (BPRS). Although the items of the BPRS are embedded in the PANSS, they do not fully correspond to all BPRS items. The PANSS consists of a semi structured clinical interview and any available supporting clinical information, such as family members or hospital staff report. There are 30 items which rate along a seven point continuum (1 = absent, 7 = extreme). The assessment provides separate scores in nine clinical domains including a positive syndrome, depression, a composite index, and general psychopathology. Ratings are generally based upon information relating to the past week the reliabilities is 0.80.

3. Young mania rating scale (YMRS- x, et al., 1978):
   Developed by RC Young et al, is probably the most frequently utilized rating scale to assess the manic symptoms. This scale has 11 items and based on the patient’s subjective report of his & her clinical condition over the previous period of 48 hours. There are four items that are graded one to 8 scale (irritability, speech Thought content,
and disruptive aggressive behavior) while the remaining. Seven items are scored on 0-4 grade. The strength of YMRS is its brevity, widely accepted and eases of administration. Reliability and validity independent clinicians on both the total score (0.93) and the individual item scores (0.66 to 0.92).

4. Hamilton Depression Rating Scale (x, 1960)

Since its development in 1960 by Dr. Max. Hamilton of the University of Leeds, England, the scale has been widely used in clinical practice and become a standard in pharmaceutical trials. HAM-D is a 17-21 item observer-rated scale to assess presence and severity of depressive states in patients diagnosed with depression. 9 items are scored 0-4, where as the further 8 are scored 0-2, as these represent variables which do not lend themselves to quantitative rating (0= absent; 1= doubtful or slight; 2= mild; 3= moderate; 4= severe; 0= absent; 1= doubtful or slight; 2= clearly resent). Items 17-21 are not regarded as measuring the intensity of depression and are commonly omitted. A score of 11 is generally regarded as indicative of a diagnosis of depression. A score of >14 is considered to be a reliable indicator of moderate to severe depression. Retest reliability for the Hamilton depression scale ranged from 0.81 to 0.98.

5. Life event scale (The University of Texas. x, et.al 1967):

Life event scale (The University of Texas at El Paso) is adapted from Holmes, T.H. and Rabe, R.H. "The Social Readjustment Rating Scale," Journal of Psychosomatic Research 11, 213-218, 1967. It's a 43-item questionnaire containing a wide range of stressful life events and incidents in normal life. The score results will be like 0-150 Low stress, 151-300 Moderate stress, 301+ High or extreme stress.

6. Ways of coping (Revised) (x, & y, 1985):

The Ways of Coping (Revised) is a 66-item questionnaire containing a wide range of thoughts and acts that people use to deal with the internal and/or external demands of specific stressful encounters. Usually the encounter is described by the subject in an interview or in a brief written description saying who was involved, where it took place and what happened. Sometimes a particular encounter, such as a medical treatment or an academic examination, is selected by the investigator as the focus of the questionnaire. Reliability across subscale scores ranged from .60 to .75 with Positive Reappraisal showing the least variability and Self-Controlling showing the most.


The SOFS is a new scale that differs from the Global Assessment of Functioning (GAF) scale in that it focuses exclusively on the individual’s level of social and occupational functioning and is not directly influenced by the overall severity of the individual’s psychological symptoms. Also in contrast to the GAF scale, any impairment in social and occupational functioning that is due to general medical conditions is considered in making the SOFS rating. The SOFS is usually used to rate functioning for the current period (i.e. the level of functioning at the time of the evaluation). The SOFS may also use to rate functioning for other time periods. For example, for some purpose it may be useful to evaluate functioning for the past year. Reliability of individual items ranged from 0.73 to 0.96.

8. Maslach Burnout Inventory (x and y, 1981):

Maslach and Jackson (1981) developed this scale. The MBI is a widely used self rating scale for measuring hypothetical aspects of burnout syndrome. It consists of 21 items with a seven-point rating scale representing three aspects (emotional exhaustion, depersonalization and personal accomplishment). For the emotional exhaustion and depersonalization subscales, high mean score reflect high levels of burnout whereas low scale on the personal accomplishment subscale reflect high levels of burnout. This scale has one more subscale i.e. Involvement which will not be used in the study. Reliability MBI subscales 0.50 to 0.82.


(Multidimensional Scale of Perceived Social Support MSPSS) (Zimet et al, 1988): The Multidimensional Scale of perceived social support is a 12-item, unidimensional tool to measure how one perceive social support system, including an individual’s source of social support (i.e., family, friends & significant others). Scoring would be 1= very strongly to 7= very strongly disagree including 4= neutral, 2= strongly disagree, 3= mild disagree and 5= mildly agree, 6= strongly agree. The scale measure subjective perceived social support. The score is at total level as well it is on the basis of domains. The total score range 69-84 indicates high acuity, 49-68 moderate acuity and 12-48 low acuity. Reliability (with a Cronbach’s alpha of 0.81 to 0.98 in non-clinical samples, and 0.92 to 0.94 in clinical samples).

10. Subjective well-being scale (Sell, H. and Nagpal, R., 1992):

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www.ijsrp.org
The 40-item subjective well-being inventory (Sell.H and Nagpal.R.1992), is an inventory that has eleven dimensions. The scoring is done according to the scoring key provided in the manual. The items are grouped under the dimensions to which they belong and total score of each dimension is calculated. Nineteen of the items elicit positive affect (i.e., whether one feels happy, good, or satisfied about particular life concerns). Twenty-one items elicit negative affect (i.e., unhappiness, worry, or regret about particular life concerns. The inventory had been standardized with an adult population. The total sum of the 40 items give the overall subjective well-being score. The SUBI is scored by attributing the values 3, 2 and 1 to response categories of positive items and 1, 2 and 3 to the negative items. Thus range of scores is 40 (minimum) to 120 (maximum). The factor analyses over the different samples in different languages, and from different parts of India showed not only an extra ordinary degree of stability incontent of factors, but also stability over time of 18 months when re-tested (Sell.H and Nagpal.R.1992). This scale has high inter-rater reliability, inter-scores reliability, and test-retest reliability. The scale has been found to be highly significant and satisfactory invalidity. Patil, M.S. and Halyal, P.S (1999) have reported that the test retest reliability of the SUBI inventory is 0.79 and the validity is 0.86.

PROCEDURE:

The study was conducted on Central Institute of Psychiatry, Kanke, Ranchi, Jharkhand. The study group was primary key care giver of patient with bipolar affective disorder and schizophrenia in relapse. The data collection was taken up according to the inclusion and exclusion criteria for the study. The sample was collected from In/Out patient department of Central Institute of psychiatry. Before collection of sample the procedure was explained by researcher to primary key care givers about the study, clinical data sheet, written consent and asked about their doubt and clarified was done according to their quarries. Informed consent was taken from the patient and primary key caregivers. The primary key caregivers who stayed with patient for two (2) years was taken for study for both the group and the patient who had relapse and duration illness of five years was taken for the study. The socio-demographic and clinical data sheet was applied on both group of primary key care giver of patient with bipolar affective disorder and schizophrenia in relapse. The clinical variables such as Young Mania Rating Scale (YMRS), Hamilton Depression Rating Scale (HAM-D) was applied on patient with bipolar affective disorder in relapse and Positive and Negative Syndrome Scale (PANSS) was applied on schizophrenia patient. Clinical variables of Social occupational functioning scale (SOFS) were applied on both the group of patient. The clinical variables of primary key care giver of patient with bipolar affective disorder and schizophrenia in relapse were administered same on both groups such as: Life event scale, ways of coping, subjective well-being, multidimensional perceived social support and burnout scale. The researcher collected sixty (60) Samples from both group was collected were 30-30 has been divided. Accordingly the data collection was started to fulfill the study purpose.

STATISTICS

1. The standard statistical method was used to analyzed data using Statistical Package For Social Science (SPSS) version 20.0.
2. Descriptive statistics (percentage, mean and standard deviation) were used to describe various sample characteristics.
3. Chi-square test was used for describing and comparing categorical data.
4. “t” test was used for group comparison on continuation data.
5. Pearson r was used for correlation analysis.
V. RESULT:

SOCIO-DEMOGRAPHICS

Table-1: Socio-demographics details of bipolar affective disorder and schizophrenia in relapse (Discrete Variables)

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>GROUP</th>
<th>N=60</th>
<th>BPAD n=30(%)</th>
<th>SCHZD n=30(%)</th>
<th>£²</th>
<th>Df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>Male</td>
<td>18(51.4%)</td>
<td>17(48.6%)</td>
<td></td>
<td>.069</td>
<td>1</td>
<td>.793</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>12(48.0%)</td>
<td>13(52.0%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td>Married</td>
<td>18(47.2%)</td>
<td>21(53.8%)</td>
<td></td>
<td>4.649</td>
<td>2</td>
<td>.098</td>
</tr>
<tr>
<td></td>
<td>Unmarried</td>
<td>4(36.4%)</td>
<td>7(63.6%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Single</td>
<td>8(80.0%)</td>
<td>2(20.0%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Religion</td>
<td>Hindu</td>
<td>24(50.0%)</td>
<td>24(50.0%)</td>
<td></td>
<td>2.400</td>
<td>2</td>
<td>.301</td>
</tr>
<tr>
<td></td>
<td>Muslim</td>
<td>4(40.0%)</td>
<td>6(60.0%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Christian</td>
<td>2(100.0%)</td>
<td>0(0.0%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>Illiterate</td>
<td>0(0.0%)</td>
<td>2(100.0%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Primary</td>
<td>7(46.7%)</td>
<td>8(53.3%)</td>
<td></td>
<td>3.741</td>
<td>5</td>
<td>.587</td>
</tr>
<tr>
<td></td>
<td>Secondary</td>
<td>9(56.2%)</td>
<td>7(43.9%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Matriculation</td>
<td>6(54.5%)</td>
<td>5(45.5%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Intermediate</td>
<td>3(75.0%)</td>
<td>1(25.0%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>5(41.7%)</td>
<td>7(58.3%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residence</td>
<td>Rural</td>
<td>22(48.9%)</td>
<td>23(51.1%)</td>
<td></td>
<td>.099</td>
<td>2</td>
<td>.952</td>
</tr>
<tr>
<td></td>
<td>Urban</td>
<td>7(53.8%)</td>
<td>6(46.2%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sub-Urban</td>
<td>1(50.0%)</td>
<td>1(50.0%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occupation</td>
<td>Nil</td>
<td>1(50.0%)</td>
<td>1(50.0%)</td>
<td></td>
<td>1.902</td>
<td>4</td>
<td>.754</td>
</tr>
<tr>
<td></td>
<td>Student</td>
<td>4(66.7%)</td>
<td>2(33.3%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>House wife</td>
<td>9(42.9%)</td>
<td>12(57.2%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Labour</td>
<td>5(41.7%)</td>
<td>7(58.3%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>11(57.9%)</td>
<td>8(42.1%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family Type</td>
<td>Nuclear</td>
<td>15(57.7%)</td>
<td>11(42.3%)</td>
<td></td>
<td>1.126</td>
<td>2</td>
<td>.570</td>
</tr>
<tr>
<td></td>
<td>Extended</td>
<td>13(44.8%)</td>
<td>16(55.2%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Joint</td>
<td>2(40.0%)</td>
<td>3(60.0%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical Group</td>
<td>Present</td>
<td>12(57.1%)</td>
<td>9(42.9%)</td>
<td></td>
<td>.659</td>
<td>1</td>
<td>.589</td>
</tr>
<tr>
<td></td>
<td>Absent</td>
<td>18(46.2%)</td>
<td>21(53.8%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychiatric group</td>
<td>Present</td>
<td>10(62.5%)</td>
<td>6(37.5%)</td>
<td></td>
<td>1.364</td>
<td>1</td>
<td>.382</td>
</tr>
<tr>
<td></td>
<td>Absent</td>
<td>20(45.5%)</td>
<td>24(54.5%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The table 1 shows the Socio-demographics details of Bipolar affective disorder and schizophrenia in relapse. The variables are consisting of sex, which shows Male (51.4%) along with female (48.0%) in bipolar affective disorder in relapse. The variables is consisting of sex : Male (48.6%) and female (52.0%) in schizophrenia in relapse. The variables on marital status in bipolar affective disorder in relapse in married is (47.2%), unmarried is (36.4%) and single is (80.0%). The variables on marital status in schizophrenia in relapse in married is (52.0%), unmarried is (63.6%), single is (20.0%). The variables on religion Hindu in bipolar affective disorder in relapse is (50.0%), Muslim (40.0%), Christian (100.0%). The variables on religion Hindu in schizophrenia in relapse is (50.0%), Muslim(60.0%), Christian (0.0%). Education shows in bipolar affective disorder in relapse in illiterate (0.0%), Primary (46.7%), Secondary(56.2%), Matriculation (54.5%), Intermediate (75.0%) and other (41.7%). Education shows in schizophrenia in relapse in illiterate ((100.0%), Primary (53.3%), Secondary (43.9%), Matriculation (45.5%), Intermediate (25.0%), and other (58.3%). Residence shows in bipolar affective disorder in relapse in rural is (48.9%), urban (53.8%), sub-urban (50.0%). Residence shows in schizophrenia in relapse in rural (51.1%), urban (46.2%) and sub-urban (50.0%). Occupation in bipolar affective disorder in relapse in Nil (50.0%), Student (66.7%), House wife (42.9%), Labour (41.7%), Other (57.9%). Occupation shows in schizophrenia in relapse in Nil (50.0%), Student (33.3%), House wife (57.2%), Labour (58.3%), Other (42.1%). Family Type in bipolar affective disorder in relapse is Nuclear (57.7%), Extended (44.8%), Joint (40.0%). Family Type in schizophrenia in relapse Nuclear (42.3%),
Extended (55.2%) and joint (60.0%). Medical group in bipolar affective disorder in relapse Present (57.1%), Absent (46.2%). Medical group in schizophrenia in relapse Present (42.9%), Absent (53.8%). Psychiatric group in bipolar affective disorder in relapse in Present (62.5%) and absent (45.5%). Psychiatric group in schizophrenia in relapse in Present (37.5%), Absent (54.5%). There is no significant differences found on both the group.
Table-02: Socio-demographics details of bipolar affective disorder and schizophrenia in relapse (continuous variables)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Group</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BPAD M±SD (n=30)</td>
<td>SCHZD M±SD (n=30)</td>
<td>(df=58)</td>
</tr>
<tr>
<td>Age</td>
<td>36.90±8.92</td>
<td>33.73±7.84</td>
<td>1.460</td>
</tr>
<tr>
<td>Family Income</td>
<td>12383±9611.1</td>
<td>23178.5±57295.2</td>
<td>-1.017</td>
</tr>
<tr>
<td>Duration of stay (caregivers years)</td>
<td>22.83±9.21</td>
<td>18.83±7.87</td>
<td>1.807</td>
</tr>
<tr>
<td>Total no. of families</td>
<td>5.86±2.40</td>
<td>6.30±2.10</td>
<td>-743</td>
</tr>
</tbody>
</table>

The table 2 shows socio-demographic variables in continuous variables. The mean score of age in bipolar affective disorder in relapse is (36.90±8.92) and mean score of age in schizophrenia in relapse is (33.73±7.84). The mean score of family income of bipolar affective disorder in relapse is (12383±9611.1) and mean score of family income in schizophrenia in relapse is (23178.5±57295.2). The mean score of duration of stay of key care givers of patient with bipolar affective disorder in relapse is (22.83±9.21) and the mean score of duration of stay of key care givers with patient with schizophrenia in relapse is (18.83±7.87). The mean score of total no. of family members with bipolar affective disorder in relapse is (5.86±2.40) and mean score of total no. of family members with schizophrenia in relapse is (6.30±2.10). There is no statistically significant found between the two groups.

CLINICAL CHARACTERISTICS

Table-3: Clinical characteristics of patient with Bipolar affective disorder in relapse

<table>
<thead>
<tr>
<th>Variables</th>
<th>BPAD (n=30) Mean±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Young mania rating scale</td>
<td>40.46±7.381</td>
</tr>
<tr>
<td>Hamilton rating scale</td>
<td>69.50±10.60</td>
</tr>
</tbody>
</table>

Table 3 shows the mean score of young mania rating scale of bipolar affective disorder in relapse is (40.46±7.381). The mean score of Hamilton rating scale is (69.50±10.60)

Table-4: Clinical characteristics of patient with schizophrenia in relapse

<table>
<thead>
<tr>
<th>Variables</th>
<th>SCHZD (n=30) Mean±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive syndrome(PANSS)</td>
<td>38.66±15.91</td>
</tr>
<tr>
<td>Negative syndrome(PANSS)</td>
<td>37.93±22.05</td>
</tr>
<tr>
<td>General psychopathology(PANSS)</td>
<td>72.06±22.05</td>
</tr>
</tbody>
</table>

Table 4 shows the mean score of Positive syndromes in PANSS of patient with schizophrenia in relapse is (38.66±15.91) and the mean score of Negative syndromes is (37.93±22.05). The mean score of general psychopathology score is (72.06±22.05)

Table-5: Comparison on Socio occupational functioning of patient with bipolar affective disorder and schizophrenia in relapse

<table>
<thead>
<tr>
<th>Variables</th>
<th>Group</th>
<th>t</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BPAD (N=30) Mean ± SD</td>
<td>SCHZD (N=30) Mean ± SD</td>
<td>(df=38)</td>
</tr>
<tr>
<td>Socio-Occupational Functioning Scale (Patient)</td>
<td>45.53±8.480</td>
<td>51.16±7.09</td>
<td>-2.799</td>
</tr>
</tbody>
</table>

Table 5 shows comparison on clinical characteristics of patient with bipolar affective disorder and schizophrenia in relapse on socio-occupational functioning. The mean score of bipolar affective disorder in relapse (45.53±8.480) and schizophrenia in relapse mean score is (51.16±7.09).
Table 6: Comparison of Ways of coping between Primary key care givers of patient with Bipolar affective disorder and Schizophrenia in relapse

<table>
<thead>
<tr>
<th>Variables</th>
<th>BPAD M±SD</th>
<th>SCHZD M±SD</th>
<th>t (df=58)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confrontive coping</td>
<td>11.10±2.29</td>
<td>10.53±1.47</td>
<td>1.137</td>
<td>.260</td>
</tr>
<tr>
<td>Distancing</td>
<td>10.60±61.79</td>
<td>10.86±1.69</td>
<td>-592</td>
<td>.556</td>
</tr>
<tr>
<td>Self-Control</td>
<td>10.86±1.88</td>
<td>10.16±2.21</td>
<td>1.317</td>
<td>.193</td>
</tr>
<tr>
<td>Seeking social support</td>
<td>10.63±2.20</td>
<td>10.20±2.36</td>
<td>.733</td>
<td>.466</td>
</tr>
<tr>
<td>Accepting responsibility</td>
<td>7.16±1.34</td>
<td>6.73±1.46</td>
<td>1.197</td>
<td>.236</td>
</tr>
<tr>
<td>Escape avoidance</td>
<td>15.03±2.73</td>
<td>14.53±1.87</td>
<td>.826</td>
<td>.412</td>
</tr>
<tr>
<td>Planful problem</td>
<td>10.26±2.54</td>
<td>10.56±2.90</td>
<td>-425</td>
<td>.672</td>
</tr>
<tr>
<td>Positive reappraisal</td>
<td>13.03±2.45</td>
<td>12.96±2.44</td>
<td>.105</td>
<td>.916</td>
</tr>
</tbody>
</table>

Table 6 shows comparison of both the group of primary key care givers in ways of Coping. In Bipolar affective disorder Group the mean of variables in confrontive coping is (11.10) and schizophrenia is (10.53), same as the mean distribution of variables in distancing coping is (10.60) and schizophrenia is (10.86). Self control coping (10.86) in Bipolar affective disorder and (10.16) in schizophrenia, were as in seeking social support (10.63) in Bipolar affective disorder and (10.20) in schizophrenia. Mean distribution of variables in accepting responsibility in Bipolar affective disorder is (7.16) and (6.73) in schizophrenia. Mean distribution of variables escape avoidance is (15.03) and (14.53) in schizophrenia. Mean distribution of variables in planful problem solving in Bipolar affective disorder is (10.26) and (10.56) in schizophrenia. Mean distribution of variables in positive reappraisal in Bipolar affective disorder is (13.03) and (12.96) in schizophrenia. There was no significant difference found between both the groups in various variables in ways of coping.
Table-7: Comparison on burnout on primary key care givers of patient with Bipolar affective disorder and Schizophrenia in relapse

<table>
<thead>
<tr>
<th>Variables</th>
<th>Group</th>
<th>BPAD M±SD (n=30)</th>
<th>SCHZD M±SD (n=30)</th>
<th>t (df=58)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emotional Exhaustion</td>
<td></td>
<td>10.63±2.65</td>
<td>10.26±2.44</td>
<td>.556</td>
<td>.581</td>
</tr>
<tr>
<td>Personal accomplishment</td>
<td></td>
<td>9.13±2.02</td>
<td>9.83±3.37</td>
<td>-.974</td>
<td>.334</td>
</tr>
<tr>
<td>Depersonalization</td>
<td></td>
<td>10.16±2.36</td>
<td>10.16±2.80</td>
<td>.000</td>
<td>1.000</td>
</tr>
</tbody>
</table>

Table 7 shows the comparison of burnout of primary key care givers of patient with bipolar affective disorder and schizophrenia in relapse which consist of 3 domains. High score in each domain indicates more level of burnout functioning in each particular dimension. The mean score variables on emotional exhaustion is (10.63) in bipolar affective disorder and (10.26) in schizophrenia. The mean score variable on personal accomplishment is (9.13) bipolar affective disorder and (9.83) in schizophrenia. There was no significant difference found in both the group in two variables, while the two variables have similar burnout. There is significant difference found on the variables of depersonalization.

Table-8: Comparison on Life event of primary key care givers of patient with Bipolar affective disorder and schizophrenia in relapse

<table>
<thead>
<tr>
<th>Variables</th>
<th>Group</th>
<th>BPAD M±SD (n=30)</th>
<th>SCHZD M±SD (n=30)</th>
<th>t (df=58)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life event</td>
<td></td>
<td>1345.76±101.65</td>
<td>2533.56±3303</td>
<td>1.969</td>
<td>.050*</td>
</tr>
</tbody>
</table>

*P value significant at < 0.05 level

Table 8 shows the Comparison on Life event of primary key care givers of patient with Bipolar affective disorder and schizophrenia in relapse. The mean score of primary key care givers of patient with Bipolar affective in relapse is (1345.76±101.65) and the mean score of primary key care givers of patient with schizophrenia in relapse (2533.56±3303). There is statistically significant found on both the of primary key care givers (.050*) at 0.05 level of significance, which reveals primary key care givers of both group had stressful life event.

Table-9: Comparison on Perceived social support of primary key care givers of patient with Bipolar affective disorder and schizophrenia in relapse

<table>
<thead>
<tr>
<th>Variables</th>
<th>Group</th>
<th>BPAD M±SD (n=30)</th>
<th>SCHZD M±SD (n=30)</th>
<th>t (df=58)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived social support</td>
<td></td>
<td>46.33±782</td>
<td>48.60±7.71</td>
<td>-1.130</td>
<td>.263</td>
</tr>
</tbody>
</table>

Table 9 shows perceived social support of primary key care givers of patient with bipolar affective disorder and schizophrenia in relapse. The mean variables of perceived social support in bipolar affective disorder is (46.33) and (48.60) in schizophrenia. It indicates there is no significant difference found in both the groups.

Table-10: Comparison on Subjective well-being of primary key care givers of patient with bipolar affective disorder and schizophrenia in relapse

<table>
<thead>
<tr>
<th>Variables</th>
<th>Group</th>
<th>BPAD M±SD (n=30)</th>
<th>SCHZD M±SD (n=30)</th>
<th>t (df=58)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>General well-being (positive affect)</td>
<td></td>
<td>6.63±1.77</td>
<td>6.33±1.42</td>
<td>.723</td>
<td>.472</td>
</tr>
<tr>
<td>Expectation</td>
<td></td>
<td>7.00±1.57</td>
<td>6.76±1.61</td>
<td>.567</td>
<td>.572</td>
</tr>
<tr>
<td>Confidence</td>
<td></td>
<td>7.16±1.23</td>
<td>7.10±1.42</td>
<td>.194</td>
<td>.847</td>
</tr>
<tr>
<td>Transcendence</td>
<td></td>
<td>6.83±1.51</td>
<td>6.93±1.91</td>
<td>-225</td>
<td>.823</td>
</tr>
<tr>
<td>Family support group</td>
<td></td>
<td>6.13±1.77</td>
<td>5.93±1.61</td>
<td>.456</td>
<td>.650</td>
</tr>
</tbody>
</table>

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The table 10 shows the subjective well-being of primary key care givers of patient with bipolar affective disorder and in relapse. The mean variables of subjective well-being of primary key care givers of patient with bipolar affective disorder in relapse in general well-being is (6.63±1.77) and primary key care givers of patient with schizophrenia is (6.33±1.42). Primary key care givers of patient with bipolar affective disorder in expectation achievement is (7.00±1.57) and primary key care givers of patient with schizophrenia is (6.76±1.61). Confidence in coping in primary key care givers of patient with bipolar affective disorder is (7.16±1.23) and schizophrenia is (7.10±1.42). Transcendence in bipolar affective disorder is (6.83±1.51) and schizophrenia is (6.93±1.91). Family group support of primary key care givers of patient with bipolar affective disorder is (6.13±1.77) and schizophrenia is (5.93±1.61). Social support of primary key care givers of patient with bipolar affective disorder is (8.80±2.41) and schizophrenia is (7.86±2.20).

Primary group concern of primary key care givers of patient with bipolar affective disorder is (14.66±3.00), and schizophrenia is (14.53±4.09). Percieved health support of primary key care givers of patient with bipolar affective disorder is (11.86±2.43) and schizophrenia is (12.53±3.10). Deficiency in social contacts of primary key care givers of patient with bipolar affective disorder is (7.10±1.49) and schizophrenia is (7.06±1.68). General well being (negative affect) is (6.43±1.63) and schizophrenia is (6.73±2.59). There are no significant differences found between the groups.
Table-11: Correlation of socio-demographics & clinical Variables with Ways of coping of primary key care givers of patient with in bipolar affective disorder in relapse

<table>
<thead>
<tr>
<th>Variables</th>
<th>Confrontive (WC)</th>
<th>Distancing (WC)</th>
<th>Self control (WC)</th>
<th>Seeking Social support (WC)</th>
<th>Accepting Responsibility (WC)</th>
<th>Escape Avoidance (WC)</th>
<th>Planful Problem solving(WC)</th>
<th>Positive Reappraisal (WC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>r</td>
<td>-.294</td>
<td>.271</td>
<td>.194</td>
<td>.173</td>
<td>.304</td>
<td>.423*</td>
<td>.264</td>
<td>.371*</td>
</tr>
<tr>
<td>p</td>
<td>.115</td>
<td>.147</td>
<td>.305</td>
<td>.360</td>
<td>.102</td>
<td>.020</td>
<td>.159</td>
<td>.043</td>
</tr>
<tr>
<td>Family Income</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>r</td>
<td>-.095</td>
<td>.004</td>
<td>.217</td>
<td>.178</td>
<td>.099</td>
<td>-.095</td>
<td>.030</td>
<td>.025</td>
</tr>
<tr>
<td>p</td>
<td>.618</td>
<td>.982</td>
<td>.250</td>
<td>.347</td>
<td>.602</td>
<td>.618</td>
<td>.877</td>
<td>.896</td>
</tr>
<tr>
<td>Duration stay of caregiver</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>r</td>
<td>-.073</td>
<td>-.470**</td>
<td>-.081</td>
<td>-.149</td>
<td>-.134</td>
<td>.047</td>
<td>-.026</td>
<td>-.091</td>
</tr>
<tr>
<td>p</td>
<td>.703</td>
<td>.009</td>
<td>.672</td>
<td>.432</td>
<td>.479</td>
<td>.806</td>
<td>.892</td>
<td>.632</td>
</tr>
<tr>
<td>Total no. of family member</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>r</td>
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</table>

WC=Ways of coping
YMRS=Young mania rating scale
HAM-D=Hamilton depression rating scale
SOFAS= Social occupational functioning scale
**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).
The table 11 shows the correlation of socio-demographic variables and ways of coping of primary key care givers of patient with bipolar affective disorder in relapse. Results have shown a significantly positive correlation of age with escape avoidance ($r=0.423^*$) and Positive Reappraisal ($r=0.371^*$) at 0.05 level of significance. Negative correlation have shown in duration of stay with distancing ($r=-0.470^{**}$) at 0.01 level of significance. Results have again shown a significantly negative correlation of Hamilton depression rating scale with Confrontive (-1.000**) and Escape Avoidance (-1.000**) at 0.01 level of significance. Positive correlation of Hamilton depression rating scale with Self control (1.000**) and Planful Problem solving (1.000**) at 0.01 level of significance.

Table 12: Correlation of socio-demographics & clinical variables with Burnout, stressful life events, perceived social support and subjective well being with primary key care givers of patient with bipolar affective disorder in relapse

<table>
<thead>
<tr>
<th>Age</th>
<th>Burnout 1</th>
<th>Burnout 2</th>
<th>Burnout 3</th>
<th>LE</th>
<th>PSS</th>
<th>SWB</th>
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<td>-.101</td>
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</tr>
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</tr>
<tr>
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<td>1.000**</td>
<td>1.000**</td>
<td>-1.000**</td>
<td>-1.000**</td>
<td>-1.000**</td>
</tr>
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</table>

WC=Ways of coping
YMRS=Young mania rating scale
HAM-D=Hamilton
SOFAS= Social occupational functioning scale
B1=Emotional exhaustion
B2=Personal Accomplishment
B3=Depersonalization
LE=Life event
PSS=Perceived Social support
SWB=Subjective well-being

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Table 12 shows the correlation of socio-demographics and clinical variables of primary key care givers of patient with bipolar affective disorder in relapse. The table shows the result of significantly positive correlation of age with emotional exhaustion (B1) at 0.05 level of significance. The result have shown significantly negative correlation of duration stay of caregiver with emotional exhaustion (B1), ($r=0.405^*$) at 0.05 level of significance. Young mania rating scale have significantly positive correlation with perceived social support ($r=0.477^*$) at 0.05 level of significance. The result again shows the significant negative correlation of Hamilton depression rating scale with emotional exhaustion (B1), ($r=1.000^{**}$), life event ($r=-1.000^{**}$), perceived social support ($r=-1.000^{**}$) and subjective well-being ($r=-1.000^{**}$) at 0.01 level of significance. The significant positive correlation have shown on Hamilton depression rating scale with Personal Accomplishment (B2), (1.000**) and Depersonalization (B3), (1.000**) at 0.01 level of significance. The significant positive correlation of social occupational functioning is shown with perceived social support (.369*) at 0.05 level of significance.
Table-13: Correlation of socio-demographics & clinical variables with Ways of coping of primary key care givers of patient with schizophrenia in relapse

<table>
<thead>
<tr>
<th></th>
<th>Confrontive WC</th>
<th>Distancing WC</th>
<th>Self control WC</th>
<th>Seeking Social support WC</th>
<th>Accepting Responsibility WC</th>
<th>Escape Avoidance WC</th>
<th>Planful Problem solving WC</th>
<th>Positive Reappraisal WC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
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<td>.142</td>
<td>.320</td>
<td>-.003</td>
<td>.057</td>
<td>.102</td>
<td>.005</td>
<td>.115</td>
</tr>
<tr>
<td></td>
<td>P: .966</td>
<td>.453</td>
<td>.084</td>
<td>.989</td>
<td>.766</td>
<td>.593</td>
<td>.978</td>
<td>.546</td>
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<td>-.375*</td>
<td>.443*</td>
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<tr>
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<td>P: .396</td>
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<td>.018</td>
</tr>
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<td>-.088</td>
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<td>-.297</td>
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</tr>
<tr>
<td></td>
<td>P: .622</td>
<td>.365</td>
<td>.643</td>
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<td>.925</td>
<td>.742</td>
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<td>.525</td>
</tr>
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<td>.083</td>
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<td>-.203</td>
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<td>.866</td>
<td>.984</td>
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<td>-.069</td>
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</table>

WC=Ways of coping
PS=Positive syndrome
NS=Negative syndrome
GS=General psychopathology
SOFS=Social occupational functioning scale

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).
Table 13 shows the correlation of socio-demographics and ways of coping of primary key care givers of Patient with schizophrenia in relapse. Significantly negative correlation have shown on family income with Self-control (r=-.377*), Planful Problem solving (r=-.375*) at 0.05 level of significance and family income is positive correlation with Positive Reappraisal (.443*) at 0.05 level of significance. The total no. of family members have negatively significance with Positive Reappraisal (.443*) at 0.05 level of significance.

Table-14: Correlation of socio-demographics & clinical characteristic with Burnout, stressful life events, perceived social support and subjective well-being with primary key care givers of patient with schizophrenia in relapse

<table>
<thead>
<tr>
<th></th>
<th>Burnout 1</th>
<th>Burnout 2</th>
<th>Burnout3</th>
<th>LE</th>
<th>PSS</th>
<th>SWB</th>
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<tr>
<td></td>
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<td>.107</td>
<td>.138</td>
<td>.740</td>
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<tr>
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<td>.461*</td>
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<td>-.157</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>Duration stay of caregiver</td>
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<td>.062</td>
<td>-.044</td>
<td>.365*</td>
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</tr>
<tr>
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<td>.816</td>
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<td>p .955</td>
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<td>.464</td>
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<td>.261</td>
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<tr>
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<td>.840</td>
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<td>NS</td>
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<td>r -.177</td>
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<td>.072</td>
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<td></td>
<td>p .349</td>
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</tr>
<tr>
<td>GP</td>
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<tr>
<td></td>
<td>PS=Positive syndrome</td>
<td>LE=Life event</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>NS=Negative syndrome</td>
<td>PSS=Perceived Social support</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>GS=General psychopathology</td>
<td>SWB=Subjective well-being</td>
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</tr>
</tbody>
</table>

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

Table 14 shows the correlation of socio-demographics and clinical variables of primary key care givers of patient with schizophrenia in relapse. Results have shown a significantly positive correlation of family income with emotional exhaustion (B1) ,r=.403* and personal accomplishment (B2),r=.461* at 0.05 level of significance. Family income is negatively significance with subjective well being ,r=-.662**) at 0.01 level of significance. Also the result have shown significantly positive correlation of duration of stay of primary key caregivers with perceived social support is ,r=.365* at 0.05 level of significance. The positive syndrome (PANSS) is significantly positive correlation with personal accomplishment (B=2) ,r=.435*) at 0.05 level of significance. The negative syndrome (PANSS) is significantly shown negative correlation with perceived social support ,r=-.366**) at 0.01 level of significance. As general psychopathology has shown negative correlation with perceived social support ,r=-.385*) at 0.05 level of significance.

VI. DISCUSSION

GENERAL CONSIDERATIONS

The present study was conducted to assess stressful life events, coping, social support, subjective well-being and burnout in primary key care givers of patients with schizophrenia and bipolar affective disorders in relapse, as compared within key care givers. Based on findings from literature and behavioral perception in general, it was hypothesized that there would be no difference in both groups. Generally, we expected to observe a relation in the stressful life events, coping, social support, subjective well-being and burnout in primary key care givers of patients with schizophrenia and bipolar affective disorders in relapse. So, it was hypothesized that there will be no significant correlation between selected variables.
For the study sixty primary key care givers with inpatient/outpatient department from Central Institute of Psychiatry Ranchi, Jharkhand who fulfilled the inclusion & exclusion criteria were taken up for the study. All participants were explained about the aims, objective and purpose of the study to take their consent. They were also informed about the confidentiality of the information provided and given opportunity to participate or refuse to participate. Following this the questionnaires/scales were administered.

VII. METHODOLOGICAL CONSIDERATION

DESCRIPTION OF THE SCALES

Positive and negative syndrome scale (PANSS) (x, et al. 1987):
The PANSS, developed by SR Kay et al. is a 30-item rating scale that is specifically developed to assess individuals with schizophrenia and is used widely in research settings. One of the study done on these scale found that he Positive and Negative Syndrome Scale and General Psychopathology (PANSS) - developed to assess the severity of symptoms and measure general psychopathology and drug-related change is one of the most widely used instruments to evaluate psychotic symptoms (Cynthia H. Higuchi et al 2014). Studies done by researcher revealed that it is well characterized and standardized techniques are a clear prerequisite for meaningful study of these syndromes, their relationship to other features of schizophrenia, and their response to medication (Stanby R, key et al 2014). Another researcher revealed about the scale that it has good reliability and validity, the positive and negative subscales are used to differentiate between positive and negative schizophrenia (Niranjan Prasad et al 2016).

Young mania rating scale (YMRS- x, et al., 1978):
Developed by RC Young et al. at the year 1978, is probably the most frequently utilized rating scale to assess the manic symptoms. One of the study done on sensor motor gating deficits in bipolar disorder Patients with Acute Psychotic Mania the researcher found that psychosis on the Young Mania Rating scale (thought content) was revealed, such that the degree of disturbed thinking the lower the level (William et al.,2001). Other studies revealed that YMRS used to derive clinically meaningful information about mood disorders (Barbara L. Gracious et al. 2002). The studies found that YMRS scale has high reliability and validity coefficients (Vilela et al 2005).

Hamilton Depression rating scale (x, 1960):
Since its development in 1960 by Dr. Max. Hamilton of the University of Leeds, England, the scale has been widely used in clinical practice and become a standard in pharmaceutical trials. The researcher found that the scale has significant and qualitative findings out the result (Joseph et al 1998). In the studies found that the Hamilton depression scale has been the standard for the assessment of depression for more than 40 years and it is also a policy makers charged with the task of providing standards to evaluate treatment outcomes in depression are faced with three possible solutions: retain, revise, or reject,(R. Michael et al.,2004). Also the researcher found that the scale is known to be considered the gold standard for assessing severity of depression and is widely used in research field, (Barry A et al, 2010).

Life event scale:
Life event scale (The University of Texas at El Paso) is adapted from Holmes and Rabe in the year 1967. It has a 43-item questionnaire containing a wide range of stressful life events and incidents in normal life. The past studies found that people experiencing serious illnesses also had high scores on the Life Event Scale (Rabe 1967). Another studies done on this scale revealed that finding affirms the accomplishment of original intent, to construct an instrument suitable for obtaining reports of characteristic experiences from persons (Mardihorwitz et al, 1979). The researcher found in their studies that scale is associated to Social Readjustment Rating Scale which gives the consensual weights for life events occurred (Rahe, Lundberg, Theorell, & Bennett, 1971).

Ways of coping (Revised) (x, & y, 1985):
The Ways of Coping is been developed by (Lazarus and folkman 1985), containing a wide range of thoughts and acts that people use to deal with the internal and/or external demands of specific stressful encounters. The researcher has found the scale have tested its constructs through exploratory factor analyse y (Abramovitch, Schreier, &Koren, 2000; Howells & Stewart, 2003; Latack&Haylovic, 1992). The scale evaluate the finding coping strategies are related to stress levels (Evers, Kraaimaat, Geenen, and Bijlsma ,1997). The researcher found that problem focused coping strategies were negatively related to stress level and health (Caliguiri 2005). Another researcher found that scale provides validity evidence for alpha coefficients (Folkman& Lazarus, 1980, 1985).

Social occupational functioning scale (SOFs) (x, et al, 2005):
The SOFS was developed by (Nirmal, et al, 2005) is a new scale that differs from the Global Assessment of Functioning (GAF) scale in that it focuses exclusively on the individual’s level of social and occupational functioning and is not directly influenced by the overall severity of the individual’s psychological symptoms. The studies done by researcher found that scale has comprehensive, easy to administer measure of social functioning for use in busy clinical settings and it has adequate psychometric properties in terms of reliability and validity. It also focuses only on functioning and does not include symptom assessment (Nirmalsaras et al. 2005). The researcher found that scale focuses only on functioning and does not include symptom assessment N.Saras et al 2006). The scale has a brief, yet comprehensive, easy to administer measure of social functioning for use in busy clinical settings. It has adequate psychometric
properties in terms of reliability and validity. Exploratory factor analysis revealed a three-factor structure comprising of adaptive living skills, social appropriateness and interpersonal skills, accounting for 59% of the variance in total SOFS score(Roa k et al 2006).

**Maslach Burnout Inventory (x and y, 1981):**
Maslach and Jackson in the year (1981) developed this scale. The MBI is a widely used self-rating scale for measuring hypothetical aspects of burnout syndrome. It consists of representing three aspects (emotional, exhaustion, depersonalization and personal accomplishment). Reliability MBI subscales 0.50 to 0.82. The researcher found that scale has a standard measure of occupational burnout and has been significantly correlated with other measures of job burnout, job stress, and other indices of job satisfaction and performance (Brookings, Bolton, Brown &McEvoy, 1985; Jackson, Schwab, & Schuler, 1986; Maslach& Jackson, 1981). Another studies researcher found that measures of various outcomes that had been hypothesized to be related to burnout. All three sets of correlations provided substantial evidence for the validity of the MBI(Christina and susane 1981).

**Multidimensional Scale of Perceived Social Support (x,et.al, 1988):**
(Multidimensional Scale of Perceived Social Support MSPSS) was developed by (Zimet et al., 1988): The Multidimensional Scale of perceived social Support is a 12-item, uni-dimensional tool to measure how one perceive social support system, including an individual's source of social support (i.e., family, friends & significant others). The past studies revealed about scale that it demonstrated excellent internal consistency including construct validity (Kee- Lee Chou 1999).The researcher also found that high levels of perceived social support were associated with low levels of depression (Gregory et al, 2010). Another research also found that the scale has internal consistency reliability, measurement invariance, and differential correlates of the Multidimensional Scale of Perceived Social Support (MSPSS; Zimet, Dahlem, Zimet, & Farley, 1988).

**Subjective well-being scale (x and y, 1992):**
The subjective well-being inventory was developed by (Sell.H and Nagpal.R.1992), is an inventory that has eleven dimensions. In the studies done on these scale the researcher found that it has high inter-rater reliability, inter-scores reliability, and test-retest reliability also highly significant and satisfactory in validity.. (Patil, M.S. and Haloyal, P.S 1999). Another studies found that the scale points out the need for a thorough conceptual mapping process as exemplified (M.E Sharpe et al 1994). Researcher found that scales revealed that people interpret them as cardinal, and intend to provide responses that reflect this as accurately as possible (Van Praag 1991; Parducci 1995; Schwartz 1995).

**Socio-demographic Characteristics**

**DISCRETE VARIABLES:**

In the present study there were two groups: Primary key care givers of patients with schizophrenia and primary key care givers of patient with bipolar affective disorder. Sixty primary key care givers with patients were selected. The two groups were compared along important socio demographic variables like age, gender, marital status, religion, and education, and occupation, total no. of family members, duration stay of care givers, habitat, presence and absence of medical/psychiatric illness. The discrete variable of sex on both the group, male 18(51.4%) in bipolar affective disorder and 17(48.6%) in schizophrenia and female 12(48.0%) in bipolar affective disorder and 13(52.0%) in schizophrenia. The males were almost twice as high as females reasons being cultural issues and stigma (Jayakrishna et al 2018). The variables of marital status of both the group married in bipolar affective disorder patient 18(97.2%) and in schizophrenia 21(52.8%), unmarried in bipolar affective disorder in 4(36.4%) and in schizophrenia 7(63.6%), were as in single patient in bipolar affective disorder 8(80.0%) and 2(20.0%) in schizophrenia patient. In the past studies researcher has found that 66% of the subjects were married where in marriage is a social norm and divorce is not very common (Evid, 2018). In our study Hindu religion has higher majority 24(50.0%) in bipolar affective disorder in relapse and schizophrenia in relapse 24(50.0%) than muslim in bipolar affective disorder in relapse 4(40.0%) and schizophrenia in relapse is 6(60.0%) and christian in bacterial affective disorder in relapse 2(100.0%) and schizophrenia in relapse 0(0.0%). In other study revealed that Hindus were maximum (73.4%).(Maryy H et al 2005). In our present study also revealed that hindu religion was maximum in number, and perhaps this might be due to the existence of the Institute in the heart of a Hindu dominated area. There were no significant differences found on the both group. On socio demographic variables chi-square test shows that the two groups do not differ significantly on age, givers, habitat, presence and absence of medical/psychiatric illness. (Refer table 2).This shows that both the groups have similar socio-demographic characteristics. Though findings reveal that majority of the respondents in both groups were males.

In the variables of duration of stay of caregivers of patient with bipolar affective disorder (22.83±9.21) and stay of caregivers of patient with schizophrenia (18.83±7.87). In past studies found that about 50%–90% of people with chronic psychiatric illness live with their families or friends and informal caregivers provide an important service(Gater et al., 2014). Another studies revealed that about 25%–50% of people with schizophrenia stay with their families after being discharged from the hospital and depend on the assistance and care of their families, depend on the family for care provision (S. Chan, 2011).

**Comparison of Ways of coping between Primary key cares givers of patient with bipolar affective disorder and Schizophrenia in relapse**
There were no significant differences found in ways of coping between the two groups. The mean score of ways of coping between Primary key care givers of patient with bipolar affective disorder is (13.03±2.45) and Schizophrenia (12.96±2.44). The similar studies were found by (Chakrabarti et al. 1995, 2003), coping of bipolar affective disorder is remarkably similar to schizophrenia with regard to parameters such as problems faced and distress associated with them, levels of patient-dysfunction and caregiver. Another study done by (Chakrabarti and Gill 2002) reveals that coping pattern between bipolar affective disorder and schizophrenia caregivers several similarities were noticed between both sets of caregivers. Our study also reveals same ways of coping pattern in both the group of primary key care givers of patient with bipolar affective disorder and of primary key care givers of patient with schizophrenia in relapse.

Comparison on burnout on primary key care givers of patient with Bipolar affective disorder and Schizophrenia in relapse
The present study revealed that, the mean score of burnout on primary key care giver with bipolar affective disorder patient on variables on emotional exhaustion (10.63±2.65) and burnout on primary key care giver with schizophrenia patient (10.26±2.54), variables on Personal accomplishment of burnout on primary key care giver of bipolar affective disorder patient (9.13±2.02), and burnout on primary key care giver with schizophrenia patient (9.83±3.37). There is no statistical significant found on both the two variables on exhaustion and personal accomplishment. The past studies research reveals that being unhappy and dissatisfied with their work, caregivers develop a poor self image; daily work tasks are neglected as they feel incompetent and struggle with focusing on their responsibilities (Maslach et al., 2001; Montero-Morin et al., 2014; NIH, 2013). In another past studies done by researchers found that inefficacy, the feelings of being an underachiever on the job lead to reduced personal feelings of accomplishment (Maslach et al, 2001; Montero-Morin et al., 2014), emotional exhaustion depletes an individual's psychological resources with regard to care and concern for others (Awa et al., 2010; Maslach, 1978; Maslach et al., 2001). Same has been revealed in our studies on the variables of emotional exhaustion and personal accomplishment on burnout of primary key care giver with bipolar affective disorder and burnout of primary key care giver with schizophrenia in relapse. The mean score of burnout on primary key care giver with bipolar affective disorder patient on variables on depersonalization (10.16±2.36), and burnout on primary key care giver with schizophrenia patient is (10.16±2.80). There is statistical significant found on the variables on personalization (1.000**) at the level 0.01 level of significance. One of the studies reveals 70% of working caregivers suffer work-related difficulties due to their dual caregiving roles (National Alliance for Caregiving, 2009). In the other past studies found that depersonalization is an emotionally distancing one self and detaching and disengaging from all aspects of the work environment (Demerouti et al., 2014; Maslach et al., 2001; Shin et al., 2014). Also depersonalization may be associated with negative reactions and responses towards work activities (National Institute of Health 2013). In our present studies also revealed that both the group have higher depersonalization, these could be because of over burden of the work load.

Comparison on Social OCCUPATIONAL FUNCTIONING of patient with bipolar affective disorder and schizophrenia in relapse
The mean score of Social occupational functioning scale of bipolar affective disorder in relapse (45.53±8.480) and schizophrenia patient is (51.16±7.09). There is a statistically significant (.007*) at 0.05 level. The past studies found that Schizophrenia patients have demonstrated deficits in affect recognition. Schizophrenia patients have general face processing deficits, but affect recognition deficits may lead to more problems in social behavior (Kristine Hooker 2002). Another studies show that among patients with bipolar disorder is not as severe as that seen in schizophrenic patients (Marry cannon et al 1997). Past research suggest that affective psychoses, such as with bipolar psychotic feature have been generally considered to have better outcome outcomes than nonaffective psychosis (Mrneros et al., 1990; McGlashan, 1984). Researcher again found evidence suggests that as few as one third of patients with bipolar disorder (BD) achieve functional recovery over time (Huxley and Baldessarini, 2007). In our present study also revealed that there is a severe impairment of schizophrenia patient than bipolar affective disorder these could be because of cognitive impairment and negative symptoms of schizophrenia patient.

Comparison on Life event of primary key care givers of patient with Bipolar affective disorder and schizophrenia in relapse
The mean value of Life event of primary key care givers of patient with Bipolar affective disorder is (1345.76±101.65) and schizophrenia mean value (2533.56±3303), the life event is found higher in primary key care givers of patient with schizophrenia than bipolar affective disorder. There is statistical significant found on both group, the significant level at 0.05 level of significance. One of the studies has
depicted that major life stress appears to be associated more strongly with first episodes of major affective disorder than with later episodes. Life stress and major depression have generally supported this observation (Monroe & Harkness, 2005). The past researcher found bipolar affective disorder (BPAD) is a chronic, relapsing condition which is associated with significant negative outcomes for patients and their caregivers (Grover et al., 2017). In another study researcher found Bipolar disorder has generally been regarded as having a better functional outcome than schizophrenia (Sanchez et al., 2009). Other studies revealed that demonstrated an association between various forms of psychological stress and health complaints use of primary care services (Katon, 1984; Olfson and Klerman, 1992; Salovey et al., 2000). Prior studies of perceived stigma among caregivers have found that higher levels of mental illness stigma were associated with less adaptive coping and/or mental health outcomes, specifically with less use of social support (Fadden et al., 1987; Rose et al., 2002; Stengler-Wenzke et al., 2004) and increased report of depressive symptoms (Mickelson, 2001). Though major difficulties have been found to predict the onset of a depressive episode (Brown & Harris, 1978, 1989). The other studies found major life events in the onset of depression (Brown & Harris, 1989; Hammer, 2005; Mazure, 1998; Monroe & Hadijyanannikis, 2002). In our study finding also revealed that Life event were the most of the primary key care givers has gone through depressed phased. As in the care givers of bipolar affective disorder in relapse has more functioning rather than schizophrenia, these could be because of bipolar affective patient has more functioning than schizophrenia patient, which could lead to focus more on patient.

**Comparison on Perceived social support of primary key care givers of patient with Bipolar affective disorder and schizophrenia in relapse**

The mean score of perceived social support of primary key care givers of patient with Bipolar affective disorder in relapse (46.33 ± 782) and mean score of primary key care givers of patient with schizophrenia in relapse (48.60 ± 7.71). There were no statistically significant found in the both group. In the past studies indicates that caregivers may put their own health and well-being at risk while assisting loved ones (Burton et al., 1997; Tang and Chen, 2002). Another studies also reveal that schizophrenia and affective disorders, have a considerable impact on the lives of not only patients but also their caregivers imposes high costs on patients with respect to personal suffering, on caregiver due to a shift of burden from hospital to families and ultimately on society at large with regard to costs of frequent hospitalizations, the need for long-term psychosocial and economic support, and the lost productivity Awad & Voruganti, 2008). Other studies show that about 70% of patients with schizophrenia live with their family. They depend on the family for care provision (W. Chan, 2011). The studies illustrate daily difficulties, burdens and quality of life of family members of people with schizophrenia and mood disorders (Chan, et al., 2011). In our studies revealed that perceived social support of both group of primary care givers has equal perceived social support.

**Comparison on Subjective well-being of primary key care givers of patient with Bipolar affective disorder and schizophrenia in relapse**

The mean variables of subjective well-being of primary key care givers of patient with bipolar affective disorder in relapse is (6.63 ± 1.77) and primary key care givers of patient with schizophrenia is (6.33 ± 1.42) primary key care givers of patient with bipolar affective disorder in expectation achievement is (7.00 ± 1.57) and primary key care givers of patient with schizophrenia is (7.66 ± 1.61). Confidence in coping in of primary key care givers of patient with bipolar affective disorder is (7.66 ± 1.23) and schizophrenia is (7.10 ± 1.42). Transcendence in bipolar affective disorder is (6.83 ± 1.51) and schizophrenia is (6.93 ± 1.91). Family group support of primary key care givers of patient with bipolar affective disorder is (6.13 ± 1.77) and schizophrenia is (5.93 ± 1.61). Social support of primary key care givers of patient with bipolar affective disorder is (6.70 ± 1.72) and schizophrenia is (6.73 ± 1.76). Primary group concern of primary key care givers of patient with bipolar affective disorder is (8.80 ± 2.41) and schizophrenia is (7.86 ± 2.20). Inadequate mental mastery of primary key care givers of patient with bipolar affective disorder is (14.66 ± 3.00), and schizophrenia is (14.53 ± 4.09). Perceived well-being of primary key care givers of patient with bipolar affective disorder is (11.86 ± 2.43) and schizophrenia is (12.53 ± 3.10). Deficiency in social contacts of primary key care givers of patient with bipolar affective disorder is (7.10 ± 1.49) and schizophrenia is (7.06 ± 1.68). General well-being (negative affect) is (6.43 ± 1.63) and schizophrenia is (6.73 ± 2.59).

In the past studies it has revealed that care of patients can become a significant burden for families, including increased stress, worsened subjective well-being, physical deterioration, and self-value reduction. Patients’ families generally experienced both objective and subjective burden, which can foster family dysfunction (Xia Wang et al., 2017). Another study found mood disorders as a major cause of impaired functioning and well-being, the original study was criticized (Jencks, 1990). In another research also has a finding that impairments in functioning and well-being reported by Wells and colleagues in patients with active major depressive disorder (Wells et al., 1989). In our studies also found that there is no significant finding between both the groups as both groups has equal subjective well-being, these could be valid if the sample size will be large.

**Correlation of Socio-demographics & Clinical Variables with Ways of coping of primary key care givers of patient with bipolar affective disorder in relapse**

The correlation of socio-demographic variables and ways of coping of primary key care givers of patient with bipolar affective disorder in relapse has shown a significantly positive correlation of age with escape avoidance (ρ = .423*) and Positive Reappraisal (ρ = .371*) at 0.05 level of significance. Negative correlation has shown duration of stay of caregivers with distancing (ρ = -.470*) at 0.01 level of significance. Again significantly negative correlation of Hamilton depression rating scale with Confrontive (-1.000*) and Escape Avoidance (-1.000*) at 0.01 level of significance. Positive correlation of Hamilton depression rating scale with Self control (1.000*) and Planful Problem solving (1.000*) at 0.01 level of significance. In the past studies revealed that younger adults, older adults used
more distancing and positive reappraisal to cope with stressful situations (Folkman, Lazarus, Pimley, and Novacek 1987). In another study, it was revealed that women were more likely than men to utilize turning against self, seeking social support, and escape-avoidance as coping strategies (Labouvie-Vief et al., 1987, 1989). Again another study indicated that core aspects of self and coping vary significantly by sex, early in development, sex differences in defense mechanisms become more pronounced with age (Cramer 1979, 1991).

In other studies, the caregiving process as a chronic stressor due to persistent, often physically demanding responsibilities (Hochberg et al. 2010). Past research revealed that deleterious effect of BPAD on families in terms of high levels of disability, burden of care, distress associated with symptoms (Chakrabarti et al. 1992, 2003; Perlick et al. 1999). In other past studies, revealed that caregiving process is in itself a chronic stressor, which gives rise to strains from several areas, and, ultimately, leads to increased risk for psychiatric distress and diagnosable disorders, including depression (Joling et al. 2010). In our study also revealed that most of the care givers used coping strategies to cope with the situation while taking care of the patient and it was there most tragedy in their life and almost all caregivers had gone through difficult phase of their life while taking care relapse patient.

**Correlation of socio-demographics & clinical characteristic with Burnout, stressful life events, perceived social support and subjective well-being with primary key care givers of patient with Bipolar Affective Disorder in relapse**

The correlation of socio-demographics and clinical variables of primary key care givers of patient with bipolar affective disorder in relapse shows that significantly positive correlation of age with emotional exhaustion (B1) at 0.05 level of significance. In the past studies revealed that patients illness and its impact on the caregiver are the main sources of stress (Gill and Chakrabarti, 2002). Significantly negative correlation of duration of stay with caregiver with emotional exhaustion (B1), (r=-.405*) at 0.05 level of significance. In the previous study revealed that Burden in general and emotional exhaustion were the aspects of subjective burden best predicted by objective burden (Pim and Heleen, 2000). In our studies also found that the age of the patient matters, according to the age of patient, the responsibility increased by caregivers, these could be because by taking care of patient the care givers emotionally burnout. Young mania rating scale have significantly positive correlation with perceived social support (r=.477*) at 0.05 level of significance. In the past studies revealed that perceived social support helps the patient to find help and comply with the proposed treatment (Janson et al., 2003). The significant negative correlation of Hamilton depression rating scale with emotional exhaustion (B1), (r=-1.000**), life event (r=-1.000**), perceived social support (r=1.000**) and subjective well-being (r=-1.000**) at 0.01 level of significance. The significant positive correlation have shown on Hamilton depression rating scale with Personal Accomplishment (B2), (r=1.000**) and Depersonalization (B3), (r=1.000**) at 0.01 level of significance. The significant positive correlation of social occupational functioning is shown with perceived social support (r=.369*) at 0.05 level of significance. In the past studies revealed that caregivers who are prone to depression or anxiety often overestimate the threat posed by the patient’s illness and underestimate their own coping abilities leading to ineffective coping (Barrowclough and Parle 1997). In the other studies found caregivers personality, quality of family relationships, or degree of social support may influence the appraisal outcomes in terms of psychological or physical (Szmukler et al. 1996). In our studies also revealed that care giver has problem focused strategies, these could be positive outcomes to only give the patient early recovery.

**Correlation of socio-demographics & clinical variables with Ways of coping of primary key care givers of patient with schizophrenia in relapse**

The correlation of socio-demographics and ways of coping of primary key care givers of Patient with schizophrenia in relapse has shown significantly negative correlation on family income with Self-control (r=-.377**, Planful Problem solving (r=-.375*) at 0.05 level of significance and family income is positive correlation with Positive Reappraisal (.443*) at 0.05 level of significance. In the past studies revealed that schizophrenia impose considerable personal, social, and economic burden on individuals (Van et al. 2003). In another studies researcher found that the patient’s behavioral problems, the caregiver’s worries, the patient’s dependency, and family disruption were predictors of the levels of problem solving (Leffley 1998). In other research found that Indian caregivers perceived difficulties in several areas such as finance, family relationship, well-being and health, they still perceived burden (Prashant and Shevonne 2010). In our present study also revealed that most of the care givers has a hardship with financial issues, apart from these the care giver used problem focused, these could be because of the resilience throughout their life while taking care of the patient and to give better life.

**Correlation of socio-demographics & clinical characteristic with Burnout, stressful life events, perceived social support and subjective well-being with primary key care givers of patient with schizophrenia in relapse**

The correlation of socio-demographics and clinical variables of primary key care givers of patient with schizophrenia in relapse have shown a significantly positive correlation of family income with emotional exhaustion (B1), (r=.403*) and personal accomplishment (B2), (r=.461*) at 0.05 level of significance. In the past studies revealed that family income is negatively significant with subjective well-being (r=-.662**) at 0.01 level of significance. In another studies revealed that Vast majority (44%) of the caregivers in India said that the current financial position is not adequate to look after the patient compared to 22% of the Malaysian caregivers (Prashant and Shevonne 2010). Also the result have shown significantly positive correlation of duration of stay of primary key care givers with perceived social support is (r=.365*) at 0.05 level of significance. Researcher have revealed that care as an alternative to hospital care, or crisis intervention, providing overnight placement and focusing more on patients than care givers (Breakey 1996, Hoge et al., 1997). The positive syndrome (PANSS) is significantly positive correlation with personal accomplishment (B=2), (.435*) at 0.05 level of significance. Researcher have found that (Runions and Prudo, 1983), reported having more difficulties with problems related to typical positive symptoms. The negative syndrome (PANSS) is significantly
shown negative correlation with perceived social support (-.366**) at 0.01 level of significance. As general psychopathology has shown negative correlation with perceived social support (r=-.385*) at 0.05 level of significance. In other researcher revealed that negative symptoms have more burdensome than positive ones (Fadden et al., 1987; Schene, 1990). Educated relatives expressed more distress about negative symptom behaviors (e.g., forgetfulness, slowness) than about positive symptom behaviors (Gopinath and Chaturvedi, 1992). In our present study found that the caregiver find most challenging task while handling the patient with schizophrenia in relapse these could be of schizophrenia positive and negative syndrome.

VIII. SUMMARY AND CONCLUSION

1. The aim of the study was to assess stressful life event, coping, social support, subjective well-being and burnout in primary key caregivers of patient with bipolar affective disorder and schizophrenia in relapse. The present study was conducted at Central Institute of Psychiatry (CIP), Ranchi, Jharkhand. It was a hospital based cross sectional study. The purposive sampling was used to collect the study sample. The study sample has two group i.e. 30 primary key care givers of patient with bipolar affective disorder in relapse and 30 primary key care givers of patient with schizophrenia in relapse. Informed consent was taken from the patient and primary key care givers. As per the criteria primary key care givers who’s stay with less than 2 years was drop out which included the patient duration of illness blow five years was also counted on drop out. The study sample was taken those who full fill the inclusion and exclusion criteria was taken up for the study. Before collection of sample the procedure was explained by researcher to primary key care givers about the study, clinical data sheet, written consent and asked about their doubt and clarified was done according to their queries. The socio-demographic and clinical data sheet was applied on both group of primary key care giver of patient with bipolar affective disorder and schizophrenia in relapse. The clinical variables such as Young mania rating scale(YMRS), Hamilton depression rating scale (HAM-D) was applied on patient with bipolar affective disorder in relapse and Positive and Negative Syndrome Scale (PANSS) was applied on schizophrenia patient. Clinical variables of Social occupational functioning scale (SOFS) were applied on both the group of patient. The clinical variables of primary key care giver of patient with bipolar affective disorder and schizophrenia in relapse were administered same on both group such as: Life event scale, ways of coping, subjective well-being, multidimensional perceived social support and burnout scale. The standard statistical method was used to analyzed data using Statistical package for social Science (SPSS) version 20.0. Descriptive statistics (percentage, mean and standard deviation) were used to describe various sample characteristics. Chi square test was used for describing and comparing categorical data. “t” test was used for group comparison on continuation data and Pearson r was used for correlation analysis.

Over all findings of the studies:

1. The socio demographic profile revealed that there is no significant different found in the terms of age, sex, marital status, religion, education, residence, occupation, family income, family type, total no. of families, family history on both the group of primary key care giver of patient with bipolar affective disorder and schizophrenia in relapse.
2. Significant differences were noted in duration of stay of primary key care givers of both the group of primary key care giver of patient with bipolar affective disorder and schizophrenia in relapse.
3. There was a significant findings in the clinical profile of sample studied, in young mania rating scale and positive - negative syndrome scale, were the result noted that intensity of psychopathology were higher in schizophrenia patient in relapse rather than bipolar affective disorder in relapse.
4. Significant differences were noted in Life event, were the primary key care givers of schizophrenia in relapse has higher stressful life event than bipolar affective disorder in relapse.
5. There was no significant difference found in the ways of coping of both the group of primary key care givers of patient with bipolar affective disorder and schizophrenia in relapse.
6. There was no significant difference found in social support of both the group of primary key care givers of patients with bipolar affective disorder and schizophrenia in relapse.
7. There was no significant difference found in subjective well-being of primary key care givers of patient with bipolar affective disorder and schizophrenia in relapse.
8. Significant differences were noted in burnout on the domain of depersonalization were schizophrenia primary key care giver has higher depersonalisation than primary key care givers of schizophrenia in relapse.
9. Results have shown a significantly positive relation of age with escape avoidance and Positive Reappraisal in ways of coping in primary key care givers of patient with bipolar affective disorder in relapse.
10. Results have shown a significantly negative relation of duration of stay of key care givers with distancing in ways of coping in primary key care givers of patient with bipolar affective disorder in relapse.
11. Results have shown a significantly negative relation of Hamilton depression rating scale with Confrontivein ways of coping in primary key care givers of patient with bipolar affective disorder in relapse.
12. Results have shown no significant relation of social occupational functioning with ways of coping in primary key care givers with bipolar affective disorder in relapse.
13. Results have shown a significantly positive relation of age with emotional exhaustion in burnout in primary key care givers of patient with bipolar affective disorder in relapse.
14. Results have shown a significantly negative relation of duration stay of caregiver with emotional exhaustion in burnout in primary key care givers with bipolar affective disorder in relapse.
15. The young mania rating scales have significantly positive relation with perceived social support in primary key caregivers of bipolar affective disorder in relapse.
16. Results have shown a significantly negative relation of Hamilton depression rating scale with emotional exhaustion in burnout, life event, perceived social support and subjective well-being in caregivers of patients with Bipolar affective disorder in relapse.
17. The significant positive relation has shown on Hamilton depression rating scale with personal accomplishment and depersonalization in primary caregivers of Patients with Bipolar affective disorder in relapse.
18. The significant positive relation has shown on social occupational functioning with perceived social support in primary caregivers of patients with bipolar affective disorder in relapse.
19. Results have shown a significantly negative relation of family income with Self-control, planful problem solving in ways of coping in primary key caregivers of patients with Schizophrenia in relapse.
20. Results have shown a significantly positive relation of family income with Positive Reappraisal in primary key caregivers of patients with Schizophrenia in relapse.
21. Results have shown a significantly negative relation of total no. of family member with positive reappraisal in primary key caregivers of patients with Schizophrenia in relapse.
22. Results have shown a significantly positive relation of family income with emotional exhaustion in burnout in primary key caregivers of patients with Schizophrenia in relapse.
23. Results have shown a significantly negative relation of family income with subjective well-being in primary key caregivers of patients with Schizophrenia in relapse.
24. The result has shown significantly positive relation of duration of stay of primary key caregivers with perceived social support in primary key caregivers of patients with Schizophrenia in relapse.
25. The result has shown significantly positive relation of positive syndrome (PANSS) with personal accomplishment in burnout in primary key caregivers of patients with Schizophrenia in relapse.
26. The result has shown significantly negative relation of negative syndrome (PANSS) with perceived social support in primary key caregivers of patients with Schizophrenia in relapse.
27. The result has shown significantly negative relation with perceived social support in primary key caregivers of patients with Schizophrenia in relapse.

LIMITATIONS

- The study was conducted in/out – patient Department of Central Institute of psychiatry, Ranchi, Jharkhand.
- The study has a cross sectional design and hence patient and primary key care givers were assessed once.
- Both sexes were not equally distributed in the selected sample.

The sample used for the present study may not represent the entire population from which it has drawn because of the small sample size and heterogeneity in relation to various socio-demographic and cultural variables.

FUTURE DIRECTIONS

- The study can be further conducted on a large sample size.
- In future, stratification of the population can be done to ensure appropriate representation of people of all socio-demographic group.
- Both the sexes should be equally represented in the study sample.
- To get the actual representation of the primary key care givers of patient with bipolar affective disorder and schizophrenia in relapse, sample should collected from community if possible.
- In future similar types of study can be conducted on adolescent age below 18 years.
- The scope for intervention by mental health professionals, especially psychiatric social workers in planning and delivering adequate therapeutic services in the clinical context for key caregiver can be conducted.

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Perceptions of 1st year MBBS students regarding utilization of e-learning tools for collaborative learning in Anatomy.

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Abstract- E-learning in Anatomy is an improved scalability of educational development in this digital era which breaks down geographical and temporal barriers presenting opportunities for learners through availability of authentic information, subject content, skill development procedures. The present study involved a total of 195 MBBS students of 2014-2015 and 2015 -2016 batches who answered a close and open questionnaire comprising of 12 questions related to utilization of e-learning tools while learning Anatomy in a collaborative manner. Results revealed that 100% 1st year MBBS students were aware of the availability of e-learning Anatomy tools. 89.8% of 2014-2015 and 92.8% students of 2015-2016 batches utilized these learning tools in addition to traditional class room teaching in Anatomy thus adopting a blended approach for effective learning of Anatomy. 75.5% and 70.1% students of the ‘14-‘15 and ‘15-‘16 batches respectively applied group learning strategies and 73.6% and 70.1% students could utilize e-learning of Anatomy in a collaborative manner. E-learning engines utilized by these students were identified and archived establishing Anatomy department’s e-learning bank. Thus it has been observed in this study that e-learning in Anatomy allows blended collaborative discovery learning for better alignment of the subject through use of technology, information, communication and networking.

Index Terms- e-learning, Online learning, Internet learning, Digital learning, Collaborative learning.

I. INTRODUCTION

There have been innovations in utilization of learning tools in Anatomy in MBBS program revolutionised in the 21st century in accordance with adult learning principles.1,13 Part of this Anatomy training revolution has been driven by the effective use of digital technology to deliver, manage, learn instructional topics and perform accordingly.8,26 Thus e-learning as educational model, has been considered as blended integration of traditional and internet based educational technology to achieve best outcome in student learning process through improved access to training, skill development and attitude building, communication and interaction facilitating adoption of new ways of understanding and comprehension.5

The 1st year MBBS students, as consumers, explore newer media and methodology for learning Anatomy. Traditional learning involves activities in classroom environment while on the internet, e-learning tools have been emerging as a worldwide platform designed for learning Anatomy to support individual learning or group collaborative learning thereby meeting the performance goals.24 With the turn of the century, books have been complemented by the availability of high quality, easy to retrieve online resources referred to as e-learning resources which can be used collaboratively by the students for learning Anatomy and developing learners’ related skills in diverse environments under technological, cultural and pragmatic constraints. In this study, it was also observed that besides classroom learning, e-learning technologies and techniques were also adopted by the 1st year MBBS students for learning the subject in a collaborative manner which has been captured as perceptions in the questionnaire of this study.34,35 Results of this study reveals that digital revolution in information and knowledge age can greatly influence learning of Anatomy thus strengthening traditional class room learning.32,33

II. RESEARCH ELABORATIONS

Operational Definition: Since early 2000s, e-learning in education have been widely adopted through web technology as implemented in Anatomy learning.30

Aim and Objectives:
1. To evaluate perceptions of 1st year MBBS students towards utilization of e-learning tools in Anatomy.
2. To identify e-learning tools presently available for learning Anatomy for establishing e-learning tool bank/archive in Anatomy.
3. To analyse the utilization of these e-learning tools in providing collaborative Anatomy learning assistance to 1st year MBBS students for better understanding of Anatomy.

Materials and Methods:
This is an Observational Quasi Experimental Educational Research involving convenience sampling which included 195 MBBS students of 1st year in this Institution belonging to 2014-2015 and 2015-2016.
After Institutional Ethics Committee clearance and collection of signatures of participating 1st MBBS students in informed consent forms, the present study was implemented during Anatomy self-study slot so that the study process did not affect students’ classes or examination schedule.

Close and Open ended questionnaire comprising of 12 questions assessing the utilization of e-learning tools for collaborative learning in Anatomy was finalized following a pilot study conducted on 25 MBBS students of 1st year studying Anatomy. All participants, encouraged to participate, were instructed to respond to the questionnaire independently without discussing among themselves. A total of 98 students of 2014-2015 and 97 students of 2015-2016 batches participated in the study while 5 students were drop-outs. Applying Grounded Theory and Triangulation Method, narratives for Open ended Questions were categorized and coded in Table 5 as record of e-learning strategies/tools/ resources and sites as mentioned by the participating students in the questionnaire which helped in establishing the e-learning archive/repository in Anatomy. Graphical representation of result matrices of Quantitative analysis for Close ended Questions depicted in Tables 1-4 contribute in evaluating perceptions of 1st year MBBS students towards utilization of Anatomy e-learning tools in a collaborative manner.

III. RESULTS OR FINDING

98% and 97% of 1st year MBBS students of 2014-2015 and 2015-2016 batches respectively participated voluntarily in the study following sensitizing sessions. 63.3% and 68.04% were male respondents rest being females belonging to 1st and 2nd batches respectively. Among the participants, 72.45% and 71.13% were hostelites while rest were day scholars. (Table 1-Graphs)

A total of 92.8% students have been using smart phones for networking, socializing, learning, while 86.3% students have been using Desktop /Laptop alone, 11.7% using Laptop and Ipad/Note/Tab and 2% Ipad/Note/Tab alone. 78.2% students have been using these electronic devices since 6 months-1 year while rest for >1 year. (Table 2 - Graphs)

100% respondents in both the batches participating in the study were aware of the availability of Anatomy e-learning search engines and tools while 89.8% and 92.8% students utilized and recognized that these tools and resources could provide effective assistance for learning in Anatomy. However, none felt that e-learning tools were not effective at all though only 5.1% and 3.1% students felt that e-learning tools may not be much effective in learning Anatomy. However, One Tailed Hypothesis revealed a t value as 0 with P value as 0.5 result being Not Significant p<0.05. While learning Anatomy, 75.5% and 70.1% students utilized e-learning tools in groups (9-15) and (2-10) respectively through face to face and/or networking while rest utilized it for self-learning purpose. However, only 59.4% and 58.6% students applied principles of Group Dynamics effectively by selecting Leader, Facilitator, Moderator, Observer and Scriber. (Table 3 and Graphs).

Students of both the batches selected e-learning tools to be most effective strategies in learning Anatomy. 60.5% students could access various sites through online search engines for learning Theoretical aspect of Anatomy while 68.7% students learnt Practical aspects of Anatomy also. These sites promoted best learning of Histology (54.4%), Neuroanatomy (52.3%), Gross Anatomy (49.2%) and Embryology (32.8%). 1st Year MBBS students could also acquire Psychomotor skills through these sites.(Table 4 and Graphs).

100% students participating in the study identified their preferred Anatomy learning applications/strategies on the internet as Wikipedia (12% and 10%), You Tube Dissection Videos like Acland Dissection videos (62.7% and 67.8%), e-books (75.5% and 76.7%), e-dissection atlases (69.2% and 63.3%) , Google 3D images and Animations (92.9% and 88.7%), Online Interactive Forums (75.5% and 70.1%), Facebook (83.5% and 81.1%), What’s App (82.4% and 87%), Subway Surfaces (1% each), UC Browser ( 3.2% and 3%) HealthKart.com (11% and 10.5%), Slideshare.com (39.1% and 42.4%), Studentconsult.com (23% and 37%), Opera Mini (43.3% and 57.9%), e-book reviewer (1% and 4%), Medline (37% and 39%), Embase (21.7% and 29.2%) and Web of Knowledge ( 47.3% and 51.7%) etc. (Table5).

Students felt that Anatomy tools for e-learning contributed in basic concept building (59.8% and 60.2%), developing holistic approach to learning Anatomy (60.2% and 59.7%), deep learning (59.8% and 60.2%), retention of knowledge (58% and 53.6%), developing dissection skills (62% and 65%) and confidence building (31.6% and 39.2%). 28.6% and 29.9% students felt motivated while utilizing e-learning tools. 20.4% and 26.8% students felt that e-learning influenced their examination performance thus enabling them to score better in Anatomy Theory and Practical. 53.1% and 45.4% students enjoyed the e-learning method in Anatomy, 37.8% and 32% participants enjoyed the discovery learning while surfing, navigating, browsing and utilizing the e-learning tools for learning and developing skills in Anatomy. In addition to traditional class room learning and e-learning, 43.9% and 47.4% students also studied in Library. Collaborative e-learning was practised by 73.6% and 70.1% students (Tables 3, 5) through e learning sites verified by faculty for content validity, reliability, easy access, credibility prior to saving as repository for establishing Anatomy e-learning bank. (Table 5). It is also planned that e-learning archive/repository set up in Anatomy shall be updated periodically for the utilization by health professional students.

Thus study results have revealed e-learning in Anatomy can be matched and blended effectively, seamlessly and harmoniously with learner-centered content in Anatomy.

Brief Discussion:

The study results provide insight into the perceptions of two batches of 1st year MBBS students belonging to 2014-2015 and 2015-2016 regarding utilization of e-learning tools while studying Anatomy in a collaborative manner. Blending of traditional class room teaching in Anatomy and e-learning minimize requirement of expensive human resources while promoting flexible student centered, self directed learning in a fixed time frame. Students were self motivated to practice both collaborative and discovery learning. These e-learning tools effectively guide learners to process and assimilate new knowledge and skills in Anatomy achieving Fact, Concept, Process, Procedure and Strategic Principles of content of e-learning. Widespread utilization of e-learning tools in Anatomy have motivated the Anatomy faculty or e-learning design team to develop upgradeable Anatomy archive/repository of e-learning sites with resources to be accessed freely. Results related to percentage of MBBS students utilizing...
e-learning tools as found in this study are at par with the study by Sugrue and Rivera. Media comparison studies have shown that no differences exist in learning and achievement though some distant learning courses have been more effective than class room courses and vice versa. However, the aspects of effective learning in an online environment have given similar results as evidenced in study by Tallent-Runnels et al. Losing sight of the job or media abuse are pitfalls of e-learning which could not be evidenced in the results of the present study since participants utilized e-learning tools in a specified time frame without any compulsion. The three e-learning architectures e.g receptive, directive and guided discovery as expressed by Clark was also evidenced in this study. The three metaphors of learning e.g response strengthening, information acquisition and knowledge construction or cognitive load or constraints in multimedia learning was expressed by the participating students as expressed by Mayer et al and Rich and Guy. It has already been identified that graphics and simulations in e-learning are effective interfaces which have also been utilized by students. Anatomy learning through Internet, though has not substituted traditional classroom teaching with text books and teacher/facilitator, however, these resources also help student access to latest developments in various fields of Anatomy, content being checked by faculty. The results of the present study have been at par with those achieved in the study conducted for application of mobile learning in Anatomy where online sites have been identified which have contributed in planning this project, formulating policies for access, making an Anatomy archive/repository similar to description by Horton in 2006. These online internet sites engage learners to manage cognitive load of learning Anatomy. Application of this innovative learning has also contributed in developing 21st century medical graduates being able to adapt to changing conditions from traditional class room setting to e-learning environment excelling in concept building, developing holistic approach along with critical thinking, scientific reasoning and motivation. The students felt that they should acquire knowledge and competencies to be able to utilize learning of Anatomy in blended technology mediated education environments.

IV. CONCLUSION

The results of the present study demand a further in-depth exploration of retrieval and transfer applications of e-learning content by students in formative and summative assessments and drawing a comparative analysis of e-learning tools utilized by students vs performance indicators. Facilitators in Anatomy bear responsibility to guide and encourage students to accept, understand, comprehend, implement and utilize innovative tools and resources of learning to achieve better learning influenced outcome. Various e-learning sites identified in Anatomy compiled to build an Anatomy e-learning Archive/Repository for browsing and navigation by students and faculty not only promote e-learning but also provide guidelines and tools to develop online interfaces meeting the goals in learning Anatomy. However, success in implementation of e-learning in Anatomy in a collaborative manner would depend on prudent but flexible application of e-technology based on sound and effective educational principles and designing of convenient and effective instructional strategy with inclusion of Learning Objectives. This would require planning, designing, developing, integrating, delivering and seamlessly managing learning of Anatomy in electronic media in a collaborative manner. Thus collaborative e-learning in Anatomy marks an age of diversity and crossover of Anatomy learning integrating learning tools and topics in the dawn of a new age of network. This study results thus would help in creating online environment for information exchange to knowledge construction contributing in collaborative online learning of Anatomy in addition to class room learning thus emphasizing on Utilitarian Concept of e-learning tools and resources as expressed by Schon in 1987.

ANNEXURE

| TABLE 1 |
| % of responses by 1st year MBBS students, hostellites or day scholars of both batches, 2014-2015 and 2015-2016 belonging to both sexes |
TABLE 2

% of responses by 1st year MBBS students of both batches regarding use of mobile phones and electronic devices for various purposes:
### TABLE 3

Responses regarding strategies for e-learning in groups following group dynamics along with library utilization:

<table>
<thead>
<tr>
<th>Batch</th>
<th>Strategies(Numbers)</th>
<th>Mean (M), Median (MED), Mode (MO)</th>
<th>E-learning in Groups</th>
<th>Group Dynamics %</th>
<th>Library Utilization %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Graph for 2 batches</td>
<td>Graph for 2 batches</td>
<td>No of participants in Groups</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ME E U NE NEAA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2014-2015</td>
<td>18 70 4 5 0</td>
<td>M:19.4 MED: 5 MO:18</td>
<td>75.5</td>
<td>9-15</td>
<td>59.4</td>
</tr>
<tr>
<td>2015-2016</td>
<td>23 67 4 3 0</td>
<td>M:19.4 MED:4 MO:23</td>
<td>70.1</td>
<td>2-10</td>
<td>58.6</td>
</tr>
</tbody>
</table>

Index: ME: Most Effective, E: Effective, U: Undecided, NE: Not Effective, NEAA: Not Effective At All  
Note: In the text, Most Effective and Effective have been clubbed for % analysis. Analysis for Strategies: Significance level: 0.05  
One Tailed Hypothesis: t value : 0  P value: 0.5 Result Not Significant p<0.05
Table 4

% of responses for estimating development of Cognitive and Psychomotor skills during e-learning of various sections of Anatomy:

<table>
<thead>
<tr>
<th>Effectivity (%)</th>
<th>Psychomotor</th>
<th>Parts of Anatomy</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive</td>
<td>60.5</td>
<td>Histology</td>
<td>54.4</td>
</tr>
<tr>
<td></td>
<td>68.7</td>
<td>Neuroanatomy</td>
<td>52.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gross Anatomy</td>
<td>49.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Embryology</td>
<td>32.8</td>
</tr>
</tbody>
</table>

Table 5

Coding and Categorization of themes for e-learning search engines and contributions

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>e-Learning Applications /Search Engines utilized</td>
<td>100</td>
<td>100</td>
<td>100</td>
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<tr>
<td></td>
<td>Wikipedia</td>
<td>12</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>You Tube Dissection Videos like Acland Dissection Videos</td>
<td>62.7</td>
<td>67.8</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>e-books</td>
<td>75.5</td>
<td>76.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>e-dissection atlases</td>
<td>69.2</td>
<td>63.3</td>
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<td></td>
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<tr>
<td></td>
<td>Google 3D Images and Animations</td>
<td>92.9</td>
<td>88.7</td>
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</tr>
<tr>
<td></td>
<td>Online Interactive Forums</td>
<td>75.5</td>
<td>70.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Facebook</td>
<td>83.5</td>
<td>81.1</td>
<td></td>
<td></td>
</tr>
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<td></td>
<td>What’s App</td>
<td>82.4</td>
<td>87</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Subway Surfers</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>UC Browser</td>
<td>3.2</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HealthKart.com</td>
<td>11</td>
<td>10.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slideshare.com</td>
<td>39.1</td>
<td>42.4</td>
<td></td>
<td></td>
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<tr>
<td>-----------------</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Studentconsult.com</td>
<td>23</td>
<td>37</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opera Mini</td>
<td>43.3</td>
<td>57.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e-book reviewer</td>
<td>1</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medline</td>
<td>37</td>
<td>39</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Embase</td>
<td>21.7</td>
<td>29.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Web of Knowledge</td>
<td>47.3</td>
<td>51.7</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. **e-Learning contributing in learning and examination**

<table>
<thead>
<tr>
<th>Basic concept building</th>
<th>59.8</th>
<th>60.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deep learning</td>
<td>59.8</td>
<td>60.2</td>
</tr>
<tr>
<td>Holistic approach in learning anatomy</td>
<td>60.2</td>
<td>59.7</td>
</tr>
<tr>
<td>Retention of knowledge</td>
<td>58</td>
<td>53.6</td>
</tr>
<tr>
<td>Developing dissection skills</td>
<td>62</td>
<td>65</td>
</tr>
<tr>
<td>Confidence building</td>
<td>31.6</td>
<td>39.2</td>
</tr>
<tr>
<td>Motivation</td>
<td>28.6</td>
<td>29.9</td>
</tr>
<tr>
<td>Better performance in examinations</td>
<td>20.4</td>
<td>26.8</td>
</tr>
<tr>
<td>Discovery learning</td>
<td>37.8</td>
<td>32</td>
</tr>
<tr>
<td>Collaborative learning</td>
<td>73.6</td>
<td>70.1</td>
</tr>
<tr>
<td>Enjoyment in learning</td>
<td>53.1</td>
<td>45.4</td>
</tr>
</tbody>
</table>
ACKNOWLEDGMENT

The authors acknowledge the facilitation of Prof J. Vagha, Professor and Head Pediatrics and Prof T. Srivastava, Professor and Head Physiology of JNMC, Sawangi, Wardha and 1st year MBBS students of 2014-2015 and 2015-2016 of ESI PGIMSR, Joka, Kolkata who participated in this study.

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Characterization and Suitability Evaluation of Soils over Sandstone for Cashew (Anacardium occidentale L) Production in a Nigerian Southern Guinea Savanna

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Abstract- The study examined the properties as well as the Taxonomic classification of soils developed on sandstone in the Southern Guinea Savanna of Nigeria. The soils were also evaluated for their suitability for cashew production. The contour map of Bekwarra was obtained in the ArcGIS 10.2.1.3 environment and two profile graphs plotted to represent two toposequences. Six profile pits were then sited. The soils were deep (>100 cm) to weathered rock with argillic B horizons. The surface soils were dark reddish brown (5YR 3/4) to very dark gray (2.5YR 3/1) and gray (7.5YR 5/1). Soil bulk density was < 1.60 Mg/m3. Amount of clay fluctuated with soil depth while sand fraction dominated the soils. Irrespective of landscape position, the soils were severe to moderately acid in reaction, and low to moderate in organic carbon. The soils were moderate in exchangeable Ca2+ and Mg2+ and low in K+ and Na+. The soils were moderately suitable (S2) and currently not suitable (N1), potentially for cashew production. Pedon 1 was classified as Typic Haplustalf (Haplic Luvisols), pedons 2, 3 and 4 as Typic Paleustalfs (Haplic Luvisols) while pedon 4 was Rhodic Luvisols in the WRB system. Soils at the valley bottom were classified as Aquic Udorthents (Hypereutric Gleysols). Site specific conservation farming, combined application of organic and inorganic fertilizers as well as the application of calcite and dolomite at appropriate dosages are advocated. Furthermore, it is pertinent to change land use of the soils at the valley bottom (pedons 5 & 6).

Index Terms- Soil characterization; classification; toposequence; suitability; cashew

I. INTRODUCTION

Land forms in the sub humid tropics are generally characterized by rolling topography and small valleys; soils formed along such slopes often vary in basic properties and classification. Hence, the agricultural land use potentials of soils along different landscape positions also differ. Sustainable agriculture rests on the in-depth study as well as inventorization of soil resources, consequently, inadequate information on the soil resources of any region contributes to the problem of soil degradation as well as food insecurity.

Different rates of weathering of parent materials, the nutrients they contain for plant use and dominant particle size are some ways in which parent materials influence soil formation. Parent materials are important soil forming factor that contribute to the differences in soil properties (Ibangha, 2006; Esu, 2010). However, Akamigbo and Asadu (1982) observed that parent materials have very significant influence on the overlying soil when the soil is formed in situ. Sandstone on which the soils under study is medium grained and composed of quartz and clastic in origin, and occurs in the major ecological zones of Nigeria (Ogunwale and Ashaye, 1975). Soils developed on sandstone are shallow, sandy and gravelly, and are generally erodible (Bulktrade, 1989). Such soils in the Niger Delta area and particularly Akwa Ibom State are fragile, acidic and low in native fertility, and are described as marginal by farmers in the area (Udoh et al., 2015).

Adequate information on land resources has been identified as a pre-requisite for sustainable land management (Ofem et al., 2016), consequently, Esu (2004) advocated detailed study of soil resources through soil characterization and land evaluation. Land suitability evaluation is a simple avenue to combat the many problems linked to land use (Ofem et al., 2016). It also helps individual land owners and regional development agencies to make valid national decisions among available land use and site selection options (Esu, 2013; Widiatmaka et al., 2014), and makes it even more necessary to know how suitable the land is for Cashew production.

Cashew has an architecture for reclaiming tracts of land to enhance its productivity (Adeigbe et al., 2015). Nearly 90% of the lateral roots of cashew concentrate in the upper 15-45 cm of the soil while its tap root may extend up to a depth of about 5 m (Schoenmaker, 1998). The crop requires deep, well drained and light to medium textured soils (Sys et al., 1993). Its young tap root is sensitive to physical soil limitation (Ngatunga et al., 2001) and requires optimum pH of 4.5-6.5 (FAO, 1994). However, Sys et al. (1993) recommended an optimum pH of 5.5-7.0. Furthermore, organic carbon of over 0.8%, CEC of over 12.4 cmol/kg and loam textures with a minimum effective soil depth of 40 cm were recommended for productivity above 80% (Widiatmaka et al., 2014). The crop is draught resistant and requires hot conditions, as frost
conditions may result in black nuts or rots (Sys et al. (1993). Consequently, cashew productivity decreases with higher rainfall.

Economically, cashew nut accounts for 7-8 % of non-oil export earnings in Nigeria with an estimated USD 25-35 million per year (Nugawela & Oroch, 2005). Production increased from 30,000 in 1990 to 836,500 MT in 2012 (FAOSTAT, 2013). Majority of such export quality come from the eastern and western Nigeria (Adeigbe et al., 2015). Nigeria was ranked second in the world, next to only Vietnam and first in Africa in 2010, 2011 and 2012 with production estimated at 650000, 813023 and 835500 MT, respectively (Ogunsinan & Lucas, 2008 & FAOSTAT, 2013). Since 2014, cashew has become the second main cash crop in west Africa behind cocoa and ahead of cotton, rubber, palm oil or banana (Nitidae, 2019). In 2018, 250,000 MT was produced in Nigeria from an area of 755,000 ha (Nitidae, 2019).

The agricultural potentials of the soils have not been fully harnessed due to scanty recent research on the soils; hence the adoption of wrong land management methods and land use types by the farmers who are either not exposed to relevant information regarding the soils they intend to cultivate or such information are too cumbersome for their understanding. This has resulted in underutilization and degradation of the soils as they are often not used for what their characteristics match for. It is therefore apt to study the soils in order to bridge the gap in soil resource information and also expand on their agricultural use options through suitability evaluation for cashew production. Although the soils have been adjudged to be low in fertility status (Udoh et al., 2015), oil palm, cashew, rice and maize as well as cassava, sorghum and yam have been found to have comparative advantage over other crops. This study is therefore saddled with the responsibility of characterizing and taxonomically classifying the soils based on the criteria of USDA and correlating same with the World Reference Base for Soil Resources System. Suitability evaluation of the land will also be carried out to ascertain its fitness and possible consideration for intensive and commercial production of cashew.

II. MATERIALS AND METHOD

Environment of study area

The study was sited in Bekwarra Local Government Area (LGA) of Northern Cross River State. It lies in the southern guinea savanna of Nigeria with patches of rainforest and located between longitudes 4°21’ and 6°45’E, and latitudes 7°15’ and 9°28’N. It is bounded to the North by Vandikyia in Benue State and to the East by Obudu cattle ranch. Soils in the area are developed on sedimentary formation which constitutes fine grained sandstone, shales and siltstone with local occurrences of limestone (Bulktrade, 1989). The study area varies between level to nearly level and gently undulating local relief with pronounced hills. Rainfall varies between 1251.4 and 3347.8 mm/annum while range of 22.96-33.75 °C characterizes temperature in the area (Sambo et al. 2016). Mean relative humidity was reported as 72.14 % while evaporation rate had mean value of 2.24 mm/day and range of 1.8-2.8 mm/day. The area is dominated by grass species like; Andropogon spp., Imperata cylindrical, Combretum spp., Panicum maximum and tree species like Elaeis guineensis, Bukrea Africana, Gmelina aborea, and Anacardium occidentale.

Field studies

The contour map of Bekwarra was obtained in the ArcGIS 10.2.1.3 environment. Considering the distribution of elevations on the contours, topo-positions were identified and two profile graphs plotted to represent two toposequences. Each toposequence was located in Anyikang and Ibararagi (Fig. 1). These are major agrarian communities in Bekwarra LGA. These locations have major advantages for the production of cashew in the area. Upon field reconnaissance verification, point locations representing soil profile pits were obtained with the aid of the GPS device. Soil profile pits were then sited in the summit, middle slope and valley bottom positions of each toposequence to represent the soils. Furthermore, pedons were dug and described according to the requirements of Soil Survey Staff (2012). Soil samples were obtained from pedogenic horizons, labeled and transported to the laboratory for analysis. Samples meant for bulk density determination were collected with the aid of cylindrical cores that were drilled vertically downwards. The core samples were oven dried at 105 °C until constant weight was obtained.

Laboratory studies

Soil samples were air dried under laboratory conditions, grinded and sieved through a 2 mm mesh. The fine earth fraction (< 2 mm) was used for various laboratory analyses. Particle size analysis of was done by the Bouyoucos hydrometer method using sodium hexametaphosphate as the dispersant (Gee and Bauder, 1986) while bulk density (Bd) was determined by undisturbed core cylinder (Blake, 1965) and particle density (Pd) was determined by the use of a pycnometer (Bowles, 1992). Consequently, total porosity (Tp) was determined from the expression: \( Tp = (1 - Bd/Pd) \times 100. \) Soil pH was determined in a soil to water ratio of 1:1 using a glass electrode pH meter while soil organic carbon was obtained by the Walkley and Black wet oxidation method and total N was determined by the macro Kjeldahl digestion method (Udo et al., 2009). Bray 1 solution was used as extractant in the colorimetric determination of available P while exchangeable bases were extracted with 1 N neutral NH\(_4\)OAc. Exchangeable Ca and Mg were there after obtained by the Versenate EDTA titration method while K and Na were determined with the aid of a flame photometer (Udo et al., 2009). Cation exchange capacity was determined in neutral NH\(_4\)OAc as outlined by Udo et al. (2009) while base saturation was obtained by expressing the sum of exchangeable bases as a percentage of the CEC by NH\(_4\)OAc at 7.0.

Land suitability evaluation procedures

Land suitability for cashew production was according to the requirements of Sys et al. (1993) (Table 4). The pedons were placed in suitability classes by comparing the data obtained in the study area (Table 3) to cashew requirement (Table 1). The most limiting factor was used to determine the overall suitability ratings in accordance with Liebig’s law of
minimum.

For the parametric (square root method) method, each limiting characteristic was rated as shown in Table 1. The potential and current indices of productivity (IP) for each pedon were computed using the equation:

\[ IP = \frac{A \times B \times C \times D \times E}{100} \]

Where:
- \( A \) = Overall lowest characteristic rating;
- \( B, C, D, E \) = The lowest characteristic rating for each land quality group.

Since there are often strong correlations within a land quality group, only one member with the least rating in each of climate (c), wetness (w), physical soil characteristics (s), soil fertility (f) and available nutrients (a) were used to calculate the index of productivity; current and potential productivity. In potential productivity, properties (organic C, total N and available P) that are easily altered by soil management procedures were masked.

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**Fig. 1:** contour and location map of Bekwarra with profile points

**Table 1:** Land requirement for Oil palm production indicating; Class, degree of limitation and rating scale

<table>
<thead>
<tr>
<th>Land Characteristics</th>
<th>S1</th>
<th>S2</th>
<th>S3</th>
<th>N1</th>
<th>N2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rating scale</td>
<td>100-95</td>
<td>95-85</td>
<td>85-60</td>
<td>60-40</td>
<td>40-25</td>
</tr>
<tr>
<td>Climate (c)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAR (mm/yr)</td>
<td>1800-1600</td>
<td>1600-1200</td>
<td>1200-800</td>
<td>800-500</td>
<td>-</td>
</tr>
<tr>
<td>MAT (°C)</td>
<td>&gt;25</td>
<td>25-22</td>
<td>22-20</td>
<td>&lt;20</td>
<td>-</td>
</tr>
<tr>
<td>Wetness (w)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flooding</td>
<td>Fo</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>F1+</td>
</tr>
<tr>
<td>Drainage</td>
<td>Good, moderate</td>
<td>Good; moderate</td>
<td>Imperfect + Fluctuating H₂O</td>
<td>Imperfect + Permanent high</td>
<td>Poor but drainable</td>
</tr>
<tr>
<td>Physical soil characteristics (s)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Texture</td>
<td>C, SiC, SiCL, CL, SiL, SC</td>
<td>C,L,S,SL,CS,SL</td>
<td>fS, LcS</td>
<td>S, CS</td>
<td>-</td>
</tr>
<tr>
<td>Soil depth (cm)</td>
<td>&gt;150</td>
<td>150-100</td>
<td>100-50</td>
<td>50-25</td>
<td>-</td>
</tr>
<tr>
<td>Soil fertility characteristics (f)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*CEC (cmol/kg)</td>
<td>&gt;12.4</td>
<td>8.5-12.4</td>
<td>2.6-8.5</td>
<td>&lt;2.6</td>
<td>-</td>
</tr>
<tr>
<td>BS (%)</td>
<td>&gt;35</td>
<td>35-20</td>
<td>&lt;20</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>pH (H₂O)</td>
<td>6.0-5.5, 7.0</td>
<td>6.0-7.0</td>
<td>5.2-4.8, 7.5-8.0</td>
<td>4.8-4.5, 8.0-8.5</td>
<td>&lt;4.5</td>
</tr>
<tr>
<td>Org. C (%)</td>
<td>&gt;1.5</td>
<td>1.5-0.8</td>
<td>&lt;0.8</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Available nutrients (a)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Total N (%)</td>
<td>&gt;0.07</td>
<td>0.05-0.07</td>
<td>0.03-0.05</td>
<td>&lt;0.03</td>
<td>-</td>
</tr>
<tr>
<td>*AvailableP(ppm)</td>
<td>&gt;40</td>
<td>11-40</td>
<td>1-11</td>
<td>&lt;1.0</td>
<td>-</td>
</tr>
<tr>
<td>*Exch.K(cmol/kg)</td>
<td>&gt;0.37</td>
<td>0.27-0.37</td>
<td>0.10-0.27</td>
<td>&lt;0.10</td>
<td>-</td>
</tr>
</tbody>
</table>

Source: Sys et al. (1993); *Widiatmaka et al. (2014)
### III. RESULTS AND DISCUSSION

#### Soil morphological properties

Dark reddish brown (5YR 3/4, 2.5YR 2.5/4), very dark greyish brown (10YR 3/2) to dark brown (10YR 3/3), and very dark gray (2.5YR 3/1) overlaid dark red (2.5YR 3/6) to red (2.5YR 4/8), dark brown (7.5YR 3/3) and red (2.5YR 4/6), and gray (7.5YR 5/1) colours in the crest, middle slope and valley bottom, respectively (Tables 2a,b,c). Reddish soil colour in the crest and middle slope is indicative of the presence of oxides and oxyhydroxides of iron and aluminum, and further suggests soil maturity or well-drained condition. Souza et al. (2019) attributed such colours to the presence of goethite and hematite.

#### Table 2a: Morphological properties of the soils

<table>
<thead>
<tr>
<th>Horizon</th>
<th>Depth (cm)</th>
<th>Soil Colour (moist)</th>
<th>Mottling</th>
<th>Texture</th>
<th>Structure</th>
<th>Consistence</th>
<th>Boundary</th>
<th>Other characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crestal soils</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pedon 1 (N06°40'500&quot;, E 008°52'054&quot;, 120m ASL)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Medium common pores; many coarse roots; few iron nodules; quartz mineral; many ants and termites.</td>
</tr>
<tr>
<td>Ap</td>
<td>0 – 33</td>
<td>2.5YR 2.5/4</td>
<td>-</td>
<td>gsl</td>
<td>Wfgbk</td>
<td>wss; mvfr</td>
<td>cs</td>
<td></td>
</tr>
<tr>
<td>Bt</td>
<td>33 – 72</td>
<td>2.5YR 4/8</td>
<td>-</td>
<td>scl</td>
<td>mfmsbk</td>
<td>wns; mvfr</td>
<td>cw</td>
<td></td>
</tr>
<tr>
<td>Cr1</td>
<td>72 – 133</td>
<td>2.5YR 4/8</td>
<td>-</td>
<td>sl</td>
<td>mmsbk</td>
<td>wns; mvfr</td>
<td>gs</td>
<td></td>
</tr>
<tr>
<td>Cr2</td>
<td>133 – 200</td>
<td>2.5YR 4/8</td>
<td>-</td>
<td>sl</td>
<td>wmsbk</td>
<td>wns; mvfr</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Pedon 2 (N06°40'932&quot;, E 008°53'663&quot;, 145 m ASL)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Very few fine thin clay cutans pores; many common pores; common medium roots; ants and termites.</td>
</tr>
<tr>
<td>Ap</td>
<td>0 – 28</td>
<td>5YR 3/4</td>
<td>-</td>
<td>scl</td>
<td>2m sbk</td>
<td>wss; mfr</td>
<td>cs</td>
<td></td>
</tr>
<tr>
<td>Bt</td>
<td>28 – 105</td>
<td>2.5YR 4/8</td>
<td>-</td>
<td>sc</td>
<td>2m sbk</td>
<td>wss; mf</td>
<td>cw</td>
<td></td>
</tr>
<tr>
<td>Cr1</td>
<td>105 – 147</td>
<td>2.5YR 3/6</td>
<td>-</td>
<td>sc</td>
<td>wm sbk</td>
<td>wss; mvfr</td>
<td>gs</td>
<td></td>
</tr>
<tr>
<td>Cr2</td>
<td>147 – 200</td>
<td>2.5YR 3/6</td>
<td>-</td>
<td>gsc</td>
<td>wm sbk</td>
<td>wss; mvfr</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

On the other hand, dark and brown colours common in the surface soils are due to the presence of decomposed organic matter. This result is similar to those of Bulktrade (1989) in the study area and Ahukaemere et al. (2013) on similar soils elsewhere. Furthermore, grey colours obtained in the valley bottom soils indicates loss of oxides of Fe and Al, as well as wetting. Similar colours were obtained by Ukut et al. (2014).

Irrespective of the landscape positions, textural class in the surface soils was mainly loam with variable sand content giving rise to sandy loam and sandy clay loam. The subsurface soils seemed to have similar or finer textures across the landscapes. This suggests greater vertical than lateral movement of fine particles. Such textures are typical of sandstone soils and are responsible for the well-drained soil condition. Similar textures were obtained by Bulktrade (1989) while Laffan et al. (1998) obtained sandy loam, loamy sand and clay textures in the sandstone soils of Northern Tasmania, New Zealand.

Soil consistence in the crest was slightly sticky when wet, and friable to very friable in moist condition for the surface soils while the underlying soils were more sticky (Tables 2a,b,c). However, consistence under moist condition ranged from friable to very friable and firm in the middle slope and valley bottom (Tables 2b,c). Ahukaemere et al. (2013) had consistence varying from friable to very firm in the surface soils and very friable to firm in the subsurface soils. Plant roots, ants and termites beyond 122 cm indicate the absence of physical impediments, as well as the availability of water and nutrients at
such depths. Ants, worms and termites encourage decomposition and soil mixing. Clay cutans were found in almost all the subsurface horizons of the crest and middle slope soils (Tables 2a,b), and indicates soil maturity.

Table 2b: Morphological properties of soils at the middle slope

<table>
<thead>
<tr>
<th>Horizon</th>
<th>Depth (cm)</th>
<th>Soil Colour (moist)</th>
<th>Mottling</th>
<th>Texture</th>
<th>Structure</th>
<th>Consistence</th>
<th>Boundary</th>
<th>Other characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedon 3 (N 06°40'324&quot;, E 08°51'871&quot;, 105 m ASL)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ap</td>
<td>0 – 15</td>
<td>10YR 3/2</td>
<td>-</td>
<td>sl</td>
<td>wmbk</td>
<td>ws; mfr</td>
<td>cs</td>
<td>Many common pores; many few roots; many quartz; many ants.</td>
</tr>
<tr>
<td>Bt1</td>
<td>15 – 43</td>
<td>5YR 4/6</td>
<td>-</td>
<td>scl</td>
<td>2m sbk</td>
<td>wss; mfr</td>
<td>gs</td>
<td>Few thin clay cutans on ped faces; quartz; very few ants.</td>
</tr>
<tr>
<td>Bt2</td>
<td>43 – 97</td>
<td>5YR 4/6</td>
<td>-</td>
<td>sc</td>
<td>2mc sbk</td>
<td>wss; mfr</td>
<td>gs</td>
<td>Common thin clay cutans on ped faces; common medium coarse roots; quartz; very few ants.</td>
</tr>
<tr>
<td>Cr1</td>
<td>97-137</td>
<td>10YR 4/6</td>
<td>10YR 6/6</td>
<td>scl</td>
<td>1mc sbk</td>
<td>wss; mfr</td>
<td>cw</td>
<td>Common moderate iron clay cutans on ped faces; common very few pores; few fine roots.</td>
</tr>
<tr>
<td>Cr2</td>
<td>137-200</td>
<td>2.5YR 3/6</td>
<td>10YR 6/4</td>
<td>scl</td>
<td>mcgbk</td>
<td>wss; mfr</td>
<td></td>
<td>Moderate clay cutans on ped faces; few very fine pores; quartz.</td>
</tr>
<tr>
<td>Pedon 4 (N 06°40'850&quot;, E 08°53'768&quot;, 135 m ASL)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ap</td>
<td>0 – 16</td>
<td>10YR 3/3</td>
<td>-</td>
<td>gsl</td>
<td>wmbk</td>
<td>wns; mfr</td>
<td>cs</td>
<td>Many common pores; many coarse roots; quartz; few ants.</td>
</tr>
<tr>
<td>Bt</td>
<td>16 – 69</td>
<td>7.5YR 3/3</td>
<td>-</td>
<td>gsc</td>
<td>wmbk</td>
<td>ws; mfr</td>
<td>gw</td>
<td>Many medium pores; common medium roots; iron nodules; quartz; very few ants; out crop of sandstone rock.</td>
</tr>
<tr>
<td>BC</td>
<td>69 – 122</td>
<td>5YR 4/6</td>
<td>-</td>
<td>gsc</td>
<td>wmbk</td>
<td>wss; mfr</td>
<td>dw</td>
<td>Common moderate pores; clay cutans; common very few pores; few fine roots; iron nodules; quartz; very few ants.</td>
</tr>
<tr>
<td>Cr</td>
<td>122 – 200</td>
<td>2.5YR 4/6</td>
<td>-</td>
<td>scl</td>
<td>2m sbk</td>
<td>wss; mfi</td>
<td>-</td>
<td>Common thick clay cutans on ped faces; few medium pores; quartz.</td>
</tr>
</tbody>
</table>

Table 2c: Morphological properties of soils at the valley bottom

<table>
<thead>
<tr>
<th>Horizon</th>
<th>Depth (cm)</th>
<th>Soil Colour (moist)</th>
<th>Mottling</th>
<th>Texture</th>
<th>Structure</th>
<th>Consistence</th>
<th>Boundary</th>
<th>Other characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedon 5 (N 06°40'197&quot;, E 08°51'783&quot;, 88 m ASL)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ap</td>
<td>0 – 20</td>
<td>2.5 YR 3/1</td>
<td>7.5YR 4/4</td>
<td>Scl</td>
<td>2mg</td>
<td>wss; mfr</td>
<td>cs</td>
<td>Few fine roots; worms and ants.</td>
</tr>
<tr>
<td>Cg1</td>
<td>20 – 86</td>
<td>2.5 YR 5/6</td>
<td>2.5YR 4/1</td>
<td>scl</td>
<td>2msbk</td>
<td>ws; mf</td>
<td>gs</td>
<td>Very few thin clay cutans on ped faces; very few pores.</td>
</tr>
<tr>
<td>Cg2</td>
<td>86 – 130</td>
<td>2.5 YR 5/1</td>
<td>5YR 4/6</td>
<td>c</td>
<td>2msbk</td>
<td>wss, mf</td>
<td>-</td>
<td>Few thin clay cutans on ped faces; fine very few pores.</td>
</tr>
<tr>
<td>Pedon 6 (N 06°40'758&quot;, E 08°53'737&quot;, 113 m ASL)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ap</td>
<td>0 – 12</td>
<td>7.5YR 5/1</td>
<td>-</td>
<td>Sl</td>
<td>wfg</td>
<td>wss; mfr</td>
<td>cs</td>
<td>Common medium pores; many medium roots; ants and cricket.</td>
</tr>
<tr>
<td>Cg</td>
<td>12 – 50</td>
<td>7.5YR 5/2</td>
<td>2.5YR 4/1</td>
<td>Scl</td>
<td>wfg</td>
<td>wss; mfr</td>
<td>-</td>
<td>Common very few pores; many medium roots; common medium roots; ants.</td>
</tr>
</tbody>
</table>

Foot note: Texture: gr = gravel, Co = cobbles, L = loam, S = sand, C = clay; Structure: 1,2,3 = weak, moderate and strong, f,m.c = fine, medium and coarse; gr. abk and sbk = granular, angular blocky structure and sub-angular blocky structure; Consistence: w = wet, m = moist, s = slightly sticky, fr = friable, fi = firm, v = very; Boundary: cs = clear smooth, ds = diffuse smooth, gs = gradual smooth, cw = clear wavy, dw = diffuse wavy, gw = gradual wavy; Asl: Above sea level

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The abundance and size of soil pores seemed to decrease with soil depth and down the slope, especially in the poorly drained valley bottom. The porous nature of soils in the crest and middle slope may have been responsible for its well-drained nature giving rise to bright colours.

**Soil physical properties**

Physical properties of the soils are presented in Tables 3a,b,c. Particle size distribution of the soils indicates that sand content exceeded 500 g/kg in the surface soils with comparatively lower values in the subsurface soils. Also, values at the valley bottom appeared lower and suggest limited lateral movement of sand grains. Souza et al. (2019) obtained > 741 g/kg of sand in the soils overlying Piaui sandstone derived soils in Brazil.

High values of sand in the crest and middle slope affirms that the soils were developed in situ while the gently undulating landscape limited the movement of sand grains downslope. Such values of sand are likely to increase the infiltration rate, percolation and leaching, and reduce the availability of nutrients in the soil exchange complex. Similar results were obtained by Lawal et al. (2012) in Muma while higher values were obtained by Ahukaemere et al. (2013) and Udoh (2015) in the Southeastern and Niger Delta regions of Nigeria. However, Naganori et al. (1984) obtained lower values in Japan.

Silt fraction was less than 290 g/kg in the entire soils and appeared higher in the valley bottom than other landscape positions. This suggests the ease with which finer particles are moved compared to sand. The finding agrees with the work of Naganori et al. (1984), Lawal et al. (2012) and Ahukaemere et al. (2013) while Udoh (2015) obtained values lower than seen in the present study.

Clay fraction increased vertically downwards and downslope resulting in higher values in the B horizons and the valley bottom, respectively (Tables 3a,b,c). A further indication that clay particle sizes were easily moved compared to sand sizes.

**Table 3a: Physical properties of the soils in the crest**

<table>
<thead>
<tr>
<th>Horizon</th>
<th>Depth cm</th>
<th>Sand g/kg</th>
<th>Silt g/kg</th>
<th>Clay</th>
<th>Text.</th>
<th>Bd Mg/m³</th>
<th>Pd Mg/m³</th>
<th>TP</th>
<th>WC %</th>
<th>Air filled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedon 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ap</td>
<td>0-33</td>
<td>740</td>
<td>140</td>
<td>120</td>
<td>Sl</td>
<td>1.56</td>
<td>2.5</td>
<td>37.6</td>
<td>4.7</td>
<td>32.86</td>
</tr>
<tr>
<td>Bt</td>
<td>33-72</td>
<td>590</td>
<td>100</td>
<td>310</td>
<td>Sc1</td>
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**Table 3b: Physical properties of the soils in the middle slope**

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<th>Silt g/kg</th>
<th>Clay</th>
<th>Text.</th>
<th>Bd Mg/m³</th>
<th>Pd Mg/m³</th>
<th>TP</th>
<th>WC %</th>
<th>Air filled</th>
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<td>220</td>
<td>60</td>
<td>Sl</td>
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<td>2.3</td>
<td>40.4</td>
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<td>60-120</td>
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<td>2.1-2.2</td>
<td>32.4-36.4</td>
<td>5.26</td>
<td>28.1-31.1</td>
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<td>260-380</td>
<td>Scl</td>
<td>1.29-1.65</td>
<td>2.2-2.8</td>
<td>35.7-53.9</td>
<td>8.48</td>
<td>27.8-47.3</td>
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</table>
Similar findings were reported by Souza et al. (2019) for the sandstone soils of Piauí, Brazil. Increasing clay content with depth, particularly in the B horizons is indicative of lessivation. Values obtained in this study are higher than those of Ahukaemere et al. (2013) and Udoh (2015) and corroborates those of Lawal et al. (2012).

The coefficient of variation (CV) of silt and clay down the toposequences were 22 and 27 %, respectively for the surface soils, while sand had very low values. This suggests that surficial erosion or lateral movement encourages mainly fine particles; clay and silt.

The bulk density values ranged between 1.09 in the valley bottom and 1.65 Mg/m³ in the middle slope of the soils (Tables 3a,b,c). Irrespective of the landscape positions, the surface mean values were within 1.1 – 1.4 Mg/m³ suggested for cultivated loams (Donahue et al., 1983), but were less than 1.60 Mg/m³. This indicates that air and water movement in the soils are optimum for plant growth (Esu, 2010). Also, particle density was slightly less than 2.65 Mg/m³ (Table 2) recommended for mineral soils in the tropics (Blake, 1965). Such values may indicate lower amounts of oxides of Fe and Mn in the soils. Bulk and particle densities had very low variability with landscape position (CV < 7 %).

Forms of porosity and values obtained are presented in Tables 3a,b,c. Mean values of total porosity were less than 50 % while air-filled porosity (macro porosity) exceeded 25 % and volumetric water content (micro porosity) was quit low for the surface and subsurface soils of all the landscape positions. However, very high CV of water content (> 40 %) between landscape positions irrespective of soil depth, indicates variation in soil drainage with depth and landscape position and agrees with the concept of a catena. Total porosity values were within the range of values obtained by Ahukaemere et al. (2013) in the false bedded sandstone derived soils of Southeastern Nigeria; however, Ahukaemere and Akpan (2012) had higher values of 26.76 – 43.02 % in soils of Asamiri in Ebonyi State, Nigeria.

Chemical properties of the soils

Results of chemical properties of the soils are presented in Table 4. Mean soil pH values were comparatively higher in the subsurface soils (Table 4), and rated as severely and moderately acid for the entire soils (Holland et al., 1989). Low pH in sandstone derived soils is attributed to low soil base status (Souza et al., 2019). This indicates that significant amounts of exchangeable Al³⁺ and H⁺ may present to significantly affect plant growth (Esu, 2010). The pH seems to have been more influenced by exchangeable H⁺ as its values were higher than exchangeable Al³⁺ in over 95 % of the horizons (Table 4). Consequently, exchangeable Al³⁺ was generally less than 2.1 cmol/kg as recommended by Holland et al. (1989) for most arable crops. Such values are not likely to be toxic to plant roots as to affect its proliferation. Sandstone derived soils seem to vary in pH with location (Ahukaemere et al., 2013; Bulktrade, 1989). However, the pH values obtained by Ukut et al. (2014) in similar soils elsewhere were similar to those obtained in the present study. Very low CV for soil pH indicates that it is poorly influenced by the toposequences while exchangeable acidity had values that were > 20 %.

Soil organic carbon was rated low in the crest and valley bottom, but moderate in the middle slope (Table 4) (Holland et al., 1989). The low soil organic carbon may be attributed to organic matter mineralization, loss to leaching, and bush burning. These values agree with those of Bulktrade (1989) in the Bekwarra area and vary with those of Ogunwale and Ashaye (1975). The CV of organic C was greater than 20 % and indicates variability with landscape position imposed by land use. Total N had similar trend as organic C and was rated as low to very low (Table 4) in the entire soils (Holland et al., 1989). According to Eshtet (1985), low nitrogen in an area is attributed to crop removal and rapid mineralization of organic matter. Laffan et al. (1998) obtained similar results in Northern Tasmania, New Zealand.

The C/N values were less than the separating index of 25 (Paul and Clark, 1989) and 20 (Agbede, 2009) (Table 4), and were rated low. This ratio will encourage high level of microbial activity, increased decomposition of organic matter and corresponding release of nutrient elements into the soil solution for plant root uptake (Akpan-Idiok and Ofem, 2014). Available P was rated low (Holland et al. 1989) in the entire soils, however, the middle slope soils appeared to be comparatively higher than other landscape positions (Table 4). The surface soils had higher variation (CV) with landscape positions than the subsurface soils. Surface soils are most often manipulated than subsurface soils. This may be due to the influence of agricultural activities such as tillage, manure/fertilizer application, and fecal manure/fertilizer application, and

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**Table 3c: Physical properties of the soils in the valley bottom**

<table>
<thead>
<tr>
<th>Horizon</th>
<th>Depth (cm)</th>
<th>Sand (g/kg)</th>
<th>Silt</th>
<th>Clay</th>
<th>Text. (Cg)</th>
<th>Bd (Mg/m³)</th>
<th>Pd (Mg/m³)</th>
<th>TP</th>
<th>WC (%)</th>
<th>Air filled (%)</th>
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<td>260</td>
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<td>2.3</td>
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**Foot note:** BD= Bulk density, Pd= particle density, TP= Total porosity, WC= Water content.
### Table 4: Chemical properties of the soils in the crest

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<th>Horizon</th>
<th>Depth (cm)</th>
<th>pH</th>
<th>O.C (g/kg)</th>
<th>T.N</th>
<th>C/N</th>
<th>Av.P (mg/kg)</th>
<th>Ca</th>
<th>Mg</th>
<th>K</th>
<th>Na</th>
<th>Al&lt;sup&gt;3+&lt;/sup&gt; (cmol/kg)</th>
<th>H&lt;sup&gt;+&lt;/sup&gt;</th>
<th>EA</th>
<th>CEC</th>
<th>CEC/Clay</th>
<th>BS (%)</th>
<th>Ca/Mg</th>
<th>Mg/K</th>
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**Footnote:** OC (Organic carbon); T.N (Total nitrogen); Av.P (available phosphorus); EA (Exchangeable acidity); CEC (cation exchange capacity); BS (Base saturation)

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fecal and leaf dropping as well as surficial erosion.

The soils exchange complex was dominated by exchangeable Ca\(^{2+}\) and Mg\(^{2+}\) with values that were rated as moderate (Holland et al., 1989). Souza et al. (2019) also reported the dominance of Ca and Mg ions in sandstone derived soils in Piauí, Brazil. Exchangeable Ca had a range of 4 – 8.8 cmol/kg while exchangeable Mg ranged from 0.8 to 3.6 cmol/kg in the entire soils (Table 4). Values of exchangeable K\(^{+}\) and Na\(^{+}\) were rated low as they were less than 0.13 and 0.10 cmol/kg (Table 4), respectively (Holland et al., 1989). Souza et al. (2019) reported very low values for exchangeable K in

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Footnote: OC (Organic carbon); T.N (Total nitrogen); Av.P (available phosphorus); EA (Exchangeable acidity); CEC (cation exchange capacity); BS (Base saturation)
The exchangeable bases had CV values in the order Mg > Ca > Na > K, with Mg being the most variable down the toposequences.

Cation exchange capacity by NH₄OAc at pH 7.0 in the soils had ranges of 14-23.5 and 18.67-30.0 cmol/kg in the surface and subsurface soils (Table 4), respectively. These values are moderate to high (Holland et al., 1989). Lower values (<8.8 cmol/kg) of CEC were reported by Souza et al. (2019). They further attributed the values to low clay content. Higher subsurface values indicate that clay may have been more responsible for the soils exchange capacity than organic matter. The soils are likely to encourage plants nutrients uptake and increase crop yield. Bulktrade (1989) obtained similar results in the study area while Udoh (2015) obtained lower values for similar soils elsewhere. The CV of CEC in the surface soils was > 20 % and indicates higher variability in the surface soils of the toposequences.

Base saturation (BS) values ranged between 66 and 92 % in the middle slope and crest and 14 - 50 % in the valley bottom (Table 4). Such values are higher to very high (Holland et al., 1989) and indicate that the basic cations are in readily available forms for plant root uptake and correlates with the low values obtained for exchangeable aluminium which was within permissible levels. Similar values were obtained by Bulktrade (1989) and Udoh (2015) for sandstone soils in Bekwarra and Niger Delta region of Nigeria, while Naganori et al. (1984) obtained very low to moderate base saturation for the shattered sandstone soils in Southeast, Nigeria. The CV of BS down the toposequences was less than 7 % and described as low.

The Ca-Mg ratio in the soils was either within the range of 3:1 to 5:1 or slightly higher than recommended for productive soils (Landon, 1991), an indication that the interaction between Ca and Mg is appropriate for the growth of crops. Though with moderate levels of Mg and low K, the ratios of the cations were high when compared to the critical level of 1:2 for productive soils (Landon, 1991). This indicates that the interaction between Mg and K in the soils is high enough to support the growth of crops. Mg in the form of Mg²⁺ is more likely to be available to crop plants in the soil relative to K (Akpan-Idiok and Ofem, 2014).

**Soil classification**

Pedons in the crest and middle slope had high base saturation (NH₄OAc pH 7) below the upper boundary of the argilllic B horizons with values greater than 50 % as well as Ochric epiptus. The soils qualified as Alfisols. Ustic soil moisture regime qualified them as Ustalfs. Values obtained for CEC/clay in pedon 1 were also greater than 16 cmol/kg in all sub horizons with percent decrease in clay of > 20 % from horizons with maximum clay content. The soil qualified as Haplustalf. However, pedons 2 (crest), 3 and 4 (middle slope) had no densic, lithic or paralithic contacts within 150 cm of the soil surface. Also, with increasing depth the soils do not have clay decrease of 20 % or more from the maximum clay content while chroma of 5 or more was obtained with Hue of 7.5YR and 10YR in the argillic horizon of pedon 4 and Cr1 horizon of pedon 3 respectively. Pedons 2, 3 (Haplic Acrisols) and 4 (Rhodic Luvisols) qualified as Paleustalfs in the greatgroup and as Typic Paleustalf at the subgroup category while pedon 1 (crest) qualified as Typic Haplustalf (Haplic Acrisols).

Valley bottom soils were formed over alluvium, shallow to water table and without pedogenic horizons except Ochric epiptus. They qualified as Entisols; however, the soils fail to meet the criteria of other suborders in Entisols and are classified as Orthents and as Udorthents in the great group category. Consequently, the soils have in all horizons but one within 100 cm of the mineral soil surface, chroma of 2 or less and also aquic conditions for some time of normal years. The soils in the valley bottom qualified as Aquic Udorthents (Hypereutric Gleysols) at the suborder category.

**Land evaluation for cashew production**

Climate, wetness, physical soil properties as well as fertility qualities were optimum or near optimum for cashew production except limitations occasioned by organic C and available nutrients (a). However, poorly drained soils of pedons 5 & 6 were in addition, limited by poor drainage. Current index of productivity of the soils indicate that 33.3 % of the soils were marginally suitable (pedons 2 & 4), another 33.3 % was currently not suitable (pedons 1 & 3) while 33.3 % was permanently not suitable (pedons 5 & 6) for the production of cashew. The soils were mainly limited by organic carbon and available nutrients (total N, available P and exchangeable K) while the poorly drained soils (pedons 5 & 6) were in addition, limited by poor drainage and flooding. Organic matter content correlates with cashew nut/m² (Ngatunga et al., 2001) and acts as the main source of phosphorus (Bleepker & Laut, 1987). Available P is an essential component of the cell nucleus in cashew (Widatmaka et al., 2014), however, delay maturity as well as shriveled seeds are sensitive symptoms of its deficiency (Akipokpodion et al., 2009; Widatmaka et al., 2014a). Consequently, Ibremo et al., (2012) advocated the use of rock phosphates for treatment, while amended organic fertilizer improves the growth of the crop (Adeigbe et al., 2015).

Potential index of productivity (IPp) presents a situation where measures are put in place to remove limitations present in IPC. Figs. 2a and b show the suitability classes for Cashew production in Anyikang and Ibiaragidi. Out of a total area of 82.17 ha evaluated, 65.3 % was moderately suitable while 34.7 % of the land area was not suitable for Cashew production in Anyikang. Similarly, Ibiaragidi occupied a total area of 38.08 ha with 77.5 % considered moderately suitable while 22.5 % was not suitable for cashew production.

Limitations due to organic C, total N and available P were removed by simple application of organic matter (composted animal droppings and plant residues). Consequently, 66.7 % of the soils (pedons 1, 2, 3 & 4) were upgraded to moderately suitable status while 33.3 % were currently not suitable (pedons 5 & 6).
On the contrary, Udoh et al. (2015) classified the sandstone soils of Akwa Ibom as highly and moderately suitable for cashew production. It is therefore necessary to make a change of the current land use for the tract of land. Major limitations were due to availability of nutrients (a) expressed by exchangeable K in the entire soils while drainage caused a major challenge for soils in the poorly drained areas. Results obtained by Udoh (2015) identified soil physical properties as the main constraint for cashew production in Akwa Ibom state. Poorly drained soils have reduced availability for exchangeable cations (Bleecker & Laut, 1987) while nitrogen has been described as a necessity during the growth stage of cashew tree (O’Farrell et al., 2002). It is important therefore, to increase N, P and exchangeable K for increased production of cashew (Widiatmaka et al. 2014).

![Fig. 2a: Potential suitability classes for Anyikang](image)

![Fig. 2b: Potential suitability classes for Ibiaragidi](image)
Table 5: Land characteristics data and rating of the soils

<table>
<thead>
<tr>
<th>Ped</th>
<th>MAR mm/yr</th>
<th>MAT °C</th>
<th>Flood</th>
<th>Drain.</th>
<th>Text</th>
<th>Depth cm</th>
<th>CEC cmol/kg</th>
<th>BS %</th>
<th>pH (H₂O)</th>
<th>OC g/kg</th>
<th>TN</th>
<th>AP (ppm)</th>
<th>Exch. K (cmol/kg)</th>
<th>IPc</th>
<th>IPp</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>983</td>
<td>27.9</td>
<td>Fo</td>
<td>S(100)</td>
<td>SL</td>
<td>195</td>
<td>S(90)</td>
<td>S(100)</td>
<td>87</td>
<td>S(100)</td>
<td>S(100)</td>
<td>S(55)</td>
<td>S(55)</td>
<td>S(70)</td>
<td>S(70)</td>
</tr>
<tr>
<td>2</td>
<td>983</td>
<td>27.9</td>
<td>Fo</td>
<td>S(100)</td>
<td>SC</td>
<td>150</td>
<td>S(95)</td>
<td>S(100)</td>
<td>85</td>
<td>S(100)</td>
<td>S(100)</td>
<td>S(60)</td>
<td>S(55)</td>
<td>S(72)</td>
<td>S(41.5)</td>
</tr>
<tr>
<td>3</td>
<td>983</td>
<td>27.9</td>
<td>Fo</td>
<td>S(100)</td>
<td>SCL</td>
<td>145</td>
<td>S(90)</td>
<td>S(100)</td>
<td>73</td>
<td>S(95)</td>
<td>S(95)</td>
<td>S(55)</td>
<td>S(55)</td>
<td>S(70)</td>
<td>S(38.7)</td>
</tr>
<tr>
<td>4</td>
<td>983</td>
<td>27.9</td>
<td>Fo</td>
<td>S(100)</td>
<td>SCL</td>
<td>87</td>
<td>S(90)</td>
<td>S(100)</td>
<td>80</td>
<td>S(85)</td>
<td>S(85)</td>
<td>S(60)</td>
<td>S(60)</td>
<td>S(72)</td>
<td>S(65)</td>
</tr>
<tr>
<td>5</td>
<td>983</td>
<td>27.9</td>
<td>F1</td>
<td>S(100)</td>
<td>S(45)</td>
<td>SCL</td>
<td>200</td>
<td>S(90)</td>
<td>88</td>
<td>S(88)</td>
<td>S(88)</td>
<td>S(55)</td>
<td>S(55)</td>
<td>S(65)</td>
<td>S(30.4)</td>
</tr>
<tr>
<td>6</td>
<td>983</td>
<td>27.9</td>
<td>F1</td>
<td>S(100)</td>
<td>S(45)</td>
<td>SCL</td>
<td>180</td>
<td>S(90)</td>
<td>74</td>
<td>S(85)</td>
<td>S(85)</td>
<td>S(60)</td>
<td>S(60)</td>
<td>S(72)</td>
<td>S(20.9)</td>
</tr>
</tbody>
</table>

N/B: MAR; Mean annual rainfall. MAT; Mean annual temperature. FGW; fluctuating ground water. IPc; Current or actual index of productivity. IPp; potential index of productivity. w; wetness. f; soil fertility. a; available nutrients. S:; Moderately suitable. N:; Temporarily not suitable. N:; Permanently not suitable for the land use under consideration.
Conclusion and recommendations

The morphological, physical and chemical properties as well as classification of sandstone derived soils of Southern Guinea savanna in Bekwarra LGA were studied at various landscape positions and variability obtained in most soil properties. The soils were low in exchangeable cations and low to moderate in organic carbon with sand dominating the soil particle size distribution. However, soil CEC was moderate to high. At the subgroup category, pedon 1 was classified as Typic Haplustalf (Haplic Luvisols) while pedons 2 and 3 were classified as Typic Paleustalf (Haplic Luvisols) and pedon 4 as Typic Paleustalf (Rhodic Luvisols). Pedons 5 and 6 qualified as Aquic Udorthents (Hypereutric Gleysols). Land suitability evaluation indicated that the soils are most likely to improve upon proper management. Current index of productivity indicated marginal (S3) and not suitable classes (N1 & N2) which further advanced to moderately suitable (S2) and currently not suitable (N1), potentially for cashew production. It is advocated that farmer education should be intensified with the following site specific soil management procedures:

1. A combination of organic and inorganic fertilizers (Potassic fertilizer) should be used to boost soil productivity in the area.
2. Extremely acid soils affect the activities of most soil microbes and the availability of nutrients. Application of calcite and dolomite would not only attempt to solve acidity problems but also increase nutrients such as calcium and magnesium in the soils.
3. Mulching with organic plant residues should be encouraged. This will reduce the speed of run off and increase soil organic matter content thereby improving the structure of the sand dominated soils.
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IFRS Adoption and Economy Performance of Nigeria and Kenya

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Abstract: The purpose of this paper is to examine the effect of pre and post-adoption periods of the International Financial Reporting Standards (IFRS) in Nigeria and Kenya economy. A desk review research approach was adopted in this study, as related journals, articles, and literatures related to this research work were reviewed. The paper found out that, in Nigeria, many economic challenges and issues have been faced by the country during the NGAAP period such as inability of the users of financial statements to comprehend very well, the information in multinational company’s financial reports, decline in the inflow of the Foreign Direct Investment (FDI) in Nigeria, etc, and it was on this ground that the country government adopted and initiated IFRS in 2012 to combat and rectify these challenges and to foster the economic growth simultaneously. We also found that six years after the adoption of IFRS by Kenya in 1999, many companies listed on the Nairobi Stock Exchange (NSE) have not exhibit 100% compliance to the full adoption of the standard even though they had the required resources for the efficient implementation of this standard in their companies, but they feared forgoing the benefits of their past and potential future innovations in local reporting standards specific to their economies. The study therefore recommended, among other thing, that while implementing IFRS in Nigeria, Kenya and other developing countries, other factors such as the institutional framework, national legal system, and good corporate governance practices should be strengthened to ensure an improvement in transparency and comparability of financial statement preparation and presentation.

Keywords: IFRS, Adoption, Uniform Accounting Standards, Economic Growth, Compliance

INTRODUCTION

As the current trend of accounting internationalization worldwide has evolved by converging the accounting standards of each country with the International Accounting Standards Board (IASB) toward a direction that promotes and encourages IFRS adoption. The nomenclature of the Generally Accepted Accounting Principle (GAAP) has obviously become illusive in view of the pressure of globalization, capital market crash with global economic meltdown and the Enron’s case which led the accounting profession to insist on the need for a single set of high quality reporting standards (Leonard et al., 2018).

Robert A. King’wara (2015) opined that IFRS was set to be the accounting standard in Kenya in 1998 by the Council of the Institute of Certified Public Accountants of Kenya (ICPAK) effective for financial statement covering periods beginning 1 January 1999. IFRS, including IFRS for small and medium enterprises (SMEs) are the Kenya national accounting standards. Companies whose securities are not publicly traded may choose the IFRS for SMEs or full IFRS. Requirements to use IFRS have been incorporated into Regulations issued by various governmental regulatory bodies, including the Central Bank of Kenya’s prudential guidelines and regulatory guidelines issued by the Insurance Regulatory Authority of Kenya (IRA), the Capital
Markets Authority of Kenya (CMA), and the Retirement Benefits Authority. Also IFRS are required by the Nairobi Securities Exchange (NSE) listing rules.

Isenmila and Adeyemo (2013) noted that the CBN and SEC also adopted this date for compliance and has issued guidance compliance circulars to ensure full implementation of IFRS in Nigeria. Most organizations reported their financial statement based on local standards set in their countries which made interpretation of the financial statement difficult across the globe. The decision to adopt IFRS is observed to have some weaknesses, as such, implementation of policy results in a lot of challenges. For instance deficiencies in our educational systems, infrastructures and political undertone have defeated the express given. It is believed that there was no adequate consultation before the implementation policy of IFRS in Nigeria.

More so, it became unarguably clear that what was being practiced by corporations, organizations and entities world over (under the auspices of each country’s national GAAP) could not survive the pressure and heat of the globalization of virtually every nation that has economic value; a financial reporting standard that would be all embracing; that can guarantee international acceptance and cross-border interactions, comparability and standardized financial reporting (Leonard et al., 2018). Hence, this prompt the emergence of a global reporting standard called International Financial Reporting Standard (IFRS) issued by the International Accounting Standards Board (IASB). However, economic growth is fundamental to the success of every nation. Countries that have consistent economic growth have had the capacity to cut down poverty, fortify their democratic belief system and political dependability, enhance the quality of their environment, and diminish war, crime and violence.

Also, as observed by Oladeji & Agbesanya (2019), the compliance challenge with the adoption of IFRS has been a significant focus of many organizations’ conversion efforts. Companies are not keen on adopting the International financial Reporting Standards (IFRS) due to the bottlenecks and difficulty in changing from their existing reporting systems to the new one. This could be attributed to the high cost involved, including the cost of retraining their existing staffs in this regard as most of them lack the knowledge of IFRS application in financial reporting preparation. Tosin (2012) also opined that part of the problem could be attributed to ignorance on the part of the company owners as to relevance of IFRS to the quality of their financial reporting system.

However, adoption of IFRS for its impacts to be positively felt in some African countries requires overcoming obstacles like; loss of experts to other jurisdictions, need for capacity building both at Institute level as well as at firm and company levels and ensuring that training / education of accountants keeps pace with the changes in IFRSs (both academic and professional training).

STATEMENT OF THE PROBLEM

African countries' companies are not eager to adopt the International financial Reporting Standards (IFRS) due to the bottlenecks and difficulty in changing from their existing reporting systems to the new one. This could be attributed to the high cost involved, including the cost of retraining their existing staffs in this regard. Part of the problem could be attributed to ignorance on the part of the company owners as to relevance of IFRS to the quality of their financial reporting system. This research work aims at examining the challenges of African countries in the adoption of International financial Reporting Standards (IFRS) and its effect on their economic growth.

OBJECTIVE OF THE STUDY

The objective of the study isto appraise the challenges companies or organizations face in the adoption of International financial Reporting Standards (IFRS) in Nigeria and Kenya. Also to determine if adoption of International financial Reporting Standards (IFRS) has enhanced the economic growth in Nigeria and Kenya. These two countries are set of African countries that have already adopted IFRS but have some challenges embattling with its total adoption. Difference in the economic growth before and after IFRS adoption are the main focus of this study.
LITERATURE REVIEW

According to Yahya et al., 2016, International Financial Reporting Standards (IFRS) are designed as a common global language for business affairs so that company accounts are understandable, reliable, relevant and comparable across international boundaries. They are a consequence of growing international shareholding and trade and are particularly important for companies that have dealings in several countries. They are progressively replacing the many different national accounting standards. IFRS includes: IFRS issues by the IASB; International Accounting Standards (IASs) issued by the IASC, or revisions thereof issued by the IASB; Interpretations of IFRS and IAS developed by the Interpretations Committee (IFRSIC) and approved for issue by the IASB and Interpretations of IAS developed by the SIC and approved for issue by the IASB or IASC. Umobong et al., (2015) investigated the differences in the quality of accounting information Pre and post IFRS adoption by manufacturing firms in Nigeria over a five year period and concluded that there is a declination in accounting quality using earnings management, value relevance, and timely loss recognition as independent variables. Earnings and book value of equity are less value relevant and timely loss recognition is less in post-IFRS compared to pre-IFRS period.

International Financial Reporting Standards (IFRS) is the new dominant set of accounting standards developed under a rigorous due diligence process and now used in more than 120 countries around the world, including Australia, Brazil, Canada, the European Union, South Africa, Nigeria and many others (Deloitte Touche Tohmastu, 2013). Each country adopting IFRS undergoes a transition process in the year of adoption. This process may be fairly disruptive for users of financial statements as accounting treatments of analogous items may vary, and impair comparability and trend analyses. Since the quality of financial statements is influenced by the quality of the underlying accounting standards, users may benefit from understanding the impact of a shift from local generally accepted accounting principles (GAAP) to IFRS. Also, economic changes are likely to have similar consequences as Land and Lang (2002) document that accounting quality has improved worldwide since the beginning of the 1990s, and suggest that this could be due to factors such as globalization and anticipation of international accounting harmonization.

IFRS Adoption in Nigeria & Kenya

IFRS adoption and implementation in Nigeria started on 28 July 2010, when the Nigerian Federal Executive Council (FEC) approved January 2012 as the effective date for the convergence from Nigeria Generally Accepted Accounting Practices (NGAAPs) to International Financial Reporting Standards (IFRS). In addition, the FEC ordered the Nigerian Accounting Standard Board (NASB) to take further necessary action to give effect to councils’ decision. This decision of Federal Executive Council to fully adopt IFRS in Nigeria was followed by the enactment of the Financial Reporting Council of Nigeria Act in 2011, which led to the transformation of the Nigerian Accounting Standard Board (NASB) to the Financial Reporting Council of Nigeria (FRCN). The NABS announced its Roadmap to convergence with IFRS in September 2010. Based on this Roadmap Nigerian Listed Companies and significant public interest entities have been mandated to comply with IFRS commencing from 1st January, 2012. While other public interest entities have been required to comply starting from 1st January, 2013 and small and medium sized entities expected to comply for period ending after 1st January, 2014. The report sought the amendment of relevant laws and regulations that had one provision or the other impacting on financial reporting in Nigeria to ensure uniformity and removal of conflicts and ambiguity. Specifically; Companies and Allied Matters Act (CAMA) 1990, Banks and Other Financial Institution Act BOFIA) 1991, Investment and Security Act (ISA) 2007, etc. Furthermore, the report recommends for an early countrywide intensive capacity building programs to facilitate the process of adoption and the establishment of IFRS Academy an institutional platform for capacity building. Akpan-Essien (2011) state that the adoption of the IFRS will ensure transparency, accountability and integrity in financial reporting necessary for addressing the crisis in the financial sector in Nigeria which was responsible for the Nigeria loss of the Foreign Direct Investment (FDI) in the oil and gas sector to countries such as Ghana; that have begun oil production in commercial quantity and who are perceived to have better financial reporting standards in place.

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Kenya was one of the first countries to adopt the use of IFRS and IAS in 1999. Over the years, Kenya has developed a wealth of experiences in the use of IFRS which would provide useful insights in the development of strategies by ISAR to aid other countries in the implementation of IFRS (United Nations Conference on Trade and Development, 2006). There is one stock market in Kenya; the Nairobi Stock Exchange, in which the shares of about 50 companies are traded. In addition to these listed companies, there are also a sizeable number of companies which are either multinationals or owned privately by Kenyans, as well as a large number of small and medium-sized enterprises (SMEs). In terms of financial reporting, all these companies are required to prepare financial statements based on International Financial Reporting Standards (IFRS). Other public interest companies such as, among others, banks, insurance companies, cooperative societies, non-governmental organizations also prepare accounts in accordance with IFRS. According to the United Nation Conference on Trade and Development (UNCTAD) in 2006, it was cited that in a bid to entrench and encourage the use of International Financial Reporting Standards (IFRS), ICPAK established an award known as the Financial Reporting (FiRe) Award in 2002. This award involves the evaluation of financial statements which have been voluntarily submitted by companies, to gauge their compliance with the requirements of IFRS. In 2005, six years after implementation of the IFRS in Kenya, it was observed that there was no single company which exhibited 100 per cent compliance with IFRS out of a total of 84 companies who submitted their financial statements for review. Most of these companies were quite large and indeed about 45 of them are listed on the Nairobi Stock Exchange (UNCTAD, 2006). These companies have the resources to recruit well-trained professionals but have failed to fully comply with IFRS in the preparation of their financial statements.

According to a study by Ajibade et. al. (2019), the result of their analysis; on the effect of IFRS pre adoption period (2002-2009) and post adoption period (2010-2016) on economic growth in Kenya, showed that the economic growth in Kenya is better after the adoption of IFRS. They went further in their study that IFRS improved GDP in the manufacturing sector of the country as this was achieved through increased foreign direct investment in the country, and therefore, posited that for a developing country like Kenya to enjoy consistency in their economic growth, the country has to adopt the notions of IFRS in their financial statement preparation and presentation so as to enjoy the full benefit of the standard. This was in line with the work of Kenneth Enouch (2012).

Benefits of IFRS Adoption
Odo (2018), notwithstanding that there may be some challenges to face by countries in their decision to adopt IFRS; its worldwide adoption has been promoted on the premise of its perceived benefits which are considered to outweighed the costs. Proponents of the adoption of IFRS argue that there are a number of benefits which can be gained from greater cross-country comparability of firms’ financial reports. Barth (2008), for instance, argues that by adopting a common body of international standards, countries can expect to lower the cost of information processing and auditors of financial reports can be expected to become familiar with one common standard than with various local accounting standards. The argument here is that countries choose to adopt IFRS when they expect to increase the share of foreign capital and trade in the economy. In this sense, even countries with low levels of foreign capital and trade can choose to adopt IFRS if they are expecting growth in those sectors.

Uniformity in Accounting Language
Adoption of IFRS will lead to uniformity in accounting language across the globe which is a pre requisite for the globalization of business, finance and investment with primary objective of eliminating the unnecessary complexity that exists with multiple reporting languages. As it is common knowledge, there exist differences in the classifications of financial information, levels of disclosure and accounting concepts between countries (Odo, 2018). Abel, (2011) opined that accounting terminologies can easily confuse the uninitiated owing to differences in business language. In supporting his view gave an instance on the word stock which, in most North American countries, refers to share ownership, whereas, in the commonwealth countries, the word stock is typically associated with merchandise inventory. The closest word to current in
Japanese language is said to be present. While these two words (i.e. current and present) may appear to convey the same meaning, such may not be the case if used in terms of asset valuation in the preparation of financial statements. While current value is about discounted cash flow measures. In this sense, unsold stock may convey under-subscribed floatation. In commonwealth countries, this will refer to unsold inventory of finished goods. Still on current: whereas the time frame distinguishing a current and non-current liability is typically a year in the US and in IFAC standards, the cut-off point is commonly four years in Germany. In fact, Choi (1998) said it succinctly when he observed in his presentation at conference that “Accountants inhabit a kind of Tower of Babel where we not only speak different language but also give different interpretations of the same events and transaction”.

Positive effects of IFRS
At least five affirmative reliefs flow from adopting uniform reporting standards, the first three relating to voluntary adoption (i.e., without government fiat), while the remaining two are dictated by regulatory and user influences (Herbert, 2010). The first affirmative argument, which relates to scale economies, underlies all forms of uniform contracting: uniform rules need only be introduced once. They constitute a type of ‘public good’, in that the marginal cost of an additional user adopting them is zero, and nobody is disadvantaged by another using them. The second advantage of uniform standards is the protection they give auditors against managers playing an ‘opinion shopping’ game (Ball, 2006). If all auditors are required to enforce the same rules, managers cannot threaten to shop for an auditor who will give an unqualified opinion on a more favourable rule.

The third argument supporting uniform financial reporting is the potential of eliminating informational externalities arising from lack of comparability. If firms and/or countries use different accounting standards and techniques – even if unambiguously disclosed to all users – they can impose costs on others (in economics parlance, create negative externalities) due to lack of comparability. To the extent that firms internalize these effects, it will be advantageous for them to use the same standards as others - IFRS. The fourth advantage derives from the worldwide support from multinational corporations (MNCs), regulators and users because of the belief that common standards in the preparation of corporate financial statements will facilitate international comparability from different countries. Large MNCs operating in multiple jurisdictions would be able to use one accounting language company-wide and present group financial statements in the same language as their competitors. The fifth benefit is the belief that in a truly global economy, finance professionals will be more mobile, and companies will more easily respond to their group human capital needs around the world.

These advantages imply that the IFRS offer some degree of uniformity in accounting standards that is prospective in a market setting. In addition to the above, direct and indirect advantages of IFRS adoption for investors have been isolated. Direct advantages to investors include:

a) IFRS promise more accurate, comprehensive and timely financial statement information, relative to thenational standards they replace for public financial reporting in most of the countries adopting them. To the extent that financial statement information is derived from IFRS sources, this should lead to more-informed valuation in the equity markets, and hence lower risk to investors.

b) Small investors are less likely than investment professionals to anticipate financial statement information from other sources. Improving financial reporting quality through uniform standards allows them to compete better with professionals, and hence reduces the risk of adverse selection through a better-informed professional (known as ‘adverse selection’) (Diamond and Verrecchia, 1991; Leuz and Verrecchia, 2000).

c) By eliminating many international differences in accounting standards, and standardizing reporting formats, IFRS eliminate many of the adjustments analysts historically make in order to make companies’ financials more comparable internationally. IFRS adoption has the potential to reduce the cost of processing financial information. The gain would be greatest for institutions that create large, standardized-format financial databases.

d) Reducing the cost of processing financial information will most likely increase market efficiency, that is, the efficiency with which the stock market incorporates it in prices. Investors are expected to gain from increased market efficiency.
Reducing international differences in accounting standards assists to some degree in removing barriers to cross-border acquisitions and divestitures, which in theory will reward investors with increased takeover premiums (See Bradley et al., 1988). In addition, IFRS offer several additional indirect advantages to investors. First, it is expected that IFRS should induce higher information quality which, in turn, should reduce the risk of equity investment and the risk to less informed (naive) investors due to adverse selection. Theoretically, therefore, IFRS should lead to a reduction in firms’ costs of equity capital, which would increase share prices, and make new investments more attractive, *ceteris paribus*. Another indirect advantage of IFRS is the potential improvement in transparency and usefulness of financial statement information in contracting between firms and other stakeholders, notably lenders and managers (Watts, 1977; Watts and Zimmerman, 1986). Increased transparency causes managers to act more in the interests of shareholders. In particular, timely loss recognition in the financial statements increases the incentives of managers to attend to existing loss-making investments and strategies more quickly, and to undertake fewer new investments with negative net present values (Ball, 2001; Ball and Shivakumar, 2005).

The increased transparency and loss recognition timeliness promised by IFRS therefore could increase the efficiency of contracting between firms and their managers, reduce agency costs between managers and shareholders, and enhance corporate governance. The potential gain to investors arises from managers acting more in their (i.e., investors’) interests. In other words, the increased transparency and loss recognition timeliness promised by IFRS could increase the efficiency of contracting in debt markets - between firms and lenders - with potential gains to equity investors in terms of reduced cost of debt capital both locally and internationally.

### Challenges Faced by Developing Countries while Adopting IFRS

Challenges faced during the adoption of IFRS in most developing countries as noted by Abdulkadir (2013) are:

**Poor and Low Enlightenment Campaign:** The transition plan to IFRS and its implication for preparers and stakeholders of financial statement have to be effectively coordinated and communicated. A country action plan for transition needs to have logistical framework of targeted activities to be completed within a specific period of time. This includes raising awareness on the potential impact of the conversion, identifying regulatory synergies be derived and communicating the temporary impact on the transition on business performance and financial positions.

**Shortage of Manpower for IFRS:** One of the difficulties Nigeria is facing is the shortage of accountants and auditors who are technically competent in implementing IFRS. This issue again is being taken care of by ICAN and workshops that are being organized not only nationally but by each state chapter of the institute.

**Associated Problems in Higher Institution:** The extent of the integration of IFRS modules into the tertiary institutions accounting education curricula and the coordination of such accounting education program with professional institutions qualification and regulations is a major challenge to the implementation of IFRS. National Universities Commission (NUC) and the National Board for Technical Education (NBTE) should spread the knowledge of IFRS to all tertiary institution through the review of their curriculum.

**Training Resources:** The training of IFRS is not readily available at affordable cost. In addition even the training exercises organized are costly the few privileged accountants are able to attend.

**Tax Reporting Effects or Issues on IFRS:** IFRS conversion calls for a detailed review of the tax law and tax administration. Adjustment should be required in equity, retained earnings and reserves. Specific taxation rule will have to be redefined to accommodate these adjustments.

In addition, GAB (2012) stated that one of the demerits that will be experienced by countries adopting IFRS include: forgoing the benefits of any past and potential future innovations in local reporting standards specific to their economies.

### Theoretical Review

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The Economic Network Theory
Economic networks use the various competitive advantages and resources of each member to increase the production and wealth of all the members. Economic network theory predicts that in addition to network benefits, a product with network effects can be adopted due to its direct benefits (Liebowitz & Margolis, 1994 cited in Hamisi, 2012). In the case of the IFRS adoption by a country, the theory argues that the direct benefits are represented by both the net economic and net political value of IFRS over local standards (Barth, 2008). According to this theory economies with high levels of or expected increases in foreign investment and trade are more likely to adopt IFRS. This theory reveals evidence of regional trends in IFRS adoption, such that a country is more likely to implement IFRS if other countries in its geographical region are IFRS adopters (Hamisi, 2012). Adopting a set of standards like IFRS can be more appealing to a country if other countries have adopted them as well, in this sense, IFRS can be a product with “network effects”.

Positive Accounting Theory
This is an expression of neo-classical economic theory, which believes in an opportunistic behavior as a basis of all economic activity. PAT is the reason for the choice of accounting methods, techniques and policy decisions. PAT describes the organization in terms of a collection of contracts. These contracts are necessary in order to get self-seeking individuals to agree to cooperate. Examples are contracts with managers, suppliers of capital and employees including managers. These contracts enable the individual party to maximize on the shareholders wealth. The contracts are also associated with contracts costs such as monitoring and maintenance costs, negotiating costs and agency costs. PAT holds that firms will seek to minimize the contracting costs and this will affect the policies adopted including the accounting policies. PAT’s three hypothesis are the bonus plan hypothesis, the debt covenant hypothesis and political cost hypothesis. The bonus plan hypothesis suggests that managers of firms will be more likely to choose accounting procedures that shift reported earnings from future periods to the current period. According to Colasse (2000) PAT interferes either on the level of standards setter or on the firm level when standards setter let the choice among several options. Belkaoui (1992) argues that the central idea of the positive approach is to develop hypothesis about factors that influence the world of accounting practices and to test empirically the validity of these hypothesis. According to Watts and Zimmerman (1990), a sole accounting choice can reduce the explicative power of tests.

Empirical Review
Ajibade, et al, (2019) researched on International Financial Reporting Standard (IFRS) adoption and economic growth: a study of Nigeria and Kenya. The study adopted descriptive statistics to analyze the data collected from the manufacturing sector GDP of the two countries for the period of 2000-2011 and 2012-2016 as the pre and post IFRS adoption years respectively. The result of the T-test carried out at a significant level of 5% showed that there is a significant difference in the manufacturing sector GDP pre and post IFRS. Examining the findings revealed that adoption of IFRS improves the economic growth of both countries significantly. This means that IFRS adoption has brought about improved GDP in the manufacturing sector GDP of both countries. Thus posits that for emerging countries to enjoy improved economic growth, they have to properly adopt the notions of IFRS in their financial statement preparations and presentation so as to enjoy the full benefits.
Okoye et al., (2014) researched on the ‘Impact of the IFRS Adoption on Stock Market Movement in Nigerian Corporate Organization.’ Descriptive design was adopted using the stock price and shares traded during two years periods. SPSS Version 7.0 was also used to obtain the mean, variance and Std. Deviation. It observed that the adoption of IFRS in Nigeria will enhance credible financial statements that will also provide a basis for the strength of a corporate entity in capital market hence is a welcome development in Nigerian economy.
Zakari (2014) investigated the challenges of IFRS adoption in Libya using descriptive statistics. The research evidence indicated that IFRS adoption by Libyan Companies has faced some obstacles such as accounting education and economic issues.
Muller (2014) measured the impact of IFRS adoption on the quality of consolidated financial reporting in Germany using multiple regression model for a period of 4 years (2003-2006). The results of the findings revealed an increase in consolidated financial statement quality as a result of the adoption of IFRS.

**METHODOLOGY**

In this study, the articles, journals and literature related to this work were reviewed and a desk review research approach was adopted in the course of this study to give a well-grounded information and resolute conclusion.

**Findings and Conclusion**

Based on the review of many research works and assessment of the two countries’ economic situation during the pre-adoption periods and post-adoption periods of IFRS, it was discovered that many economic challenges and issues have been faced by Nigeria during the NGAAP period such as inability of the users of financial statements to comprehend very well, the information in multinational company’s financial reports, decline in the inflow of the Foreign Direct Investment (FDI) in Nigeria, etc. It is on this ground the country government adopted and initiated IFRS in 2012 to combat and rectify these challenges and to foster the economic growth simultaneously. More so, Nigeria face some other challenges while adopting the standard, such as lack of trained professionals for the efficient and effective implementation of this standard, which hinders the full implementation in the country as at that period, but it was observed that if the country provides adequate frameworks, trained professionals and adhere to the norms of the standard, the country will enjoy the full benefits of adopting IFRS.

On the other hand, Kenya adopted IFRS in 1999 and implemented it in the year 2000 including all public listed companies in the Nairobi Stock Exchange (NSE). In 2005, six years after the adoption of IFRS in Kenya, it was observed that many companies listed on the NSE have not exhibit 100% compliance to the full adoption of the standard even though they had the required professional manpower for the efficient implementation of this standard in their companies, but they feared forgoing the benefits of their past and potential future innovations in local reporting standards specific to their economies. It was in the year 2010, the standard start to gain full recognition in many companies and this in return was observed to have a significant impact on the economic growth of the country.

**Recommendations**

The following recommendations were made from the findings and conclusion of the study:

i. The Financial Reporting Council of Nigeria (FRCN) should embark upon aggressive awareness on the benefits of IFRS adoption in Nigeria.

ii. The Financial Reporting Council of Nigeria in conjunction with various professional bodies should place more premium on continuing professional education and training. As much as possible, the professional accountancy bodies should align their continuing professional education requirements with IFAC guidelines.

iii. Various stakeholders such as the professional bodies and regulatory agencies should embark upon subsidized training for members within their sectors to increase their awareness, knowledge and applications of IFRS.

iv. The regulatory agencies should be provided with the required financial support to carry out their regulatory functions in terms of ensuring that organizations comply strictly with the adoption of IFRS.

v. The government on their part should ensure that they provide the enabling environment towards ensuring the adoption and practice of IFRS in Nigeria and Kenya. This they can do by providing the necessary legislative framework for its adoption and practice.

vi. Professional accounting bodies in Nigeria and Kenya should make IFRS training a part of MCPE at a reduce cost.
vii. Government should ensure the fully adoption and implementation of IFRS in every possible sector of the nation in other to enjoy other benefits that accrue from it.

viii. It is also recommended that while implementing IFRS in Nigeria and Kenya, other factors such as the institutional framework, national legal system, and good corporate governance practices should be strengthened to ensure an improvement in transparency and comparability of financial statement preparation and presentation.

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Cirrhosis Of Liver: How can Resistivity Index saves life?

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Abstract- Background : Hepatorenal syndrome is a well recognized complication of liver cirrhosis. The intrarenal vasoconstriction is an early marker for functional renal failure. It can be assess using Renal artery blood flow test through colour Doppler.

Aims : To evaluate non-invasively renal arterial blood flow in patients with cirrhosis of liver by Doppler Ultrasonography.

Methods : Between May 2019 to April 2020, we studied Renal artery blood flow test in 50 liver cirrhotic patients admitted in Rims Ranchi. It is an Observational and Hospital based Prospective study. All the patients underwent standard diagnostic protocol including Blood test and Renal colour Doppler test.

Result : Out of 50 patients, 36 were male and 14 were female. Alcohol is the most cause of liver cirrhosis. The resistivity index > 0.7 was found in 17 decompensated and in 3 compensated liver cirrhotic patients with the significant P value < 0.001.

Conclusion : The resistivity index is not inferior in sensitivity and specificity to MELD Score.

Index Terms- Cirrhotic Liver Disease, Renal artery blood flow test, Resistivity Index (RI)

I. INTRODUCTION

Advanced liver cirrhosis is associated with a poor clinical outcome. Therefore, assessment of prognosis is important in the management of these patients.[1] In 2002, the Model for End-Stage Liver Disease (MELD) was introduced for patients undergoing transjugular intrahepatic portosystemic shunt. It is currently used to predict survival in patients awaiting liver transplantation. Patients with liver cirrhosis frequently develop renal dysfunction. The hepatorenal syndrome (HRS), the most serious renal complication, is associated with an extremely short survival time.

The HRS is characterized by renal arterial vasoconstriction, which may precede clinically manifest renal dysfunction. The intrarenal resistance index (RI) is the most frequently used parameter to assess intrarenal resistance and is calculated based on Doppler sonographic intrarenal measurements. It is routinely used to diagnose transplant rejection or renal artery stenosis. The RI is calculated as per the formula given below:

\( \text{RI} = \frac{S_D - S_S}{S_D} \)

(peak systolic frequency shift - lowest diastolic frequency shift) / peak systolic frequency shift.

On average, renal RI is higher in cirrhotic patients. The normal value of RI is 0.60 - 0.70 and is measured at the arcuate arteries (corticomедullary junction) or interlobar arteries (adjacent to medullary pyramids). Increased intrarenal RIs in patients with liver cirrhosis, especially in the decompensated stage, have been described before as compared to healthy controls. Cirrhotic patients with elevated intrarenal RIs tend to develop the HRS leading to a poor prognosis.

II. ANATOMY

Embryologically, the liver grows as a ventral diverticulum from the junction of foregut and the midgut into the ventral mesogastrium (the caudal part of the septum transversum; the cranial part forms the diaphragm). The same diverticulum forms the gallbladder and bile ducts as well. The ligamentum teres hepatis is the obliterated umbilical vein, which joins the left portal vein; the ligamentum venosum is the obliterated ductus venosus, which joins the left portal vein to left hepatic vein. The upper surface of the liver is percussed at the level of the fifth intercostal space. Superior, anterior, posterior and right surfaces of the liver are continuous with each other and are related to the diaphragm and anterior abdominal wall.[2]

The anterior surface is separated from the inferior (visceral) surface by a sharp anterior (inferior) border that is clinically palpable on deep inspiration. The inferior surface is related to the hepatic flexure (the area where the vertical ascending (right) colon takes a right-angle turn to become the horizontal transverse colon), right kidney, transverse colon, duodenum and stomach. The gallbladder straddles the undersurfaces of liver segments IVB and V.

There is an H-shaped fissure on the inferior surface of the liver. The right vertical arm of the H is formed by the gallbladder anteriorly and the inferior vena cava (IVC) posteriorly; it is incomplete, with the caudate process between the two. The left vertical arm of the H is formed by the ligamentum teres hepatis in front and the ligamentum venosum behind. The transverse limb of the H is the porta hepatitis (hilum), a 5-cm transverse fissure (slit) on the undersurface of the liver with the quadrate lobe in front and the caudate lobe behind. It contains the common hepatic duct (CHD) in front and to the right, the proper hepatic artery in front and to the left, and
the portal vein behind, enclosed in the hepatoduodenal ligament (HDL), composed of 2 layers of lesser omentum. [ Figure 1 ]

**Blood Supply**

The liver has a unique dual blood supply (about 1500 mL/min) both from the proper hepatic artery (20-40%) and from the portal vein. [3]

**Cirrhosis of liver**

Cirrhosis of liver is a continuous, progressive and anatomically diffuse process characterized by fibrosis and distortion of the liver parenchyma with formation of nodules, resulting in decreased function of the liver and increased resistance to flow of portal venous blood. This process of cirrhosis is generally irreversible in the late stages and liver transplantation is the only treatment option in the advanced stage. But it is to be noted that certain conditions causing cirrhosis may respond to treatment of the underlying cause even resulting in reversal of the process in the early stages. This peculiarity is seen in cirrhosis caused by hepatitis C, alcohol, iron overload and obesity. [4]

Cirrhosis is the end stage of chronic injury, inflammation and destruction and regeneration of the hepatocytes, inflicted by various conditions. The pathological features include the development of excessive fibrosis along with nodular regeneration of the parenchyma, finally culminating in complete alteration in the architecture, and blood flow through the liver. The induction of the process of fibrosis occurs with the activation of hepatic stellate cells, leading to the formation of increased amounts of collagen and other extracellular matrix components. [5]

As the function progressively decreases and portal hypertension develops secondary to the altered portal blood flow, various complications of cirrhosis set in and the survival of the patients is very much shortened.

In India and most of the developing countries, the most common etiologies for development of cirrhosis are:

1. Alcoholic liver disease
2. Viral hepatitis.

Whereas in developed countries the common causes include: [8]

- Non alcoholic fatty liver disease
- Alcoholic cirrhosis
- Viral cirrhosis (hepatitis C)
- Other less frequent causes include:
  - Primary and secondary biliary cirrhosis
  - Autoimmune hepatitis

- Primary sclerosing cholangitis
- Wilson disease

**Pathogenesis**

Induction of fibrosis occurs with activation of hepatic stellate cells to myofibroblasts resulting in the development of increased amounts of collagen and other components of the extracellular matrix leading to architectural distortion in turn resulting in decrease in function and mass. [4]

**Clinical Features**

Patients may present to the clinic for the first time with the complications of cirrhosis or may be asymptomatic and incidentally be identified during medical checkup for unrelated causes or because of abnormal liver function tests.

In clinical terms, cirrhosis is classified into:

- Compensated form and Decompensated form.

**Compensated Cirrhosis:**

At this stage, the cirrhotic process of the liver is not severe enough to alter the function significantly and so the patients may be asymptomatic or present with non-localizing manifestations or may be picked incidentally due to alteration in biochemical parameters or imaging studies. [7] Patients may have fatigue, anorexia, weight loss, flatulence, dyspepsia, abdominal pain. On examination, palmar erythema, pedal edema, spider naevi, may point towards cirrhosis. Abdominal examination may reveal an epigastric mass which is the enlarged left lobe of the liver and splenomegaly. Biochemical tests are usually within normal limits in this group. The most common LFT abnormality in this group include mildly elevated transaminases, or gut. [8] Confirmation is by liver imaging or liver biopsy. Factors like b acterial infection, trauma, or medications, surgery may precipitate decompensation in compensated cirrhosis.

** Decompensated Cirrhosis:**

These patients present with ascites, jaundice, altered sensorium, and bleeding manifestations.

**Symptoms:**

Presentation in these patients may be with features of jaundice, pedal edema, abdominal distension. Upper GI bleed most commonly melena, hematemesis, pruritus, altered sensorium ranging from sleep disturbances to florid confusion and coma because of hepatic encephalopathy. [9] In women, menstrual irregularities are common due to anovulation. Men, may manifest hypogonadism in the form of impotence, loss of sexual drive, testicular atrophy and infertility.

**Hepatorenal Syndrome**

Hepatorenal syndrome is the term attributed to the renal impairment which develops in patients with end stage liver cirrhosis or those with acute fulminant liver failure which is both reversible and only functional without any anatomical alteration. It is characterized by marked reduction in glomerular filtration rate and renal plasma flow (RPF), without any other contributing cause to renal failure. The pathophysiology behind HRS is severe vasoconstriction in the renal vascular bed with paradoxical peripheral arterial vasodilation. The function of the renal tubules is normal and there is no proteinuria or abnormal histology in the kidneys.
Type 1 HRS is defined as the “acute onset of rapidly progressive oliguric renal failure unresponsive to volume expansion with the doubling of serum creatinine value to more than 2.5 mg/dl within 2 weeks duration”. However as recently proposed a diagnosis of type 1 HRS should be considered whenever there is fulfillment of criteria defining acute kidney injury by an abrupt increase in serum creatinine more than or equal to 0.3 mg/dl or an increase of more than 1.5 times from the baseline. This is to ensure that treatment is not delayed unnecessarily, as baseline creatinine is a predictor of HRS reversal with vasoconstrictors.

Type 2 HRS progresses more slowly and the cut off of serum creatinine is 1.5 mg/dl. A precipitating factor frequently is identified in type 1 HRS, whereas there are no such factors involved in development of type 2 HRS and it clinically manifests as refractory ascites.

Investigation
1. Complete blood count
2. Liver Function Test
3. Ultrasound Abdomen - Renal artery blood flow test
4. Liver Fibroscan
5. Liver biopsy

Renal Doppler Ultrasonography
Renal vasoconstriction is the major pathology behind HRS. This renal vasoconstriction can be assessed using Doppler ultrasound of the renal arteries by using an index called renal resistive index (RI). This value is derived from the spectral waveforms corresponding to the flow at the renal arteries and is determined using the formula:

\[ \text{Renal Resistive Index} = \text{Peak systolic frequency shift} - \text{Lowest diastolic frequency shift} \]

Peak systolic frequency shift

RI in cirrhosis is increased when compared to the normal population. And studies have shown that a high RI value (more than 0.7) can be documented in cirrhotic patients even in whom RFT is normal. \(^9\)

It has also been shown that normally RI exhibits a gradient decreasing from the hilum towards the outer cortex. In cirrhotic patients with diuretic responsive ascites this gradient is well maintained. Whereas as the severity increases and in cirrhotic patients with refractory ascites this gradient is lost and the RI at the level of the cortex measured in interlobular arteries is also high suggesting renal cortex vasoconstriction. This happens even before serum creatinine begins to raise. Thus in cirrhotic patients an increased RI in spite of normal values of serum creatinine, implicates that they are at a greater risk for development of renal dysfunction and elevation of serum creatinine. With treatment of first, RI value reduces. Similarly liver transplantation also decreases the RI. Thus renal RI assessed using Doppler ultrasound may be used as an early marker for renal impairment in cirrhosis patients.

Complication:
Portal hypertension

<table>
<thead>
<tr>
<th>Complication</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hepatopulmonary syndrome</td>
<td>Portopulmonary hypertension</td>
</tr>
<tr>
<td>Portopulmonary hypertension</td>
<td>Malnutrition</td>
</tr>
<tr>
<td>Gastroesophageal varices</td>
<td>Portal hypertensive gastropathy</td>
</tr>
<tr>
<td>Splenomegaly, hypersplenism</td>
<td>Ascites</td>
</tr>
<tr>
<td>Spontaneous bacterial peritonitis</td>
<td>Hepatorenal syndrome</td>
</tr>
<tr>
<td>Hepatic encephalopathy</td>
<td>Type 1</td>
</tr>
<tr>
<td>Hepatopulmonary syndrome</td>
<td>Type 2</td>
</tr>
<tr>
<td>Portopulmonary hypertension</td>
<td></td>
</tr>
</tbody>
</table>

Investigation:
- Complete blood count
- Liver Function Test
- Ultrasound Abdomen - Renal artery blood flow test
- Liver Fibroscan
- Liver biopsy

Material and Methods

Source of Data
The study was conducted on 50 consecutive patients admitted to Rajendra institute of medical sciences, Ranchi during the study period.

Inclusion criteria
Liver cirrhosis patients of any etiology as diagnosed by clinical, biochemical and imaging methods. Abdominal USG and Renal Doppler USG, was performed and interpreted by single investigator according to standard protocol. Hepatic parameters like Child Pugh Score, MELD score was calculated according to standard formulas based on which degree of liver damage will be evaluated.

Exclusion criteria
- Diabetes
- Hypertension
- Nephrotoxic medication intake
- Acute GI bleeding and shock
- Ultrasoundographic evidence of obstruction or parenchymal renal disease
- Sepsis and Autoimmune Hepatitis

Lab Investigation
- Complete blood count
- Liver function test (LFT)
- Renal function test (RFT)
- PT- INR
- Serum albumin
- Ultrasound abdomen
- Renal artery duplex Doppler

Design of Study
Hospital based Prospective study and Observational study

Period of Study
One Year Study: 1st May 2019 to 30th April 2020
Consent: Individual / caretakers written and informed consent.

Participants: 50 Liver cirrhotic patients admitted in Medicine ward at RIMS Ranchi

Results
Our data found 35 patients were decompensated and 15 patients were compensated liver cirrhotic disease. [Table 1] Out of which 17 Decompensated liver cirrhotic patients had RI more than 0.7 . [Table 2] The P value is significant i.e < 0.001 . And 42 patients were discharged and followed up well . Remaining 8 dead patients had RI more than 0.7 . [Table 3], [Table 4]

Discussion
Our study confirms that the RI , based on sonographic measurements of intrarenal resistance , is an effective , noninvasive , economical functional test that provides useful information for the prognosis and management of cirrhotic patients . Therefore , the RI may help identify a group of high-risk patients with a poor prognosis that require special therapeutic care.

III. CONCLUSION
Liver cirrhosis is characterized by complex changes in systemic hemodynamics. Especially renal dysfunction frequently complicate the clinical course of this disease. Doppler Ultrasound measurement of intrarenal resistance can estimate renal blood flow. Serum creatine is an indicator of impaired renal function; however, it has disadvantages as it depends on muscle mass and physical activity. The elevated RI may even disclose progress of the liver disease before changes in laboratory results. The cirrhotic patients should undergo Ultrasonography examination every 6-12 months.

Financial Support And Sponsorship
Nil

Conflict Of Interest
There are no conflict of interest

Abbreviation
1. RI - Resistivity Index
2. HRS - Hepatorenal Syndrome
MELD Score - Model For End Stage Liver Disease

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Tables:

1. Compensated Vs Decompensated Form

<table>
<thead>
<tr>
<th>Compensation Status</th>
<th>No. Of Cases</th>
<th>Percentages (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compensated</td>
<td>15</td>
<td>30</td>
</tr>
<tr>
<td>Decompensated</td>
<td>35</td>
<td>70</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>100</td>
</tr>
</tbody>
</table>

Comments: Out of 50 Cirrhotic patients 35 patients were decompensated and rest were compensated liver cirrhotic disease.

2. RI Vs Compensation Status

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http://dx.doi.org/10.29322/IJSRP.10.07.2020.p10344
www.ijsrp.org
RI was > 0.7 in 17 liver cirrhosis patients with Decompensated liver cirrhotic patients while RI > 0.7 in only 3 patients with Compensated liver cirrhotic patients. P value was < 0.001.

3. Death Vs Alive

<table>
<thead>
<tr>
<th>Status</th>
<th>No. Of Cases</th>
<th>Percentages (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Death</td>
<td>08</td>
<td>16</td>
</tr>
<tr>
<td>Alive</td>
<td>42</td>
<td>84</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>100</td>
</tr>
</tbody>
</table>

Comments: 42 liver cirrhotic patients were discharged and followed up well.

4. RI Vs Death Vs Alive

<table>
<thead>
<tr>
<th>RI Vs Status</th>
<th>Death</th>
<th>Alive</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 0.7 (30)</td>
<td>00</td>
<td>30</td>
</tr>
<tr>
<td>&gt; 0.7 (20)</td>
<td>08</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>0 /30 Vs 08 /20</td>
<td></td>
</tr>
<tr>
<td>P Value</td>
<td>&lt; 0.001</td>
<td></td>
</tr>
</tbody>
</table>

Comments: 8 patients were dead. All the 8 patients had RI > 0.7.
P value was < 0.001. Renal Resistivity Index correlated strongly with short term in-hospital mortality.
Acknowledgement

We have been able to work on and complete this article, I would like to sincerely thank everyone who has been instrumental in making it a possible.

Words fail to express my deep sense of gratitude towards my guide Prof Dr. Umesh Prasad MD General Medicine, Ass. Prof Dr D K Jha MD Medicine and Ass. Prof Dr Gregory Minz MD Medicine for their unfailing belief in me. We have been blessed to work under his guidance and learnt lots of things from him. He encouraged and guided me from the inception of this project in 2020 till the very end and without whom it could not have come to fruition.

We want to thank our family for inspiring us to push our limit. Last but not the least I would thank all the patients of the study who served as the backbone and without their support the study would have been possible.

Thank you

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Dr Yuvraj Lahre

Dr Punam Munda
A Comparison of Waste Management Systems in the Towns of Walvis Bay and Limbe: Experience from Vienna, Austria

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Abstract- This paper aims to give an analysis of solid waste management (SWM) performance of two coastal cities in Africa, Limbe (Cameroon) and Walvis Bay (Namibia). The authors present detailed challenges as well as management analysis, including waste collection, waste disposal, waste generation, and waste composition. A comparative study is taken from the waste management of Austria particularly the city of Vienna. In both cases, effective governance and policy framework are key. Namibia practices a form of public-private partnership (PPP) through tendering to handle the waste. Cameroon just like Namibia also practices PPP with the company HYSACAM, leading Cameroon private municipal solid waste management operators. These two developing countries are still facing challenges in managing their solid waste. Some of the challenges include the lack of enacted law, institutional capacity, unavailability of reliable data, and financial capacities. The authors observed from a careful review of literature that, unlike Vienna where a well-established legal system, central data collecting system, and decentralization in SWM is in place, Limbe and Walvis Bay are falling short in these aspects. Therefore, municipal authorities of these towns should adopt a modern waste management system that takes into consideration proper data collection and accumulation, capacity building, and community participation. Additionally, the authors advocated for the increment of taxes on organic waste for fertilizers. This will go a long way to encouraging and boosting the composting sector. Furthermore, de-monopolizing SWM is seen as key to promoting the establishment of regional recycling companies and improving cooperation between local stakeholders.

Index Terms- stakeholders, sustainability, waste composition, waste management

I. INTRODUCTION

Solid waste management is one of the topics of sustainable development that has in recent years become a key point of discussion aimed at improving the level of service provision, particularly in developing countries. Improving SWM is a critical issue in the rapidly growing cities of Africa (Kabera et al., 2019). At the same time, solid waste requires further investigation regarding its future use (Mohee & Simelane, 2015). As noted in the target 6.3 of Sustainable Development Goal (SDG) 6, the world and its people should strive to reduce pollution, eliminating dumping and minimizing the release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally.

According to UN Environment (2018), 145 000 tons of residue are produced daily in Latin American and Caribbean cities and discarded in inappropriate places, whereas in Sub-Saharan Africa, nearly 62 million tons of waste is produced annually. In India alone, about 0.3-0.4 million tons of solid waste are generated annually in rural areas (Das et al., 2019). In Africa, for example, less than half of the solid waste are generated and collected in urban centers, of which 95% is neither contained nor recycled, but thrown away at dumping sites and nearby water sources (Rasmeni & Madyira, 2019).

The situation in Africa is alarming, as many countries do not collect data on their waste. To some extent, the quality and availability of data on solid waste generation and management in Africa are, however, scanty, and this hinders the development of programs that will promote efficient use of solid waste in Africa (Mohee & Simelane, 2015). Equally important, there are little scientific studies on waste management and strategies (even for project financing) in African countries. Though waste generation is unavoidable, sustainable waste management solutions are required to address waste challenges (UNEP, 2018). For instance, African Environment Outlook (AEO) of the United Nations Environmental Program (UNEP) pointed out that population growth, urbanization, and growing middle class, changing consumption habits, economic development, and global trade, are the drivers of waste generation in Africa. Similarly, natural environmental concerns, social norms and associated concerns, historical influences, political contexts, local, regional and national legislation, institutional factors, educational factors, technological developments, and human resource deployment directly or indirectly bring to the fore challenges associated with future directions of MSW management in Africa (Mohee & Simelane, 2015).

In this context, solid waste production has a significant global footprint and a high management cost (Das et al., 2019), given that it corresponded to 3-5% of anthropogenic emissions in 2005 (Paes et al., 2020; UNEP, 2010). On the other hand, landfills account for approximately 5% of global greenhouse gas (GHG) emissions (Zhang et al., 2019). This implies that, if solid waste...
collection and management become efficient, there would be a reduction of GHG emissions.

Understanding how much waste is generated, especially with rapid urbanization and population growth, as well as the types of waste generated, allows local governments to adopt sustainable waste management measures (Kaza et al., 2018). Furthermore, a multi-dimensional approach needs to be taken to address the issue of waste management. This involves the proper engagement at a public level with the intervention of raising awareness in schools and in the surrounding communities about the negative impact of waste on people and the environment. Thus, it should be highlighted that waste management through sustainable management strategies such as source reduction and reuse, recycling, and energy recovery plays an important role in waste management (Rajaelfar et al., 2017).

In this review, we intend to provide an overview of the situation of SWM in two developing countries, Namibia, and Cameroon. We will further use two cities of these respective countries as case studies to illustrate the patterns in the management of solid waste streams that exist within other major cities and towns of the corresponding countries. Furthermore, we compare the approach used in these developing countries with that of Austria. Given that every comparative study in SWM must consider the system of collection, transportation, treatment, reuse, recycling, recovery, and disposal and also the involvement of stakeholders (the waste generators, waste processors, formal and informal sectors, financial institutions, and private initiatives such as non-governmental and community-based organizations), we based our comparison on these relevant points. Austria has earned its place as the country with the most advanced recycling system in Europe, recycling up to an approximation of 63% of its MSW generated (Herczeg, 2013). We, therefore, intend to show the differences that exist between the management of MSW streams of Cameroon and Namibia. By comparing the different approaches of these developing countries with that of Austria, we hope to give some recommendations that will be beneficial for the backcasting and road mapping of SWM in these developing countries.

II. METHODOLOGY

Focusing on Cameroon and Namibia, this article provides management analysis, challenges, and opportunities for waste management in the towns of Walvis Bay and Limbe. To bring together the recent analysis as well as the most recent and reliable information on the state of waste management in Namibia and Cameroon, more specifically in the towns of Walvis Bay and Limbe, a complete search for reviewed scientific literature, articles, and government reports was carried out. The municipal town of Walvis Bay was contacted to provide recent data that would enable the authors to provide the current state of waste management. A desktop review of environmental policies related to waste management in each of the mentioned countries was carried out. To perform the bibliographical research, some engine searches such as Google, Google Scholar, ScienceDirect, and Web of Knowledge were used using the following keywords: waste management, sustainable waste, waste collection in Africa, waste management in Cameroon and waste management in Namibia. The search results were used to extract data from a set of studies.

III. AUSTRIA

Austria is a landlocked country located at the center of Europe and bordered by 6 other European countries. It is a federally administered state with every land, except for Vienna split into districts (administrative regions), which are themselves again split into local authorities. With a smaller proportion of its landmass lying lower than 550m above sea level, most of the country is situated in the Alpine region (Hofmarcher & Quentin, 2013). As a developed country, standards of living in Austria outs most parts of the world. The country is almost completely urbanized, with its urban areas not short of the provision of social amenities. On the other hand, the tendency in developing countries is that as urbanization surges the provision of social amenities is compromised (especially the management of waste streams). Austria, on the one hand, has experienced especially in its major cities increases in population and urbanization, two factors that come along with surges in waste production. Nevertheless, the country stands at the highest recycling level in Europe, recycling more than half of its total waste. Recycling has been facilitated in Austria by the inclusion of energy recovery for district heating in all municipal waste incineration plants. Furthermore, the enactment of rock-solid laws to prevent the use of landfills, led to the decline of the landfilling of biodegradable municipal waste (Herczeg, 2013).

The Austrian constitution stipulates that the responsibility of municipal waste management be split between the federal and provincial governments (ETC/SCP, 2009). The specific waste streams, as well as waste treatment methods, are also spelled out by the federal governments. The 2002 Act sets the framework for SWM in Austria supplemented by several decrees (Herczeg, 2013). These decrees ensure that environmental and human health are not undermined, natural resources and energy are saved, landfill space is saved, and only inert residuals are deposited. Some of these decrees include the thresholds of the landfill decree, which stipulates that only materials with a total organic carbon content (TOC) < 5% or a gross calorific value < 6 000 kJ/kg be deposited into landfill, and the federal decree for compost which sets standards for compost and ensures that there be the labeling of compost from sewage sludge (Herczeg, 2013).

The legal framework is not the only factor that has contributed to the successful management of waste streams across Austria. Over the years, the law has created an environment in which companies and organizations have been able to cooperate. This has yielded several tradeoffs better known as synergistic effects (Herczeg, 2013).

IV. CAMEROON

The Republic of Cameroon is a Central African country located at the very armpit of Africa along the Atlantic Ocean and
bordered by six other African countries. It is situated between the latitudes 2° and 12°E and longitudes 2° and 18°N (Manga et al., 2008). Sitting on a land surface area of 475,440 square kilometers, the varied relief, and the coast, as well as the effects of the mountains and seas, present varying climatic gradations within the country (Molua, 2006). The population is approximated to be 24.05 million and mostly distributed to the west and north, with the interior of the country mostly sparsely populated. In recent years, its cities have experienced an exponential increase in urbanization, with 55.8%, now residing in urban areas (Toyota Motor Corporation, 2019). Unfortunately, the population growth rate has over the years superseded the curb on poverty. This is principally due to some influential factors such as the effects of climate change on the agricultural sector and political unrest (Molua, 2006). As a result, the overall number of poor in Cameroon has increased by 12% to 8.1 million in the last few years (Outlook, 2019).

Projections by the United Nations suggest that a total of 70% of Cameroon’s population will reside in urban areas by 2050. While the Government of Cameroon combats the increase in urbanization, experience has proven that it is virtually impossible to put a curb on urbanization due to the push factors that push citizens away from the countryside and the pull factors that pull citizens into the urban areas. As climate change continues to adversely affect the yields of agricultural productivity in the country, Rural-urban migration is most likely to follow the same trend (World Bank, 2017). Experts advise that rather than Cameroon laying down a policy that will cap urbanization at 57% by 2026, a more attainable approach will be to focus on taking advantage of the population increase in cities and thus improve the livelihood and productivity of cities so they can cope with increases in population and effectively contribute to the country’s economic growth and job creation (The World Bank Group, 2018).

In Cameroon, the responsibility to ensure that solid waste is effectively managed is borne by the Department of Standards and Control under the Ministry of Environment. The responsibility for the management of medical waste is held by the Ministry of Health and Municipal Waste Management by the Ministry of Habitat (Manga et al., 2008). In that light, there exists a national strategy for the management of MSW and a budget of approximately XAF 4 billion. Nevertheless, there is no fundamental law on municipal MSWM, no sanitary landfill apart from the Nkolfoulou Landfill in Yaoundé whose state-of-the-art technology is not up to standard (without landfill, gas capture and leachate control) and no reputable system for assembly of MSW data from local governments (Toyota Motor Corporation, 2019). The just mentioned factors contribute to the many constraints that are observed in the management of waste streams around major cities and towns of the country. Even though other African countries like Kenya (Edjabou et al. 2015), Ethiopia (Kassaye, 2018) and Namibia (Ministry of Health and Social Services, 2010), are experiencing an ongoing upward trend in the management of their waste streams around neighborhoods, Cameroon seems to be taking a downward trend.

HYSACAM (French acronym for hygiene and health in Cameroon) leads Cameroons private municipal solid waste management operators. The private company Operates in 17 cities and collects over 1.5 million tons of waste a year which is approximately 4000 tonnes (Achankeg, 2004). With approximately 15 million Cameroonians benefitting from its services there remains a significant proportion of the population whose waste streams are not attended to. To meet up with the waste streams of the remaining fraction of the population not serviced by HYSACAM several NGOs and CBOs work in partnership with HYSACAM and the city councils. But, sometimes some of the waste management operators in the various cities and towns are usually informal.

The 80 major towns and cities of Cameroon (Wikipedia, 2020), all face similar problems about the management of their SW streams. The increase in urbanization, political unrest, poverty, and the failure of the Governmental bodies to state laws that bind and assign the roles of the different stakeholders in waste management is casting a dark cloud over SWM. With HYSACAM the main SWM provider operating just in 17 of these cities and servicing only about 15 million of the total population (Achankeg, 2004), MSW management faces significant constraints. In this review, we decided to consider Limbe as a case study because, Limbe with a population of about 120,000 inhabitants and urbanization of 2.9% (Manga et al., 2008) falls approximately midway to major cities like Douala and Yaoundé and major towns like Nkambe and Mamfe in terms of population size and urbanization rate. A careful analysis of the problems faced in Limbe can offer a holistic assessment of the problems faced by many if not all the other major cities and towns in Cameroon.

Waste Management System in Limbe, Cameroon

Limbe is a coastal city located in the South-West Region of Cameroon. With a population of about 140982 inhabitants (Tiafack et al., 2014) and a growth rate of 2.9%, Limbe is no exception to the trend in increased urbanization observed in several other African cities (Manga et al., 2008). Dominated by a strongly tropical climate, with some areas only a few meters above the water table, flooding is thus quite common in Limbe during the rainy season (Cheo, 2012). This, therefore, makes Limbe an open vent taking up plastic and waste into the oceans affecting marine life. Home to one of the most beautiful beaches of the country which serves as a major pull factor for urbanization justifies the fact that immigration into Limbe is yet to peak. An increase in hotels, nightclubs, and bars has brought with it a significant change in lifestyle and culture. These changes have been reflected in the amount and composition of SW generated over the last few years (Manga et al., 2008).

For administrative purposes, the city of Limbe is divided into four local councils which include the Limbe councils managed by the Government Delegate, then Limbe I, Limbe II, and Limbe III managed by Mayors. Generally, in Cameroon, the municipal councils are responsible for the delivery of all SWM services, this includes, waste disposal facilities, financing of all activities related to waste management. These councils can either decide to
be responsible for SWM or subcontract to HYSACAM. Unlike some major cities like Bamenda wherein the urban council is still responsible for SWM (Achankeg, 2004), the Limbe Council plays an extremely limited role in the management of its waste streams because the whole system has been subcontracted to HYSACAM. For the financing of the management of these waste streams, the Limbe council has three principal sources of finances which include Taxes and revenues generated by council activities, subsidiary budgets from the state through the Ministry of Economy and Finance (MINEFI), and Lending facilities from the Government’s Council Development Fund (FEICOM). Supplementary budgets are subject to scrutiny by MINEFI which is responsible for the allocation of government funds based on projected fiscal revenue flows (Manga et al., 2008).

Waste Volumes and Composition

The estimated volume of waste produced in Limbe cannot be legitimized because no standardized studies have been carried out so far to accurately determine that volume. Well, estimates of waste generation in Limbe stand to be approximately 7300 tons per year (i.e. 20 tonnes/day) (Manga et al., 2008). Because this study was carried out almost two decades ago, this estimate cannot accurately fit into the context of the current population and society that has been established over the years. Given the current capacity and activities of HYSACAM, it is fair to state that little of the SW streams are attended to. The reason being that, there still exist illegal dumping sites and waste all over the metropolis.

Generally, in Limbe, the waste stream is a heterogeneous mixture of materials and products whose composition varies with its sources of generation, as well as the socio-economic classification of the locality. Households, industries, and commercial establishments such as hospitals, schools, and hotels are the principal waste generators. The variation in the material composition of the waste stream from different locales of the Limbe municipality is incredibly significant as illustrated on the graph on (Figure 1) below.

![Different waste fractions](Figure 1: Estimation of different waste fractions from different locales throughout the Limbe municipality)

Source: Manga (2008)

Waste Collection

The entire system of waste collection, treatment and disposal is attended to by HYSACAM. The company, for easy supervision, divides the city of Limbe into seven sections with two appointed heads to oversee the management of waste in these areas (Cheo, 2012). The approach used by HYSACAM in Limbe faces several constraints that are remarkably similar across many cities and towns of the country. A significant fraction of waste is most often not collected; this is evident by the persistence of waste along major streets of the Limbe municipality. Even though HYSACAM does its utmost best to manage a very tight budget and provide good services, unfortunately, the results gotten over the years question their competence in handling the waste problem in Limbe. Additionally, treatment/disposal is further made practically impossible for the reason that the waste streams are commonly mixed before disposal, therefore, there is scanty or nonexistence of data clearly stating the composition and generation rate of the various fractions of waste.

The Limbe council uses three main approaches in a bit to increase the effectiveness of the collection of waste in Limbe, they include:

Firstly, the pre-collection approach which involves the assembly of waste from the point of generation to municipal collection bins. It has been reported that 80% of household waste to public bins is done by children (Achankeg, 2004). A great dependency on children for the transportation of waste to collection points has already been reported to be a failure (Parrot, 2009). This is because most of this waste ends up on roadside gutters or illegal dumpsites. After all, children are usually not keen and responsible. An immediate solution to this issue will be a collaboration between municipal authorities and community initiatives which can eliminate this problem (Manga et al., 2008).

Secondly, “household to household” collection, usually done on fixed days which involves the use of collection trucks that give out loud sounds to announce their imminence. This alerts the occupants of the respective households to bring out their waste. This waste is loaded directly into the trucks for transportation. However, HYSACAM faces frequent breakdowns of trucks which leads to the accumulation of waste at household levels leading to illegal dumping of waste or overflow of waste at collection bins disrupting the whole system in place (Manga et al., 2008).

Thirdly, the Stationary point collection, which is the most widely used collection system in Limbe. This approach involves the positioning of large communal bins at designated locations for scheduled pickups. The rate of waste generated, access, and activities carried out in the area determine the type of skip, size, location, and frequency of pickups (Manga et al., 2008). Unfortunately, the decision by HYSACAM workers on where to place these skips does not take into consideration the proximity to settlements, farms, streams, and the height of the water table (Cheo, 2012). Waste managers do not do any proper engineering and thus only look out for flat and low-lying areas which are usually highly favorable for them to locate a skip point.
Waste Treatment and Disposal

Because of the nonexistence of recycling companies, a great percentage if not all municipal solid waste collected in the towns and major cities of Cameroon end up in landfills or better still dumpsites. The only prevalent recycling done is scavenging who pick up metals and bottles mostly shipped to China and India. In Limbe, it is guesstimated that biodegradable material makes up 60% of the total waste generated (Manga et al., 2008). This is a good fraction that can serve for cost-effective municipal waste management (Couth & Trois, 2012). Unfortunately, the great dependence on fertilizers makes this almost impossible. If the government can increase taxes on fertilizers this will go a long way to encourage growth in the composting sector (Ymele, 2013). Over the last 15 years, about six dumpsites or ‘landfills’ as they are locally known, have been established in different parts of Limbe. Most often, these dumps are sited and operated without the consideration of environmental health impacts. There is usually no form of supervision or management documentation. Because of the lack of proper engineering, it is quite common to see ponds filled with stagnant rubbish around neighborhoods (Manga et al., 2008). These are breeding grounds for vectors, especially mosquitoes. Additionally, due to the lack of professionally trained health and safety personnel, monitoring of the health and environmental risks associated with these practices is not done.

Periodic burning of the dumped waste as a means of volume reduction is still prevalent in several of the dumping sites and only increases the number of greenhouse gasses and thus climate change. However, the potential impacts of the noxious gases that are emitted from such sites have previously not been quantified or documented. Studies carried out by Cheo (2012) on Municipal Solid Waste Management and Groundwater Contamination in Limbe, Cameroon concluded that if municipal waste streams are not effectively managed the quality of groundwater in Limbe will drop drastically. It is essential to bear in mind that, placing environmental health at risk intricately places human health and wellbeing in jeopardy.

V. NAMIBIA

Namibia is situated in southern Africa, sharing borders with Zambia and Angola to the north, Botswana to the east, South Africa to the south, and the Atlantic Ocean to the west. Geographically, Namibia covers an area of 824,290 km2, with Windhoek it’s the capital city and Walvis Bay its largest port town on the west coast. Namibia has a population of 2.4 million, according to the World Bank (2018). However, almost half of the population (49%) resides in urban areas (NSA, 2018). SWM falls under the responsibility of the Department of Environmental Affairs, part of the Ministry of Environment, Forestry, and Tourism. Among different institutions involved in solid waste management include, the Ministry of Urban and Rural Development, the Ministry of Health and Social Services, and the Ministry of Works and Transport. The informal sector, on the other hand, is involved in collecting and recycling recyclable materials, and there is a policy for supporting this sector.

In the Namibian context, SWM, treatment, handling, and disposal activities are listed in terms of the Environmental Management Act, 2007 (Act No. 7 of 2007) which promotes the sustainable use of resources as an approach to waste management. Namibia has enacted SWM legislation and has a national SWM budget. Since the regulations of the Environmental Management Act were gazetted in 2012, the ministry of environment and tourism has been engaging local authorities, regional councils, and local industry to improve standards of waste management and waste disposal sites as well as to ensure that all waste disposal sites apply for environmental clearance-certificates. A strategy on national SWM was implemented and approved by the cabinet. It is believed that this strategy will deliver significant socio-economic benefits in terms of job creation especially to the youth. According to the National Solid Waste Management Strategy, Namibia aims to be the leading country in Africa in terms of standards of solid waste management by the year 2028 (Ministry of Environment and Tourism, 2018).

Waste management in Walvis Bay, Namibia

The coastal town of Walvis Bay is situated on the west coast of Namibia in Erongo region with a population of about 60,000. The town is home to Namport (Namibian Port Authority), two hospitals, three police stations, three military bases, an airport, and about twenty schools. The fishing industry is the largest sector, employing around 16 000 residents (Adam, 2019).

The municipality of Walvis Bay through the department of Water, Waste and Environmental Management, is responsible for the provision and maintenance of an acceptable site for all domestic gardens including sensitive waste as well as refuse removal services. Additionally, the department ensures continuous functional sewage purification works, and adherence to the principles of good environmental management. Findings show that the town of Walvis Bay practices a form of public-private partnership in handling its waste. Furthermore, private companies participate in the entire waste management process such as collection, disposal, and recycling. Among the Companies involved in the collection of solid waste is Rent-A-Drum. The following chapters discuss the waste collection, disposal, composition, and treatment.

Waste Generation and Composition

Based on the recent waste data collected from the town of Walvis Bay between 2019 and February 2020, the composition of waste generated annually is above 100 000 tonnes as shown in [Table 1].
The main generators of waste in the town of Walvis Bay are households, fishing industries and factories, business facilities, industrial institutions, Namport, and informal living areas with no proper housing services. The Solid Waste Management Division of the Municipality of Walvis Bay provides housing with garbage bins of 240L known as 'refuse wheelie bins' and collect the waste (Laili, 2009). In addition to the refuse wheelie bins, there are black plastic bags provided by the municipality in the informal residential areas to collect waste in. The waste is collected once a week from the households and daily from the businesses upon request. Up until February 2020, about 2160 bins were distributed in Walvis Bay. In addition to the routine collection of waste by the municipality of Walvis Bay, the town has general cleaning operations under four contractors, namely: Contractors Beaches and Roads (CB&R), Kuisebmond Cleaning Contractors (KCC), and Naraville Cleaning Contractors (NCC).

There is only one landfill site in Walvis Bay denominated as the Walvis Bay dumpsite. The site is one of 11 such sites countrywide that received stamps of approval from the Ministry of Environment, Forestry, and Tourism in 2019 (Leandrea, 2019). Prior to its approval, several inspections were undertaken to determine whether due procedures were followed by improving standards of waste management. However, it was determined that the town management complies with the approved environmental management plans, which led to the official granting of the environmental clearance certificates for the dumpsite.

### Waste Collection and Disposal

The main generators of waste in the town of Walvis Bay are households, fishing industries and factories, business facilities, industrial institutions, Namport, and informal living areas with no proper housing services. The Solid Waste Management Division of the Municipality of Walvis Bay provides housing with garbage bins of 240L known as 'refuse wheelie bins' and collect the waste (Laili, 2009). In addition to the refuse wheelie bins, there are black plastic bags provided by the municipality in the informal residential areas to collect waste in. The waste is collected once a week from the households and daily from the businesses upon request. Up until February 2020, about 2160 bins were distributed in Walvis Bay. In addition to the routine collection of waste by the municipality of Walvis Bay, the town has general cleaning operations under four contractors, namely: Contractors Beaches and Roads (CB&R), Kuisebmond Cleaning Contractors (KCC), and Naraville Cleaning Contractors (NCC).

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### Waste Treatment

Waste recycling is becoming a well-known practice in Namibia. In Walvis Bay, recyclables are collected at the landfill site and people properly employed by the private companies do the work. The waste employees work under safe conditions provided with protective wear. Each staff member receives a bottle of sanitizing solution and an information pamphlet as part of the prevention of diseases. The materials collected for recycling are papers, plastics, glasses, and cans. These materials are compacted, semi-processed, and sent to South Africa for recycling since there are no recycling plants in Namibia. However, the glass-recycling project that was built with Rent-a-drum and Indongo Toyota

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**Table 1: Walvis Bay waste composition from 2019-Feb 2020**

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<tr>
<td>Total</td>
<td>66638</td>
<td>12143</td>
<td>10569</td>
<td>8342</td>
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</tbody>
</table>

**Source:** Municipality of Walvis Bay (2020)
Company is functional though not giving the results envisaged. The major companies involved in recycling are the Rent-a Drum (a group of companies), Collect-a-Can, and The Glass Recycling Company. The composition of recycled material is shown in [Table 2].

Table 2: Waste recycled at the Walvis Bay Landfill between July 2019-February 2020

<table>
<thead>
<tr>
<th></th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
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<tbody>
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<td>3</td>
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<tr>
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<tr>
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<td>13</td>
<td>18</td>
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<tr>
<td>Steel</td>
<td>11</td>
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<td>30</td>
<td>36</td>
<td>27</td>
<td>0</td>
<td>6</td>
</tr>
</tbody>
</table>

Source: Municipality of Walvis Bay (2020)

To address waste management challenges, the Government of Namibia needs to support the implementation of the National Solid Waste Management Strategy on both the rural and urban levels.

Experience from the City of Vienna

According to Mohee and Simelane (2015), in developed countries, waste is no longer a burden of the state, but a resource that has been integrated into energy-generating strategies. Austria is one of the good examples of the best practices in modern recycling management. Waste is managed under the Federal Waste Management Act 2002 (AWG 2002) and the waste management laws of the nine federal states (Federal Waste Management Plan, 2017). These laws regulate the waste collection including waste fees and transfer of ownership, the responsibilities and organization of MWM as well as the contents of the Regional Waste Management Plan. It is no doubt that waste management in Austria revolves around the principle of sustainable development. The system is based on the Waste Management Act, with its priority being the protection of humans and the environment and is achieved through minimizing emissions and optimizing resource use (Federal Waste Management Plan, 2017).

The City of Vienna employs several targeted measures to minimize the generation of waste. More importantly, the Viennese city is responsible for the entire chain of waste management: collection, treatment, and disposal. The main areas of focus include green public procurement, eco-efficiency consulting for small and medium enterprises, the promotion of reuse and repair of goods, awareness-raising, and support for cultural services (City of Vienna, 2017). In Vienna, the Municipal Department 48 (MA 48) is part of the city administration department responsible for the municipal waste collection and treatment, street cleaning, and winter services (City of Vienna, 2017).

In addition to the AWG 2002, the Viennese Waste Management Act (Wiener AWG) regulates waste management in the city of Vienna (City of Vienna, 2017). There are municipal departments responsible for waste management in Vienna, namely: the Municipal Department for Waste Management, Street Cleaning and Vehicle Fleet (MA 48), and the Municipal Department for Environmental Protection (MA 22) (City of Vienna, 2017). While MA 48 is responsible for the communal collection and treatment of waste from private households and companies, MA 22 has the task of monitoring the implementation of waste regulations (City of Vienna, 2017). At a strategic level, they work together on the realization of the Strategic Environmental Assessment (SEA) for the Viennese Waste Management Plan.

Tools Used to Manage Waste in the City of Vienna

Waste Avoidance - Residents of Vienna contribute significantly to waste avoidance using their conscious behavior. This is quite evident from the ongoing demand for multicycle systems (City of Vienna, 2017). Some offers such as the leasing of reusable mugs or crockery trailers for events are also used as measures to avoid waste.

Correct Disposal - The city of Vienna continuously invests in improved waste separation and disposal that conserves resources and saves raw materials (City of Vienna, 2017). When it comes to manufacturing and packaging, only a small amount of energy is required for the recycling of packaging material. Thus, correct recycling methods therefore mean energy conservation, which makes an important contribution to climate conservation.

Individual Contribution - Waste disposals are simplified as a color-coded system which helps the households to correctly separate the waste. The MA 48 ensures its appropriate further utilization, by emptying containers, and sorting and disposing of waste, which can no longer be recycled (City of Vienna, 2017). The more the collected materials are sorted, the better they can be reused thus creating opportunity for the new materials to be created by recycling.

Waste to Energy - While substances such as glass and metal are recycled, MA 48 disposes the residual waste at the three Viennese waste incineration plants (City of Vienna, 2017). It employs energy recovery following the guidelines of the environmental laws which makes sure that waste is transformed into energy to serve the needs of the residents (Paleologos et al., 2016). This technology supplies energy to about 270,000 Viennese households and makes a significant contribution towards climate protection (City of Vienna, 2017).

Composting of Organic Waste - The separated collected organic materials in Vienna are first submitted to pretreatment at the waste treatment plant (City of Vienna, 2017). The bio residual substances are released from rough impurities, cut-up parts, and finally mixed with other materials. In this manner, an optimal mixing proportion is obtained each time from damp bio-waste materials as well as from tree and shrub cuttings (Gajalakshmi & Abbasi., 2008).

VI. COMPARING THE NATIONAL STRATEGIES

To make a comparison between the cities, the authors emphasized the importance of effective national strategy as well
as good governance. According to the research, the structure and functionality of the Austrian municipal waste management is completely different from that of Namibia and Cameroon. Austrian legislation has implemented a ban on landfill for untreated waste. This means that municipal waste is diverted from landfills thereby reducing environmental impact. Additionally, the authors highlighted the employment of technology in the waste management system as a novel method of addressing waste management issues. The experience from Austria shows that developing countries can make good progress in improving and modernizing waste infrastructure. For example, the city of Vienna applies a wide variety of smart initiatives. Among these initiatives, it is important to mention the separation and processing of scrap glasses. Through this process, recovered glasses are used in the glass factory to produce new glasses, thus, employing the concept of recycling.

Developing countries such Namibia and Cameroon are commonly using a conventional waste management system as indicated in (Figure 2) which is usually linear. Austria on the one hand is using a circular system (Figure 3), which is sustainable and it goes beyond the principles of “drop and store” but rather function as a “reuse, sanitize and recycle” principle.

VII. CHALLENGES

Legal Framework and Policies

The importance of proper policies in every sustainable SWM system cannot be overemphasized. Whereas in developing countries like Cameroon where most laws on waste management are affiliated to each other and concentrated at the top. Austria on the one hand, ensures that under the 2002 Act a good number of decrees are stated to address different facets of SWM. In Cameroon for example, the local government action remains very restrictive whereby the central Government’s autonomy and its role in urban affairs create an environment where local authorities cannot exercise their full mandate. Therefore, if the law is unable to define the role of stakeholders in waste management, the policies to guide their actions, and the enactment of the law, there is going to be no accountability in SWM.

Availability of Data

The availability of data from the African countries remains a big challenge. This is mainly because not all waste collected is weighed especially in the town of Limbe; it is not clear how much waste is generated and what type of wastes are collected. Additionally, data on waste management at municipal levels are relatively rare and often the available data is outdated and cannot be relied on. Due to this, it is often difficult for private investors who are willing to coordinate pilot schemes aimed at developing a sustainable management system. Furthermore, with no accurate data or reference, it is almost impossible to compare the MSWM system of developing countries with those of developed countries.

Financing Resources

Since most MSWM systems in Cameroon and Namibia are not sustainable, they are always financially dependent on governmental annual budgets. In Cameroon for example, local authorities have difficulties in generating resources independently because most of the essential taxes are collected by the deconcentrated services of the Ministry of Finance. There are usually not enough financial resources allocated to the municipal authority. Additionally, waste management is not given the importance it deserves as companies involved in MSWM are often not allocated enough budget, thus making it hard for them to buy modern equipment or even invest in recycling technologies. In some cases, when modern equipment is acquired, maintenance is also a challenge due to the lack of technical expertise.

VIII. CONCLUSION AND RECOMMENDATIONS

The municipal authorities of Walvis Bay and Limbe should adopt a modern waste management system which includes circularity, recycling, and proper data collection. Lack of proper data infrastructure would hamper the implementation of quality waste management measures. If universities, research institutions, and the waste management companies come on board to ensure that proper studies on waste are carried out and accurate data is documented, this will provide the bases for the accessibility and
availability to reliable data. Further, investments should be done in capacity building through community engagement for example through education awareness. The community needs to understand how household waste is handled through the lens of the ‘4Rs’ (acronyms for the term Refuse, Reduce, Reuse and Recycle) of waste management. Additionally, efforts for the provision of the simple and affordable methods of applying home-based sustainable waste management should be encouraged.

Policymakers should define funding priorities to set up sustainable waste management in their cities. For example, ministries and local authorities can ease the acquisition of licenses or make them free for recycling companies willing to establish waste management systems in these cities or provide structures as well as land for the establishment recycling companies. As highlighted earlier in this review, the main challenge for sustainable development in Walvis Bay and Limbe is urbanization which is not adequately managed with proper financial capacity. Implementing proper economic policies will improve infrastructures especially road networks within inaccessible neighborhoods and thus ensure that wastes are collected. Furthermore, the de-monopolization in SWM in these cities especially Limbe should be enforced. For example, Unlike Walvis Bay with registered PPPs handling the services of its MSW streams, and even more so Vienna, Limbe on the one hand has HYSACAM completely running in monopoly. A monopoly system does not encourage competition and accountability.

There are several inherent advantages to forming alliances in waste management. The authors, therefore, suggest that the municipal authorities should create an atmosphere wherein different stakeholders involved in the management of waste can cooperate and share information. As already mentioned before a decentralized structure in waste management whereby power and information flow are not concentrated at the top or one-sided but shared among the key accountable actors can lead to a very productive waste management system.

By using this illustration in (Figure 5) to show the three main phases in the development of networks between key players in SWM, we will like to suggest an approach that can be used to stepwise lay a structure that can be functional and productive.

Unlike Austria, Cameroon and Namibia are already running a centralized waste management system. A top-down approach one in which information flows from the central Government and local councils to the stakeholders (phase 1). Moving on to an upper level on this hierarchy requires a mutual and an unbiased relationship (phase 2). Here it will be required that in addition to the already top-down approach implored in phase 1, a bottom-up approach should be considered as well. In the third phase, the central Government and municipal councils become more engaging with the stakeholders who are themselves very engaging with each other (phase 3). This approach can pay off significantly in all aspects of MSW like information flow, management and capacity building.

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Plasmid-Mediated Quinolone Resistance Genes Associated With Ciprofloxacin Resistance in *Salmonella Typhimurium* from Cattle Faeces from Abattoir in Keffi, Nasarawa State, Nigeria

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Abstract- The development of antimicrobial resistance by members of the genus *Salmonella* has a significant impact on the antibiotic treatment of *Salmonella* infections. This study investigated the plasmid-mediated quinolone resistance (PMQR) genes associated with Ciprofloxacin resistance in *Salmonella typhimurium* (*S. typhimurium*) from cattle faeces from abattoir in Keffi, Nasarawa State, Nigeria. A total of Four hundred (400) samples of cattle faeces were collected from abattoir and *S. typhimurium* were isolated and identified using standard microbiological methods. Antimicrobial susceptibility of the isolates was tested and interpreted in accordance with the Clinical and Laboratory Standards Institute (CLSI) protocol. Plasmid-Mediated Quinolone Resistance (PMQR) genes in ciprofloxacin resistant isolates were screened for using polymerase chain reaction (PCR) method. Of the 400 samples, the occurrence of *S. typhimurium* was 46 (11.5%). The isolates were more susceptible to gentamicin (87.1%), chloramphenicol (78.3%), streptomycin (69.6%) and ciprofloxacin (67.4%). The occurrence of multi-drug resistance (MDR) isolates was 46 (100%). The order of occurrence of PMQR genes in the ciprofloxacin resistant isolates was: **aac (6′)-Ib-cr (66.7%) > oqxAB and qnrB (26.7%) > qnrS (20.0%)**. Gentamicin, chloramphenicol, streptomycin and ciprofloxacin, were the most effective antibiotics against the isolates. All the isolates were MDR and the most common PMQR gene detected in the ciprofloxacin resistant isolates was **aac (6′)-Ib-cr**. Further studies on the molecular diversity of PMQR *S.typhimurium* isolates from the study location should be carried out.

I. INTRODUCTION

The genus *Salmonella* is a gram negative rod shaped bacteria belonging to the family of Enterobacteriaceae, and are facultative anaerobic, non-spore forming, non-lactose fermenting bacteria possessing motility with peritrichous flagella which causes salmonellosis (Kongsoi et al., 2016). Non-typhoidal *Salmonella* are zoonotic pathogens and are the important causes of foodborne infection because *Salmonella* have a broad host range and are strongly associated with animal and plant products (Gal-mor et al., 2014). *Salmonella typhimurium* and *S. enteritidis* are natural pathogen of cattle and beef which are common reservoirs for human infection (Costa et al., 2012; Kongsoi et al., 2016). The Infections due to NTS ranges from mild diarrheal disease to severe systemic infections (Neelem Taneja et al., 2014). Non-typhoidal *Salmonella* infections are transmitted to humans primarily through consumption of contaminated foods from animal origin (Ranjbar et al., 2011).

Antimicrobial resistance in NTS is a significant public health problem both in developed and developing countries (Adesiji et al., 2014). Several literatures have reported an increasing number of cases of multi-drug resistant foodborne *Salmonella enterica* infections in both developed and developing countries, with few options left for antimicrobial treatment (Uche et al., 2017; Shu-kee et al., 2015). Examples of increases in resistance in NTS in developing countries, particularly in sub-Saharan Africa, the Indian subcontinent and Southeast Asia, are exemplified by numerous outbreaks caused by multi drug resistant non-typhoidal salmonellae; these are frequently resistant to the newer quinolones both in hospitals and the community over wide geographical areas (Kagambega et al., 2017). Fluoroquinolones exhibit potent antibacterial activity against *Salmonella* and are usually the first drug of choice for treatment of life-threatening salmonellosis due to multidrug-resistant strains (Kongsoi et al., 2016). In the early 1990s quinolone antibiotics have been approved for use in food producing animals; but the misuse and use of sub-growth inhibitory concentration of these antibiotics in animals has been reported as one of the factors that endanger quinolones resistance in NTS strains (Beneduce et al., 2008; Rankotonirina et al., 2013; Kongsoi et al., 2016; Tajbakhsh et al., 2016), which may be chromosomal or plasmid mediated. The most common PMQR genes reported in salmonellae and other enterobacteriaceae are **oqxAB, qnrB, qnrS and aac(6′)-Ib-cr**.

Non-typhoidal *Salmonella* is the primary foodborne zoonotic agent of salmonellosis in many countries (Hoelzer et al., 2011). *Salmonella typhimurium* and *Salmonella enteritidis* are natural NTS pathogens of cattle and beef which are common reservoirs for human infection (Costa et al., 2012; Kongsoi et al., 2016). Infection due to NTS ranges from mild diarrheal disease to severe systemic...
infection both in human and other animals (Tanija et al., 2014). These zoonotic pathogens are spread by consumption of contaminated food sources (Ranjar et al., 2011; Costa et al., 2012). Fluoroquinolones are usually the first drug of choice for treatment of life-threatening salmonellosis due to multidrug-resistant strains (Kongsoi et al., 2016). However, increased use of these agents in animal husbandry has led to concomitant emergence of quinolone resistance NTS (Rankontirina et al., 2013; Tajbakhsh et al., 2016). There are several reports of fluoroquinolone resistance S. typhimurium in different countries and continents of the world (Chattaway et al., 2016). In Nigeria, few studies have reported the presence of S. typhimurium resistant to fluoroquinolones (Chattaway et al., 2016). However, there is dearth of such information in the study location. This study thus, investigated the presence of plasmid mediated quinoline resistance genes in S. typhimurium isolated from cattle faeces from abattoir in Keffi, Nasarawa State, Nigeria.

Non-typhoidal Salmonella is a primary foodborne zoonotic pathogen that causes salmonellosis in different parts of the world (Kongsi, et al., 2016). Previous studies have shown that NTS are resistant to fluoroquinolones (Hernandez, et al., 2011; Raktonirina, et al., 2013; Tajbakhsh et al., 2016). However, no such studies have been reported in the study area. Hence, this study investigated the plasmid mediated Quinolones resistance genes associated with ciprofloxacin resistance in S.typhimurium, a common NTS, isolated from cattle faeces from abattoir in Keffi, Nasarawa State, Nigeria. Antimicrobial resistance in NTS is a significant public health problem both in developed and developing countries.

II. MATERIAL AND METHODS

Study Location
The study Location was Keffi. Keffi is geographically situated on latitude 8°50′ N and longitude 7°52′ E. Keffi town is about 850m above sea level and it is the North-West of Lafia, the state capital. It is 53 km away from Abuja (Capital of Nigeria) in the Guinea Savannah region of Nigeria (Akwa et al., 2007).

Sample Size
The sample size was calculated manually, using the formula below as earlier described by Fisher et al. (2002).

\[ N = \frac{Z^2P(1-P)}{d^2} \]

Where: \( N = \) desired sample size (when the population >10,000); \( Z = \) standard normal deviate, usually set at 1.96, which usually correspond to 95% confidence level; \( P = \) proportion in the target population, set at 50% (0.5) \( d = \) tolerated margin of error.

The proportion was estimated as \( p < 0.5 \) and \( q < 0.5 \) for non infection confidence estimated used was 95% (≥1.5) confidence interval with degree of accuracy of \( d (0.05) \). The designed effect of 1 was used. The sample size was obtained

\[ N = (1.96)^2 \times 0.5 \times 0.5 \div (0.05)^2 \]

= 0.9604 ÷ 0.0025

= 384

Map showing study location in Keffi, Nigeria (Source: Akwa et al., 2007).

Sample Collection
A total of 400 samples (fresh and non-freshly voided materials) were collected randomly from fecal matter at Keffi abattoir and transported to Microbiology Laboratory, Nasarawa State University for analysis using aseptic transport medium container.

Isolation of Salmonella species

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www.ijsrp.org
The method described by Cheesbrough (2006) was used. The fecal matter samples ascetically collected from Keffi abattoir was first inoculated on Xylose Lysine Deoxycholate (XLD) agar and Selenite F enrichment broth (pH 7.4) and incubated aerobically at 37°C for 24 h. After incubation, all the tubes showing turbidity were sub-cultured on xylene-lysine deoxycholate (XLD) agar and Salmonella-Shigella agar (SSA) and then incubated at 37°C for 24 h for the selective isolation of Salmonella species. Red colonies with black centre were taken as presumptive Salmonella species. Colonies not resembling Salmonella spp were further re-incubated at 37°C for overnight. Presumptive Salmonella isolates were sub-cultured unto freshly prepared Xylose Lysine Deoxycholate (XLD) agar and Selenite F enrichment broth (pH 7.4) media and incubated to obtain pure isolates as described by Iroha et al. (2016).

Identification of the Isolates
Presumptive Salmonella colonies were further identified by Gram staining reaction and biochemical tests according to the method of Cheesbrough (2006), and outlined below.

Gram Staining
A small portion of cultural organism was transferred onto a clean grease-free glass slide, and emulsified in a drop of distilled water until a thin homogeneous film is obtained, then the wire loop was re-sterilized and the thin homogeneous film was allowed to air-dry, and heat-fixed by passing through flame. The slide was then flooded with crystal violet for 1 min, and then rinsed with distilled water. The stain was again flooded with Lugol’s iodine for 1 min, and rinsed with distilled water and then decolorized, rapidly with acetone alcohol until no more colour appeared to flow from preparation and rinsed appropriately with distilled water. The stain was then counterstained with neutral red for 1 min, and rinsed with distilled water and allowed to air dry and viewed microscopically using x100 oil immersion objective. Gram positive organism retains the dark blue colour inferred by the iodine/crystal violet complex, while Gram negative organisms appear red; maintaining the colour of the secondary dye. Salmonella species is a Gram negative rod.

Biochemical tests
The following biochemical tests were carried out on the suspected Salmonella species isolates: Catalase test, Indole, Nitrate reduction, Urease production, Citrate utilisation and glucose fermentation tests.

Indole Test
A colony of the organism from culture plate was inoculated unto 5 ml tryptone broth and incubated at 37°C for 24 h. After which a few drops of Kovac’s reagent was added to the overnight tryptone broth culture, and shaken. A positive reaction is indicated by the development of red ring colour in the reagent layer above the broth within 10 min observed. Salmonella species is negative for this reaction.

Methyl Red/Voges-Proskauer Test
A pure culture of test organism was inoculated in to MR-VP medium and incubated at 37°C for 72 h after which the culture was divided in to two portion. To the first portion three drops of methyl red was added and formation of red colour was indicative of methyl red positive. To the second portion 10 drops of 40% KOH (Potassium hydroxide) was added, followed by four drops of alpha-napthol was added and observed for 30 min. Formation of pink/red colour indicates Voges-Proskauer positive and formation of yellow colour indicates Voges-Proskauer negative. Salmonella is positive for methyl red and negative for Vorges-Proskauer.

Citrate Utilization Test
A pure culture of the organism was inoculated as a single streak on the slant surface of citrate agar and was incubated at 37°C for 24 h. Blue color on the medium indicated the presence of alkaline products and it is therefore positive, while green color is negative. Salmonella species gave negative citrate utilization reaction.

Catalase test
A pure colony of the organism was streaked aseptically on Nutrient agar slant and incubated at 37°C for 24 h. Three drops of Hydrogen peroxide (H₂O₂) was added to the slant and observed for bubbling gas. Salmonella species is positive for this test.

Urease test
This was be performed by inoculating the organism into Urea broth and incubated at 37°C for 24 h. Intense pink color indicated positive; otherwise, it is negative. Salmonella species are negative for urease production.

Molecular detection of Plasmid-mediated Quinolones resistance genes
DNA Extraction
The DNA of ciprofloxacin resistant isolates was extracted using boiling method as described by Porteous et al. (1994). Briefly, following the purification, one pure colony of ciprofloxacin resistance isolate, was inoculated into 2 ml of LB broth and incubated at 37°C for 18 h. Exactly 200 μl of the Lysogeny broth (LB) culture was then transferred into Eppendorf tube and centrifuged in a micro centrifuge at 3200 revolutions per minute (rpm) for 2 min at room temperature. The supernatant was discarded leaving the cells in the...
tube. The cells were washed twice with washing buffer. Exactly 0.5 ml of sterile phosphate buffer was added to the pellet and vortexed for 5 sec. It was then heated at 90ºC for 10 min, then cooled down rapidly by freezing for 10 min. It was then centrifuged at 3200 rpm for 1 min to separate the DNA and the cells debris. Exactly 300 μl of the supernatant containing the DNA was then transferred into Eppendorf tube and stored at -10ºC for further use.

**Amplification of Target Genes**

The DNA amplification of target plasmid-mediated quinoline resistant genes in ciprofloxacin resistant isolates was carried out using singleplex method by modification of the method earlier described in a work by (Ranjbar 2017). Briefly, the reaction was carried out in 25 μl reaction volume in artificial tubes which is made up of 5 μl master mix, 2.4 μl primers (0.4 μl each of forward and reverse primers), 0.5 μl of MgCl₂, 1.5 μl of DNA template and 15.6 μl of nuclease free water. The reaction tubes were placed in the holes of the thermer cycler and its door was closed. Then qnrA, qnrB, and qnrS genes were amplified under the following conditions: Initial denaturation at 94ºC for 5 min followed by 32 cycles of amplification at 94ºC for 45 sec each, annealing at 53ºC for 45 sec, with final extension at 72ºC for 5 min. (Jiang *et al.*, 2008).

The amplification condition for detection of aac (6′)-Ib-cr was carried out as follows: initial denaturation at 95ºC for 5 min, annealing at 59ºC for 40 sec and initial extension at 70ºC for 30 secs and with final extension at 72ºC for 5 min.

**III. DATA PRESENTATION AND ANALYSIS**

**Isolation and Identification of Salmonella typhimurium**

The cultural, morphological and biochemical characteristics of S. *typhimurium* isolated from fecal samples of cattle in Keffi abattoir, Nasarawa State, Nigeria as shown in Table 4.1. The colourless colonies with black colouration in SSA which was gram negative, non lactose fermenting organism with rod shape, motile peritrichous flagella and TSI positive were identified as S. *typhimurium* as shown in Table 4.1. Transparent colonies with black centre by *Salmonella* species on SSA and red translucent colonies by *Salmonella* species on XLD. Red to Pale red translucent colonies with black centre colonies by *Salmonella* species on XLD showed morphological characteristics of S. *typhimurium*. Brilliant green agar showed pale red with black centre colonies in line with characteristics as reported according to the methods of Cheesbrough (2006).

**Occurrence of Salmonella typhimurium**

Of the 400 samples of cattle fecal matter obtained, the occurrence of S. *typhimurium* was 46 (11.5%) as shown in Table 4.2

<table>
<thead>
<tr>
<th>Cultural Characteristics</th>
<th>Morphological Characteristics</th>
<th>Biochemical Characteristics</th>
<th>Inference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gram Morphology</td>
<td>MOT  UR LYS H2S ONPG NIT MAL IN MR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transparent colonies with black centre by <em>Salmonella</em> species on SSA</td>
<td>- Rod shape</td>
<td>+ - + + - + _ +</td>
<td><em>Salmonella</em> Species</td>
</tr>
</tbody>
</table>
MOT = Motility test; UR = Urease test; LYS = Lysine utilization; H$_2$S = H$_2$S production test; ONPG = Onpg-Galactosidase test; NIT = Nitrate test; MAL = Maltose fermentation test; IN = Indole fermentation test; MR = Methyl red; MCA = MacConkey agar; SSA = Salmonella Shigella agar; BGA = Brilliant green agar

Occurrence of *Salmonella typhimurium* from cattle faeces from abattoir in Keffi, Nasarawa State, Nigeria

<table>
<thead>
<tr>
<th>Samples</th>
<th>No. of Samples</th>
<th>No (%) <em>Salmonella typhimurium</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Fecal matter</td>
<td>400</td>
<td>46 (11.5%)</td>
</tr>
</tbody>
</table>

**Antimicrobial Resistance Profile**

The antimicrobial resistance profile of the isolates is as shown in Table 4.3. The isolates were more resistant to nalidic acid and tetracycline (100.0%); sulphamethoxazole/trimethoprim (87.0%) and ceftriaxone (60.9%) but less resistant to gentamicin (12.9%) and chloramphenicol (21.7%) respectively as shown in Table 4.3.

**Antibiotic Resistance Phenotype**

The antibiotic resistance phenotypes of the *Salmonella typhimurium* isolates is shown Table 4.4. The isolates were distributed into different antibiotic resistance phenotypes and the commonest was TE-SXT-CAZ-NA-CIP (10.9%).

**Multiple Antibiotic Resistance (MAR) Index**

The MAR indices of the *S. typhimurium* isolates are as shown in Table 4.5. The isolates with MAR ≥ 0.2 are defined as MAR isolates and the commonest MAR index was 0.5 (43.5%) as shown in Table 4.5.

**Antibiotics Resistance Profile of *Salmonella typhimurium* from cattle faeces from abattoir in Keffi, Nasarawa State, Nigeria**

<table>
<thead>
<tr>
<th>Antibiotics</th>
<th>Disc Content (µg)</th>
<th>No. (%) Resistance (n=46)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amoxicillin/ Clavulanic acid (AMC)</td>
<td>30</td>
<td>18 (39.1)</td>
</tr>
<tr>
<td>Ceftazidime (CAZ)</td>
<td>30</td>
<td>20 (43.5)</td>
</tr>
<tr>
<td>Ceftriaxone (CRO)</td>
<td>30</td>
<td>28 (60.9)</td>
</tr>
<tr>
<td>Chloramphenicol (C)</td>
<td>30</td>
<td>10 (21.7)</td>
</tr>
<tr>
<td>Gentamicin (CN)</td>
<td>10</td>
<td>6 (12.9)</td>
</tr>
<tr>
<td>Sulphamethoxazole Trimethoprim (SXT)</td>
<td>25</td>
<td>40 (87.0)</td>
</tr>
<tr>
<td>Streptomycin (S)</td>
<td>30</td>
<td>14 (30.4)</td>
</tr>
<tr>
<td>Ciprofloxacin (CIP)</td>
<td>5</td>
<td>15 (32.6)</td>
</tr>
<tr>
<td>Nalidixic acid (NA)</td>
<td>30</td>
<td>46 (100.0)</td>
</tr>
<tr>
<td>Tetracycline(TE)</td>
<td>30</td>
<td>46 (100.0)</td>
</tr>
</tbody>
</table>

Antibiotic Resistance Phenotypes of *Salmonella typhimurium* from cattle faeces from abattoir in Keffi, Nasarawa State, Nigeria

<table>
<thead>
<tr>
<th>Antibiotic Resistance Phenotypes</th>
<th>Frequency (%) (n=46)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TE,SXT,NA</td>
<td>2(4.3)</td>
</tr>
<tr>
<td>CRO,TE,SXT,NA</td>
<td>4(8.7)</td>
</tr>
<tr>
<td>AMC,TE,SXT,NA</td>
<td>2(4.3)</td>
</tr>
<tr>
<td>CRO,TE,SXT,NA</td>
<td>2(4.3)</td>
</tr>
<tr>
<td>TE,SXT,CAZ,NA,NA,CIP</td>
<td>5(10.9)</td>
</tr>
<tr>
<td>TE,SXT,S,NA,CIP</td>
<td>3(6.5)</td>
</tr>
</tbody>
</table>

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Multiple Antibiotics Resistance (MAR) index of *Salmonella typhimurium* from cattle faeces from abattoir in Keffi, Nasarawa State, Nigeria

<table>
<thead>
<tr>
<th>No. of antibiotics to which isolate is resistant (a)</th>
<th>No. of antibiotics tested (b)</th>
<th>MAR Index (a/b)</th>
<th>Frequency (%) n=46</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>10</td>
<td>1.0</td>
<td>(0.0) 0</td>
</tr>
<tr>
<td>9</td>
<td>10</td>
<td>0.9</td>
<td>(0.0) 0</td>
</tr>
<tr>
<td>8</td>
<td>10</td>
<td>0.8</td>
<td>(0.0) 0</td>
</tr>
<tr>
<td>7</td>
<td>10</td>
<td>0.7</td>
<td>(19.6) 9</td>
</tr>
<tr>
<td>6</td>
<td>10</td>
<td>0.6</td>
<td>(15.2) 7</td>
</tr>
<tr>
<td>5</td>
<td>10</td>
<td>0.5</td>
<td>(43.5) 20</td>
</tr>
<tr>
<td>4</td>
<td>10</td>
<td>0.4</td>
<td>(17.4) 8</td>
</tr>
<tr>
<td>3</td>
<td>10</td>
<td>0.3</td>
<td>(4.3) 2</td>
</tr>
<tr>
<td>2</td>
<td>10</td>
<td>0.2</td>
<td>(0.0) 0</td>
</tr>
</tbody>
</table>

**Classification of Antibiotic Resistance**

The classes of antibiotic resistance of the *S. typhimurium* isolates are as shown in table above. All the isolates were MDR with percentage occurrence of 100%.

**Molecular Detection of Plasmid Mediated Quinolones resistance genes**

Molecular detection of PMQR genes in the ciprofloxacin resistant *S. typimurium* isolates is as shown in Table 4.7. The occurrence of *aac(6')-Ib-cr* (66.7%) gene was high while *qoxAB/aac(6')-Ib-cr* (13.0%), *qnrB/aac(6')-Ib-cr* (13.0%), *qnrS/aac(6')-Ibr-cr* (13.0%) and *qoxAB/qnrB/qnrS/laac(6')-Ib-cr* (13.3%) showed low Quinolones resistance genes across the table.

Classes of Antibiotics Resistance of *Salmonella typhimurium* isolated from cattle faeces from abattoir in Keffi, Nasarawa State, Nigeria

<table>
<thead>
<tr>
<th>Classes of Antibiotics Resistance</th>
<th>No. (%) <em>S. typhimurium</em> (n=46)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDR</td>
<td>46(100)</td>
</tr>
<tr>
<td>XDR</td>
<td>0(0.0)</td>
</tr>
<tr>
<td>PDR</td>
<td>0(0.0)</td>
</tr>
<tr>
<td>NMDR</td>
<td>0(0.0)</td>
</tr>
</tbody>
</table>
NMDR = Non-multi-drug resistance; MDR = Multi-drug resistance (non-susceptible to ≥1 agent in ≥3 antimicrobial categories); XDR = Extensive drug resistance (non-susceptible to ≥1 agent in all but ≤2 antimicrobial categories); PDR=Pan drug resistance (non-susceptible to all antimicrobial listed) (Magiorakos et al., 2012).

Molecular Detection of Plasmid-mediated Quinolones Resistance genes in ciprofloxacin Resistance Salmonella typhimurium isolated from cattle faeces from abattoir in Keffi, Nasarawa State, Nigeria

<table>
<thead>
<tr>
<th>Plasmid-mediated quinolone resistance genes</th>
<th>No. (%) S. typhimurium (n=15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OqxAB</td>
<td>4 (26.7%)</td>
</tr>
<tr>
<td>QnrB</td>
<td>4 (26.7%)</td>
</tr>
<tr>
<td>QnrS</td>
<td>3 (20.0%)</td>
</tr>
<tr>
<td>aac(6')-Ib-cr</td>
<td>10 (66.7%)</td>
</tr>
<tr>
<td>oqxAB/qnrB</td>
<td>4 (26.7%)</td>
</tr>
<tr>
<td>oqxAB/qnrS</td>
<td>3 (20.0%)</td>
</tr>
<tr>
<td>qnrB/qnrS</td>
<td>3 (20.0%)</td>
</tr>
<tr>
<td>oqxAB/qnrB/aac(6')-Ib-cr</td>
<td>3 (20.0%)</td>
</tr>
<tr>
<td>oqxAB/aac(6')-Ib-cr</td>
<td>2 (13.3%)</td>
</tr>
<tr>
<td>qnrS/aac(6')-Ib-cr</td>
<td>2 (13.3%)</td>
</tr>
<tr>
<td>qnrB/aac(6')-Ib-cr</td>
<td>2 (13.3%)</td>
</tr>
<tr>
<td>oqxAB/qnrB/qnrS/aac(6')-Ib-cr</td>
<td>2 (13.3%)</td>
</tr>
</tbody>
</table>

Plate 4.1: Agarose gel electrophoresis of the amplified oqxAB genes from the Salmonella typhimurium isolates. Lanes 1, 2, 3 and 4 represent the oqxAB bands, Lane M represents the 1500bp molecular ladder.
Plate 4.2: Agarose gel electrophoresis of the amplified QNRB genes from the *Salmonella typhimurium* isolates. Lanes 1, 2, 3, and 4 represent the QNRB bands, Lane M represents the 1500bp molecular ladder.

Plate 4.3: Agarose gel electrophoresis of the amplified QNRS genes from the *Salmonella typhimurium* isolates. Lanes 1, 2, and 3 represent the QNRS band, Lane M represents the 1500bp molecular ladder.
In addition, the percentage occurrence of multidrug resistance isolates observed in this study was higher than 5% reported by Ari (2017) and 3.4% by Stefana Sabtcheva et al. (2018). The study however showed a lower occurrence compared to 12% (Shu-Kee et al. 2015) and 18.5% (Thai et al. 2018) previously reported in other studies. The occurrence of this bacteria in fecal sample may have a public health implication since multi drug resistance S. typhimurium may contaminate meat or may also be useful as organic manure for cultivation of vegetables and likely serve as agent of food borne diseases that cause morbidity and mortality worldwide (Smith et al., 2016).

The S. typhimurium isolates observed in this study were less susceptible to ceftriazone, sulphamethoxazole trimethoprin, nalidixic acid and tetracycline and this finding is in agreement with the study earlier reported by Hakanen et al. (2005), Kotilainen et al. (2005) & Miriagou et al. (2004). The less susceptibility of the isolates to antibiotics mentioned may be due to inappropriate use of such antibiotics both in Hospital and agricultural settings Mir et al., (2015), Marshal &Levy, (2011).The 0%, 0%, 13% and 18% susceptibility to nalidixic acid, tetracycline, sulphamethoxazole trimethoprin and ceftriazone as reported in the study showed same pattern of no and low susceptibilities along the same line of antibiotics earlier described by Kagembega et al., (2017) in similar study.

The high susceptibility of the isolates to amoxicillin/clavulanic acid, ceftazidime, chloramphenicol, gentamycin, streptomycin and ciprofloxacin was not surprising and this however justifies their use as common drug of choice for treatment of salmonella infections (Ari 2017).

The high susceptibility of the isolates to amoxicillin/clavulanic and chloramphenicol and streptomycin observed in this study is in agreement with the earlier studies described by Ari (2017) and Rajashekhara (2014). The percentage of the isolates to antibiotics mentioned above was 60.9% to 78.3% with gentamicin having the highest susceptibility pattern of 87.1%.

The occurrence of multidrug resistance S. typhimurium in the location as was observed in the study not surprising again and this is in agreement with the study earlier described by Migma et al. (2001). The multi drug resistance (MDR) isolates occurrence was 100%, this had a slight disagreement with 94.5%, 47.7%, and 78% reported by Taneja et al. (2014), Mir et al. (2015), and Yoke-Kqueen et al., (2008) respectively in previous studies. The occurrence of multidrug resistance isolates observed in this study may have public health implication since multi drug resistance S. typhimurium have been reported to cause Salmonellosis that is difficult to be treated using antibiotics.

The detection of plasmid mediated quinolone resistance genes namely oqxAB, qnrB, qnrS and aac(6’)-Ib-cr in this study is in agreement with the study earlier reported by Maima et al. (2011); Taneja et al. (2014) and Hooper et al. (2016). Our finding in this study shows that aac(6’)-Ib-cr genes was the main gene detected in ciprofloxacin resistance isolates and this finding is consistent with the study earlier reported by Stefana Sabtcheva et al. (2009) that reported 60.7% and Migma et al. (2011) which reported 66.7%. In addition, the percentage occurrence of oqxAB (26.7%), qnrB (26.7%) and qnrS (20.0%) was less than 37.1 % reported by Shreya et al. (2018). The detection of the plasmid mediated quinolone resistance gene observed in this study was indication that may be responsible for ciprofloxacin resistance.
V. SUMMARY CONCLUSION

The findings from this study were as follows:

i. The occurrence of *S. typhimurium* in cattle faeces from abattoir in Keffi, Nasarawa State, Nigeria was 46(11.5%).

ii. *Salmonella typhimurium* isolates were more susceptible to Gentamicin (87.1%) Chloramphenicol (78.3%), Streptomycin (69.6%) and Ciprofloxacin (67.4%).

iii. The most common antibiotic resistance phenotype of the isolates was TE-SXT-CAZ-NA-CIP with percentage occurrence of 10.9%.

iv. All the isolates were MAR isolates and the commonest MAR index was 0.5 (43.5%) 

v. All the isolates were multi drug resistant (MDR).

vi. (V) The detection of aac(6’)-Ib-cr (66.7%) gene was higher than other Plasmid-mediated quinolones resistance genes in ciprofloxacin resistance isolates.

The occurrence of *S. typhimurium* was high and antibiotics namely gentamicin, chloramphenicol, streptomycin, ciprofloxacin and amoxyccilin/clavulanic acid were very effective against the isolates. All the isolates were MDR isolates and harbors plasmid-mediated quinolones resistance genes and the most common was aac-(6’)-Ib-cr gene

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Contact number +234-80-3827-6432
MONA LISA 2020

(SUSPENSE BEHIND THE PORTRAIT)

(A specific study on motherhood and its existential approach)

PRANJIT SARMA

M.V.A IN GRAPHIC ART, (PRINTMAKING)
DEPARTMENT OF VISUAL ARTS, BANGALORE UNIVERSITY, 2018

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http://dx.doi.org/10.29322/IJSRP.10.07.2020.p10347

ABSTRACT - The entire research is based on motherhood and its present existential approach. The paper has tried to address the role of mother in current society, emphasizing through the magnificent creation of Leonardo De Vinci – “Mona Lisa”. Through this creation I have tried to investigate the importance of a lady (Mona Lisa) with in a precise frame and her reason of mysterious smile and attractive eyes. The research paper has given specific importance to the relation between the landscape and the portrait and how it could be a sign of motherhood. The research topic finally arrived to novel aspects on Motherhood and its existential magnitude - “Mona Lisa 2020” in millennium arena after emphasizing on Vinci’s Creation.

Eventually, it documents the thirty days of a lady’s portraits considered as Mona Lisa, a lady who represents herself as a symbol of Motherhood and her truthful facial expression talks about the inner pain and sacrifices in the patriarchal surroundings. The entire project has been executed by Video documentation with seven different slides including the computer tomography scan of the lady overlapped with her thirty days’ documentation of portraits with special sound effects. Conclusively the paper illustrates the social sacrifices of motherhood and their importance in our millennium society.

Here I mention about the chronological key points for this paper as-

Major Key contexts -

1. Mona Lisa with a significant smile in the era of new birth.

2. Nuevo aspects of motherhood in millennium arena.

KEY REFERENCES REGARDING PROJECT- MONALISA 2020

1. The biggest mystery of Mona Lisa is pertaining to the identity of the subject in 1503.

2. Additionally, the nature of the subject’s smile is a cause of mystery and ambiguity.

3. The woman within the painting is a significant feature and her expression is the main concern.

4. The expression of Mona Lisa has been described as being both aloof and alluring within the same frame. The body gesture completely contradicts to intimacy; rather it would reflect the spirit of kindness towards the zone of suspense.
5. Mona Lisawas presented by Leonardo Da Vinci as the wife of Francesco Del Giocondo, who was a famous cloth merchant from Florence.

6. The visual evidence regarding the assumption on Mona Lisa could be pregnant found by a Japanese artist, Yasumasa Morimura’s painting- Mona Lisa in Pregnancy, in 1998.

INTRODUCTION-

OVERALL GENERALIZATION ON AN ART WORK-

One cannot restrict an artistic work with a single viewpoint. It can be initiated by numerous ideas. Basically, same retrospective thoughts and observations are developed with the mechanisms of any creative art form. Viewers’ skepticism for their manual fluency is produced through their harmonious participations. An “Art” form provides a means to express the imagination in non grammatical ways that are not tied to the formality and limitations of oral and written language. An art form itself is a range of forms, symbols and perceptions with meanings that are malleable.

RESEARCH ELABORATION-

EMPHASIZING ON AN UNIQUE SUSPICIOUS APPROACH OF MONA LISA

Leonardo’s one of the noteworthy creations of 1503, the Renaissance period is MONA LISA, who could attract a number of viewers from all over the world. It’s thematic approach has been declared as a matter of mystery not only because of its pictorial arrangement but also for Da Vinci’s chosen chiaroscuro scheme of the art work. Nevertheless, after perceiving Mona Lisa spectators have raised several questions in terms of its ambiguous interaction. The presented smile and the eyes have been said to be the most mysterious things about the piece of work. A lot of debate has been continuing among numerous scholars and rechargers since its creation. It’s fame highly increased during Mona Lisa’s execution in Salon 1911. The conflict has been articulated by the core features as the women’s body gesticulation and the cognitive interpretation of both eyes with her humble smile. Apart from the existing conflict the suspense of the representation of the woman with diverse significant gestures (in terms of eyes, smile and hands) and symbolic intervention with the mountainous landscape which is also considered to be another cause of mystery.
According to the GLORI (Scholar) “The portrait drawn by Da Vinci is known as a portrait of Lisa Del Giocondo who is said to be the wife of Francesco Del Giocondo, a famous cloth merchant from Florence. Later it has been named as Mona Lisa. Based on this secondary statement if she was married then we could emphasise that there is a strong possibility of her pregnancy and her smile could be a strong indication of inner joy for the process of creation. As far as my assumption goes, that the reason behind the mystery of her smile could be throbbing of giving birth. Through which she could execute her essence of motherhood. According to the existing resources, she has conceded with her humble visual interaction with each spectator which could be akin to social approach of Motherhood. The facial gesture of the portrait has been described to be both formal and suspiciously attractive. The posture of the both hands seems to be between chest and belly. Hence we could predict that it might be considered as Da Vinci’s symbolic depiction of a pregnant lady.
The researcher MARTIN KEMP and American journalist and writer ERNEST HEMINGWAY have mentioned about the ambiguity of mountainous Landscape in their journal. HEMINGWAY said that a small medieval town whose abbey was a model for Umberto Eco in the name of the rose, “Bobbio” its Roman Bridges its astride the Tribbia Valley which is known as one of the beautiful place around the world. KEMP has interrelated regarding statement on the rose, Bobbio given by HEMINGWAY. He said that Da Vinci had a doubt on “Bobbio”. The contradictory statement that has been given by KEMP is “‘Leonardo is reinterpreting a typical landscape on the basis of his imagination of the ‘body of the earth’.”

On the basis of the above statement we could clarify the existing relationship between humble gesticulation of the portrait and the depicted mysterious valley. The mesmerizing thematic composition of the landscape could be considered a substance of “an aura of Creation or Re-birth”. Likewise the glorious eye interaction with her humble acquit smile could be a mystery of creation. The amalgamation of two different pictorial approaches might be indicating towards the Vinci’s representation of Motherhood however, still we haven’t got the enough doctrines to definitively prove this suspicion. Looking at “Mona Lisa” any one could appreciate the marvelous scientific sense of Vinci’s creation and his given suspense through the pictorial composition, which has been creating a million thoughts with the diverse assumptions, decade after decade among the viewers.

Moreover that the visual evidence regarding the assumption on Mona Lisa could be pregnant found by a Japanese artist, Yasumasa Morimura’s painting- Mona Lisa in Pregnancy, in 1998. In this painting the artist represented the original hairstyle and landscape. But artist has used his own face along with the body of a naked pregnant woman instead of Lisa’s face.

RESULTS AND FINDING-

MONA LISA 2020 (30 DAYS’ IMPRESSION OF A WOMAN, EMPHASIS “MOTHERHOOD” IN MILLENNIUM ERA)
After emphasis on Vinci’s Mona Lisa, an idea has clicked which manifested a different approach of Mona Lisa (as a sign of Motherhood) is correspond to Vinci’s depiction. The key features of this project have carried a unique dimension of Mona Lisa in 2020.
In this project the impression of 30 consecutive days of a woman has been captured through sequential photographs and Computerized Tomography (CT scan) images, to study her diverse psychological states, during the time frame of the thirty day period. She has to deal with several social responsibilities. Consequently, she has to act socially rather than according to her physiological state. Also, the actions of a woman in our society may not be a true reflection of her emotional and psychological state of mind. Therefore, her expressed action could often be contradictory to her actual state. For a woman the term “Motherhood” is a favourite among her many social responsibilities. Because of this illusive intervention, the term “Motherhood” seems to be a sign of suspense in present society.
In this 21st century her 30 different facial impressions seem to show a mild contrast from one frame of the portrait to the other. Hence it gives space to the viewers to pose a few questions on her presented impression.

Such as- Why is this woman called “Mona Lisa 2020”?

How is the term “Mona Lisa 2020” related to this woman or the term “Motherhood”?

Why is the image replicated in each frame?

How far the images are similar to each other?
Even though these kinds of questions create a suspicious dilemma among the viewers, the approach of “Motherhood” could stand for an unique psychobiological spectrum where “the word” gets better value against the patriarchy. The value in terms of gender equality, socio-secularism and equal constitutional rights could be a concern over socio-psychological separation based upon gender difference.

CONCLUSIVE STATEMENT OF THE WORK-
Medium – Video Art
Seven different slide of replicated visuals

To execute the conclusive idea, I have chosen the video documentation included 7 slides of replicated visuals (images of 30 days documented portrait of the women and image of her CT scan) & the different frequencies of heart pulse. Each frame takes a move spontaneously according to the pulses of the heart. The different ratio of frequencies appeals to the unseen dynamic situation or circumstances that the women have gone through. And the fluctuations of each slide clarify her unstable psychic state of mind. However, we could perceive her acquit smile and eye contact remains similar to each frame. Therefore at this point, the woman considered as a sign of Motherhood remains still in suspense. The research is being continued regarding the definite existential value of “Motherhood”.

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Understanding the COVID-19 Pandemic Awareness among Indian Population- An Analysis of Online Rapid Survey

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Abstract- The COVID-19 outbreak has been rapid worldwide so as the spread of the disease among population at different age cohorts. Hence it required quick and clear awareness among population to minimize the morbidity and mortality perpetuated by the virus, about which the world has speculative information. The aim of the present study is to bring out the results of the knowledge and perception regarding Corona virus disease 2019 (COVID-19) among general public of India. An online rapid survey through google form was carried out from 24 March to 26 March, 2020 carrying a set of 10 questions. Uni-variate analyses and graphical representation of the findings were performed to present the distribution of the parameters. More than 60% of the respondents have misconceptions about COVID-19. Out of all, the respondents have wide misconceptions about transmission of the disease from pets such as dogs or cats. There is a continuous need of educational interventions to spread awareness and minimize the misconceptions and myths of general population.

Index Terms- Morbidity, Mortality, COVID-19, Awareness, Misconception

I. INTRODUCTION

Globally, there are more than 83 lakhs confirmed cases and 4 lakhs deaths due to the novel Corona virus (COVID-19) disease caused by SARS CoV-2.[1] The number of cases and the death toll are continuing to rise. Nevertheless, the recovered cases from the disease has started illuminating a ray of hope and humanity may come over the pandemic in coming times.

In the month of March when the disease was declared as global pandemic by WHO, as by then 114 countries had already been affected[2], the total number cases in India were less than 100 which surged up to more than one lakh confirmed cases just within the two months at the time of writing the present study.

Dry cough, fever, fatigue, headache, myalgia and dyspnoea are some of the symptoms of the invisible deadly disease.[3] As the country is swinging in transition of winning the widespread pandemic, the government health care authorities in India took unprecedented measures hurriedly in order to curtail the spread of the virus among its vast population, primarily through lockdown leading to social distancing and reduction in social gatherings. Apart from, all kinds of platforms were used to disseminate the awareness and knowledge among the population irrespective of educational and socio-economic disparities. It is believed that the success largely depends upon people’s adherence to the control measures which is largely influenced by their knowledge, attitudes and practices towards the global pandemic.[3] However, it is also a fact that the misconceptions and myths linger around the general public.[4] Therefore, the present study is an attempt to understand the knowledge and perceptions about COVID-19 among the general public in India.

II. METHODS

An on-line survey was carried out among the adult population of India and their participation was completely voluntary. Rapid online surveys are an important tool to gather data on population’s knowledge and perceptions during rapidly growing infectious disease outbreaks [5], currently the use of paper and telephone surveys are being replaced by the application of online surveys.[6] In current times, internet and social networking are indispensable modes which render information quickly so that it reaches everywhere in a minimal time. In the present study as well, the use of online survey not only helped to obtain quick data related to misconceptions and understanding of population related to COVID-19 pandemic but it also illuminated a path to where educational interventions can be made prompter and more persuasive.

With the help of convenience sampling method, the questionnaire was floated to the social medial- WhatsApp, Facebook and Google accounts. The self-administered questionnaire consisted of 10 questions based on the knowledge, awareness and practices related to the COVID-19 pandemic that developed after interim guidance and information spread through government health care authorities as well as private forums. The questionnaires reflected the myths and misconceptions related to Coronavirus spread. The collected data...
was tabulated in excel and descriptive statistics were performed. The distribution of responses is presented with frequency and percentages.

III. FINDINGS

A total of 247 respondents across the country responded to the survey. Figure 1 represents the total scores of the questions. The total score has been computed as the summation of the correct point of each question. For example, if a respondent has given correct answers to all 10 questions, then the total score is 10. Likewise, if a respondent could answer only 4 questions correctly, then the total score is 4. The mean of the total score is 8.8. About 39 per cent of the respondents gave correct answers to all questions showing that 61 percent of the population has one or more misconceptions. Almost one-third of the respondents had more than two misconceptions. These respondents are grappled with misconceptions which is needed to be mitigated at a large scale.

Figure 2 showed the percentage of question-wise correct answers given by the respondents. Out of 10, correct response to four questions is more than 90 percent while other five questions received the correct response between 80-90 per cent. 99.6 per cent (n=246) of the total respondents given correct answer that cold weather and snow cannot kill Coronavirus. As the history of the spread is seen, the first Coronavirus patient was detected in Wuhan city of China during the months of September when winter season was gradually starting and the number of cases continued to rise globally particularly affecting higher latitude countries such as USA, Italy, U.K, Russia and so on. Even in the month of May when the average temperature in India is recorded as 40-42°C, the number of cases in India as well as worldwide is on rise. [2] 96.8 per cent (n=239) of the respondents clearly knew the transmission sources of Coronavirus and hence, responded that mosquito bites do not spread the infection. Likewise, 92.3 per cent (n=241) of the total respondents responded that the vaccine against Pneumonia such as Pneumococcal vaccine and Haemophilus Influenzae type b (Hib) vaccine would not provide protection against Coronavirus. This is quite well understood by the population that there’s no successful vaccine available till date for the disease. Similar to the question, around 90.7 per cent (n=224) of the respondents reported that no medicine till date is recommended to cure the disease completely and hence precautions and preventive measures are the only ways to mitigate it. 88.7 per cent (n=219) of the volunteers accepted that regularly rinsing of nasal passage with saline water did not protect people from getting infected with the virus. Practicing yoga is one of the messages which had been spread during the lockdown period in the country. As acclaimed, yoga is one of the greatest tools to increase respiratory health and immunity, both are involved in the prevention and healing of COVID-19. The practice of rinsing nasal passage has been documented in Yoga related various studies as well as highlighted on United Nations’ webpage. [6,7]. However, there has not been any scientific-evidence of direct relationship. [7], [8] The healthcare authorities also encouraged the intake of healthy foods such as green leafy vegetables, cut down in junk foods, intake of plenty of water, citrus fruits enriched with Vitamin C and so on. There had been a prevalent myth that inclusion of garlic in the food would reduce the risk of getting infected with the Coronavirus. 84.6 per cent (n=209) volunteers responded that garlic cannot protect population from getting infected. WHO has also inculcated awareness among population by displaying myth busters where they advise that garlic has some antimicrobial properties but there is no scientific evidence that it would provide sufficient protection against the pandemic.[9]

IV. DISCUSSION

Ever since the outbreak of COVID-19 pandemic in China, it has a cascaded effect worldwide [10] leaving behind surged fatal cases and India is one of among such badly affected countries. Like any other developing nations, the pandemic is a serious concern in India because of larger share of senile population, lack of sufficient health infrastructural facilities, exodus movements of migrant labours from their cities of work place to their hometowns, educational and socio-economic disparities and other proximate factors. As on date, India has more than 3.8 lakhs confirmed cases and 12573 reported deaths due to COVID-19. India has become 4th worst affected countries of Coronavirus pandemic [11] and it will continue to grow, as forecasted by many scholars for instance, the peak of COVID_19 pandemic in India may arrive around mid-November, 2020 when there will be shortage of isolation, ICU beds and ventilators. [12]

In order to remain safe from the infection, it is important to practice safe measures and refrain from misconceptions and myths. Further, large amount of information has been floating on all kinds of social media platforms out of which many are “false information and news” against which the population should remain cautious. The commendable action plans by the health care authorities in India are extremely helpful in delivering correct information to the public but offshoots continue to make the population believe in misconceptions. With an average of 87.7 per cent with 99.6 as the highest percentage of correct response and 70.4 as the lowest response, the awareness among volunteers seemed to be considerable; however, misconceptions are yet to be minimised through educational interventions. Correct information, safe hygienic practices and healthier lifestyle would lead the population to safeguard them against the pandemic. However, myths and misconceptions continue to sustain in relation to pets and Coronavirus spread. As 70 per cent of the volunteers believed that it cannot be transferred through the pets, about 30 per cent of them think otherwise. Further, recent studies have shown that the pets can get affected with the virus however, how much they could spread the disease is still unsure as no concrete studies have come up till now.[13]–[15] A report published in Times of India mentioned that person who are
symptomatic with SARS-CoV-2 should remain separated from household animals and avoid direct contact such as petting, snuggling, cuddling, sleeping in the same locations and alike behavior. [13]

This study is first of its kind where general population’s awareness on COVID-19 has been assessed to the best of our knowledge. Since the initial days when the disease was declared as pandemic, actions by the government had been rendered and changing accordingly with time and spreading behavior of the virus. Such steps are supportive for the society to reduce their levels of worry and anxiety and utmost of all, significant in saving lives.

V. CONCLUSION

As India is yet to reach at the flatten curve of SARS-CoV-2 pandemic, current situations urge proactive actions and mitigation of the misconceptions and myths prevalent among the general population. Since, effective vaccine preparation is under trial currently, for instance, clinical trials with hydroxychloroquine are underway and results are awaited as the effectiveness will be monitored closely in near future[16], preventive and precautious measures are believed to be extremely helpful. We consider that the results of this study can be of great utility for the health authorities, medical personnel, the media and the general population, to know the perception of general population about COVID-19. The findings can be utilized to set priorities in Mass campaigns on COVID-19 by authorities.

VI. LIMITATION OF THE STUDY

As the study was carried in a very short span of time and with a limited number of questions asked to the volunteers, it has several limitations which gives an opportunity to be explored further.

1. The period was very short and hence the sample size was small.
2. Convenience sampling is not a true representative of general population.
3. There is a volunteer bias in the study hence not representative of general population
4. Participants could have checked the answers of some questions online before answering

APPENDIX

Online Rapid Survey: The COVID-19 Myth Challenge among Public

Question-1: Cold weather and snow can kill the Corona Virus.
A. Yes
B. No (Correct Answer)

Question-2: The Corona Virus cannot be transmitted in areas with hot and humid climates.
A. Yes
B. No (Correct Answer)

Question-3: The Corona Virus CAN be transmitted through mosquito bites.
A. Yes
B. No (Correct Answer)

Question-4: There is NO evidence that companion animals/pets such as dogs or cats can transmit the Corona Virus.
A. Yes
B. No (Correct Answer)

Question-5: Taking a hot bath prevents the Coronavirus.
A. Yes
B. No (Correct Answer)

Question-6: Thermal scanners CAN detect whether or not someone has the Corona Virus.
A. Yes
B. No (Correct Answer)

Question-7: Vaccines against pneumonia, such as pneumococcal vaccine and Haemophilus influenzae type b (Hib) vaccine provide protection against the Coronavirus.
A. Yes
B. No (Correct Answer)

Question-8: There is evidence that regularly rinsing the nose with saline has protected people from infection with the Coronavirus.
A. Yes
B. No (Correct Answer)

Question-9: Garlic is healthy and there is evidence from the current outbreak that eating garlic has protected people from the Corona Virus.
Question-10: To date, there is NO specific medicine recommended to prevent or treat the Coronavirus.
A. True (Correct Answer)  
B. False

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Socio - Technical Perspective for Better Design Thinking Process in User Interaction Design Using Light-Weight Why Because Analysis (LWBA)

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Abstract—Over decades, IT provided accessibility for all generations, from youngsters to the elderly, from the cognitively to the physically impaired. User interaction creates engagement between the user and the system, by providing the necessary structure and behaviour of a system to the users. Therefore, designing a User interaction combines cognitive sciences of psychology, computer science, human factors, and engineering, which is not easily addressed in the framework of science and engineering. This paper is presenting a use case of designing a user interaction by taking into account the socio-technical aspect of the clients. Light-weight Why Because Analysis is a semi-formal method intended to identify constraints, both technical and non-technical constraints, of a system based on the causal reasoning. The solution is generated by using the counterfactual of given causal factors. By implementing these approaches, the designed user interaction is able to satisfy the problem, resulting an appropriate delivery time of the final system.

Index Terms—Causal Inference, LWBA, Persona, Socio-technical Approach, User Interaction

I. INTRODUCTION

In recent years, IT has become a broad market both in terms of social and organizational purposes. IT provides accessibility for all generations, from youngsters to the elderly, from the cognitively to the physically impaired. Human Computer Interaction (HCI) is a multidisciplinary field of research which encompasses computer science, cognitive science, and human factor engineering. With the growing technologies, HCI expanded from its initial focus on individual and generic user behavior. The initial concern of HCI has evolved from personal computing such as social media, games, productivity application, and personal computer platforms (the operating system, programming languages, hardware). These innovations have made everyone potential users of computers. However, having a big market of potential users means that there will be usability issues arising in regard to the gap of knowledge of the market. The human-factor has made this field of research even more exciting, to include that there are other variables, such as the gender, age, cultures, even religion which might affect the success of an IT product.

This research is presenting a use case of Light-Weight Why Because Analysis (LWBA) to address issues in designing a system, particularly in designing the interaction which later affect the feature design of the system. This paper presents a proof that understanding the socio-technical aspects play an important part in delivering a successful project. The approach taken to address the identified constraint was based upon the LWBA analysis result. LWBA facilitates researchers to have a better understanding of the problem space Hence, having a broader consideration in designing the suitable approach.

II. Literature Study

Action research study is driven by real-world problems faced by researchers. Therefore, an action is performed to address the issues accordingly. These actions enable the researchers to discover new findings to a particular problem. The reason behind this paper was a phenomenon experienced by the researcher in conjunction to IT development projects.

Developing IT product requires not only technical skills but also soft skills such as communication ability. One of the critical challenges is during the requirement phase. According to the IEEE Standards in 1998 (IEEE, 1998b), a requirements are commonly classified as:

Functional. A requirement that specifies an action that a system must be able to perform, without considering physical constraints; a require- ment that specifies input/output behavior of a system.

Non-functional. A requirement that specifies system properties, such as environment and implementation constraints, performance, platform dependencies,
maintainability, extensibility, and reliability. Non-functional requirements are often classified into the following categories:

**Performance requirements.** A requirement that specifies performance characteristics of a system or system component must possess, for example, max. CPU-usage, max. memory footprint.

**External interface requirements.** A requirement that specifies hardware, software, or database elements with which a system or system, or other factors caused by such an interface.

**Design constraints.** A requirement that affects or constrains the design of a system or system component, for example, language requirements, physical hardware requirements, software development standards, and software quality assurance standards.

**Quality attributes.** A requirement that specifies the degree to which a system possesses attributes that affect quality, for example, correctness, reliability, maintainability, portability. It has been extended also to the concept of Hedonic Quality known as User Experience.

These set of requirement definitions play an important role in the success of a software, hence, to be able to correctly understand the users’ wants and needs are crucial in IT development projects. Let the quality attribute, user experience, be the case. Many translate User experience (UX) to user interface capability in assisting users’ needs. As the consequence, the UX component has a strong dependency on who the audience is. Human action is being controlled by cultural models (Clemmensen, T., & Plocher, T., 2007). Cultural models for humans interacting with computers should therefore be at the heart of the scientific study of human-computer interaction (HCI). The existing practice derived from the West of migrating software from a source culture to a target culture may work in the design and implementation phase, but not in the usability evaluation phase (Clemmensen, T., & Plocher, T., 2007). Moreover, the decision of icons, metaphors, shapes, colors of text and background, frame/text locations on screen, etc. may be employed in system designs by considering the relevance to the culture of origin of the software (Wirya, 2009). This should be taken into consideration as some signs or colors may represent the opposite of the intended meaning in other cultures. Therefore, a UX designer should be aware of the social-technical aspects and incorporate these to the designs.

Designs may result in a subconscious impact on the emotion perceived by its user. A cognitive scientist and usability engineer Don Norman (Norman, D., 2013) discussed how everyday objects are designed and the powerful effects of the design can affect the emotions and daily lived experience of the user. Don Norman (Norman, D., 2013) gives an example case by presenting the logic of how color screens gain its popularity when it is first introduced. In the early days of the personal computer, all the display screens were black and white. In that period of time, color was primarily used either to highlight text or to add superfluous screen decoration. On that ground, from a cognitive point of view, color added no value that could be provided with the appropriate use of shading. However, the market response showed otherwise. Don Norman is then doing the research by borrowing a color display for himself. He came to the conclusion that, although the logic reasoning at that time concluded that color was unimportant, however, the emotional perspective of human beings responded otherwise. The affect or emotion that humans have is passing judgments, presenting humans with immediate information or response about the world. Affect, therefore, regulates how humans solve problems and perform tasks. Negative affect can make it harder to do even easy tasks; while positive affect can make it easier to do even the most difficult tasks (Norman, D., 2002).

Usability design of a system combines cognitive sciences of psychology, computer science, human factors, and engineering, which is not easily addressed in the framework of science and engineering (Norman, 2002). People learn patterns of thinking and acting from living within a defined social environment, normally typified by national culture (Massey, A.P., et al., 2001). By definition, it is learned that culture may pre-determine a person’s communication preferences and behaviors. Understanding cultural consequences, therefore, contributes to better comprehension of how a system should be built and should behave. To design a sustainable system, the consideration of technical issues alone will not satisfy the problem, as there are other factors that. On this ground It is essential to contemplate the organizational and cultural aspects on which the system is implemented (Wirya, 2009).

Humans are using computers to perform certain tasks. Humans told the system their needs. Computers enable human beings to communicate with an inanimate object. The platform which provides such ability for humans to interact with the computer is the User interface. Hence, an interface should facilitate users to use their particular communication styles (Massey, A.P., et al., 2001). Differences across cultures should be considered while determining proper user interface for a system that intended for public use. Consequently, global interfaces need to accommodate a diversity of communication styles to provide support for the cultural diversity of the users (Ford, G., and Kotze, P., 2005). A good quality that is accepted in the related culture can make the users more loyal to the services (Wirya, 2009).

Simple cause-and-effect questions are the motivation for much research in the social, demographic, and health sciences, even though definitive answers to cause-and-effect questions may not always be possible to formulate given the constraints that we face in collecting data and evaluating alternative explanations (Morgan, S.L., and Winship, C., 2015). Causal analysis is an approach to find the causality reasoning behind an event based upon the cause-and-effect questions. Causal analysis provides the ability to distinguish the root causes of a given problem with its contributory factors and its contextual details. The common view on causation is sometimes called a “causal chain”, which suggests one-to-one causal relations between causes and effects. A root causal analysis depends upon a more general view of causality. In this case, the causes that potentially happen in future. Causal analysis provides the ability of presumption of certain factors which may have a significant role in leading an event to failure.

This paper presents a use case of taking into account the socio-technical perspective to design a user interaction. This paper shows a real-world case, on how socio-technical aspects may affect the interaction design of a software product. The Light-weight Why Because Analysis method is carried to capture...
both technical and non-technical constraints. By identifying the system, both technical and non-technical, constraints, one is able to have a broader point-of-view in analyzing the problem. Consequently, giving the convenience of what kind of approach that has more potential in addressing the constraints.

III. CASE STUDY

The research was conducted during a web-based software development project. The client name and institution will remain classified. The aim of the website is to deliver necessary information to its users. In terms of human resources, the agency can be regarded as a small-scale government-based agency, as it is only run by 2 to 3 people. One serves as the top-decision maker while others are the administrative staff. Nevertheless, the impact made by the agency to the public is quite strong.

The client already have a prior web application, however, the client lost contact to its former developer. The client would like to have a new web application similar / to replicate the former. As the consequence, we defines the requirement, both functional and non-functional, based upon the late application. This project itself is expected to be finished in 1 month, therefore the Agile Software Development framework was adopted. However, due to major refinements, the project schedule was stretched. In order to cut back the damage, we employ series of approaches and, hence, the final system was able to be delivered in 1.5 months. The series of approaches will be discussed in the subchapters.

A. Personas

Personas is an approach to create a reliable and realistic representations of the system audience. The personas can be used as the segments for reference. By having Personas model, one can discover the expected functionalities, uncover gaps, or highlight new opportunities. During the research, personas profile information is gathered based on qualitative approach which is through interview and discussion with the user group.

There are three persona identified in the case of study:

- Public users - the visitors of the website. This type of user is utilizing the website for discovering information or to contact the agency.
- Management – Decides which content should be put and put down, answer related questions comes to the web, and so on.
- System Administrator - is the people responsible for managing the website content, technically.

However, the uniqueness of this research is there are two personas profile that is assigned to a single person. Though there are three different persona identified, in the midst of the project the people responsible in acting as the system administrator is resigned. Such that, the gap cause by such event should be includes in the system design.

B. Light-weight Why Because Analysis

In the midst of the case study, the schedule of the project is keep being pushed back by the user. Therefore, we know that the time for the project will be longer that what it is scheduled. This problem triggered of this condition is caused by the dissatisfaction, both in the perspective of users’ and developers. As we are trying to understand the reason why there is this delay is happening, and how to be back on track as soon as possible. Hence, in this perspective, the root problem is set upon the dissatisfaction of developers’ perspective, which is the duration of the project taking longer than expected. However, these reasoning may not be easily understood because there might be information that is not pulled out during the discussion. Hence, the causal interference method is deployed.

To understand more the problem, we utilize an analysis method namely, Light-Weight Why Because Analysis (LWBA) (Wiryana, 2009) a semi-formal method intended to identify constraints of a system. LWBA is based upon Why Because Analysis developed by Peter B. Ladkin in Bielefeld University and has been used for incident analysis (Ladkin, 2001). WBA is employed to perform root causal analysis, by finding the necessary causal factor of the incident.

LWBA is using causal interference between the technical and non-technical constraint as cause-and-effect relation. The common view on causation is sometimes called a "causal chain", which suggests one-to-one causal relations between causes and effects (Wiryana, 2009). The counter-factual test is used to define necessary causal factor (NCF), which further being used to generate the solution to the problem.

The analysis result of LWBA is depicted by a Lightweight-Why-Because Graph (LWBG) in Figure 1.

![Figure 1. The result of Causal Analysis Using Light-Weight Why Because Analysis](image-url)

The blue hexagon (Figure 1) is indicating a problem that can be solved using technology, while the green octagon is indicating the problem that can be solved using non-technology solutions. LWBA approach is based upon ‘and’ relation between the root problem and its causal factors. Accordingly, the solution can be generated by identifying the counter measure the NCF which resulting on form of either technical solution or non-technical solution.
As seen in Figure 1, the inflexibility of the system are the necessary causal factor of two unsatisfactory node. Therefore, by developing the counter measure to the problem one can eliminate the causal factors. In this manner, the counter measure will satisfies the root problem.

IV. FINDINGS & DISCUSSION

Based upon the identified NCF of the LWBG the solution of the problem, to the case problem can be addressed by making the system to be as flexible as possible. This solution may sound simple, however we must take a consideration that there are two different personas that will be assigned to a person. In which, the more power we give to the user, the less we can control the system. This two things is that should be put in balance.

A. Personalized Content Management System

The plan is to give a controlled-freedom to the system administrator personas, by doing categorization of website elements. The freedom is define by giving the ability for users to customized the front application from a content management. The control variable that developer have in order to maintain its original design is by setting a rule for each given customization ability.

There are four categorization of menu available within the website are:

Top menu. Top menu is typical menu that we see at the top of most web application. This type of menu has a predefined number, in this case we set up to 5 menu can be put in. Not only we limit the number of main menu, we also limiting the length of a menu name. The decision is made by taking into consideration in maintain he esthetical perspective to its original design. However, there are no restriction on how many sub-menu and contents for each main menu can be created.

Left menu. Refers as the vertical menu appears on the left-hand side of the web application. We set the number of main menu to 11. However, there are no restriction on how many sub-menu and contents for each main menu can be created.

Topical Issue. This type of menu category used for particular issue. There are no maximum limit in creating such menu. However, the number of menu shown within the homepage of the front website is up to 3 issues, based upon the latest post.

Important Links. Refers as the horizontal menu appears on the bottom of the front web application. We limit the number of main menu to 5.

B. Usability Consideration: Pattern Design Approach

Employing LWBA simplifies the design thinking process and help identifies the solution during the in a short period of time. In redesigning process, we use pattern design approach as our main reference standard in designing the user interaction. The design patterns give insight of how other users have been interacting with similar system and how other UX designer have been addressing a particular problem. User Interface Design patterns can also be seen as recurring solutions that solve common design problems.

VI. CONCLUSION

This research is presenting a use case of Light-Weight Why Because Analysis (LWBA) to address issues in design thinking process, particularly in the user interaction design. By identifying the counter measure of the necessary causal factor to the root problem, we are able to design an appropriate solution. As the result, the time delay of the project can be well maintained. The use of other tools such as personas and pattern design helps to save time during the reengineering process.

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Anthropocentrism to Dystopia: An Analysis of Margaret Atwood's *Oryx And Crake*

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Abstract- This thesis paper, talks mainly about how the anthropocentric attitude within humans may lead our world in to a kind of Dystopia. For substantiating the given statement I have given here a detailed analysis of Margaret Atwood’s novel *Oryx and Crake*. Through her novel, the great writer is trying to give a warning to her readers about the Dystopian future.

Index Terms- Anthropocentrism, Dystopia, Margaret Atwood's Fictions, *Oryx and Crake*, Apocalyptic future.

Many environmentalists lamented that universe is being destroyed by humans because the manifold ecological problems arise from the growing human population and also by the human exploitation of nature. These issues are revolving around the concept of anthropocentrism. The term anthropocentrism is an ideology, which values humanity over non-humanity. From a philosophical point of view, it is a concept which argues that human beings are the central or most significant entities in the world. This is a belief embedded in many western religions and philosophies.

Anthropocentrism has negative impacts, as it is considered to be responsible for several environmental crises ranging from global warming; ozone depletion and drought etc. The domino effect of such crises would lead to the severe climate changes resulting in the extinction of various species due to their habitat-loss. For example, because of the anthropocentric view point, people cut down trees to build huge buildings and offices for making money to satisfy their greedy minds. This will finally result in the deforestation which leads to the increase of carbon dioxide gas in atmosphere. Then its severe outcome would be enhanced greenhouse effect and global warming.

Margaret Atwood’s *Oryx And Crake* is a novel which tells us about our futuristic dystopia. Margaret Eleanor Atwood is a Canadian poet, novelist, literary critic, essayist, inventor, teacher and environmental activist. Atwood and her writing have won a lot of awards like Man Booker prize, Franz Kafka prize etc. Major themes of her writing are gender and identity, religion, myth, climate changes and power politics. Her other works include *The Edible Woman*, *Surfacing* etc. Poetry collections are *Expeditions*, *True stories* etc. Atwood has a special interest in ecology. Moreover, she has many relatives who are scientists, which might have influenced in her writing. Her Maddaddam trilogy comprises *Oryx And Crake*, *The Year of the Flood*, Maddaddam. *Oryx And Crake* is basically a speculative fiction, published in 2003. The novel is a warning against future of technology fuelled by capitalism and corporate greed. Humans are completely driven by greed and laziness. In their attempt to develop robots and other technological developments, they themselves will lose their existence. Humans develop technology for making themselves more carefree. Technological developments are, of course, beneficial but on the other side it had made man lazy in his life. *Oryx And Crake* tells its readers about how technological developments will contribute for destroying the world. The protagonist of the novel is Jimmy, who is struggling to survive in a world where he had already lost his friend Crake and his beautiful lover Oryx.

The second book in the trilogy, *The Year of the Flood* came six years after *Oryx And Crake*. In this book, a reader can see the melding of religion and science. After the natural disaster occurred, the human life has obliterated. Two women have survived; Ren and Toby. Meanwhile, genetically engineered species like the lion/lamb blends the Mo`hair sheep with human hair, the pigs with human brain tissue, are proliferating. The third book, Maddaddam takes us to more challenging dystopian world and holds up a mirror to our own possible future. Jimmy and other survivors are united in facing the struggles of dystopian world. Atwood also poses the questions about the creation, the infallibility of god and the evolution of religion.

While reading the novel *Oryx and Crake*, one can easily come across the notion of anthropocentrism. The character Crake is depicted as a kind of ruler or god, who can make the biologically and fundamentally different beings on earth. These beings have even resistance to the sun’s ultraviolet radiations. Here, a man is trying to be a god, as humans consider god as the creator of whole living beings and the whole universe. This illustrates the anthropocentric attitude of a man like Crake in our world.

A pigoon is the creature in the novel that can grow five or six kidneys is highly desirable because it drastically reduce the cost. This is another instance of anthropocentrism in the novel. Humans are afraid of death. They find various ways to get rid of it. Here in then novel, humans are becoming the ultimate problem solvers and also the solution makers. They are showing that they can even avoid the death through their inventions. One such invention is the pigoon. After making pigoons, the corporations sold the animal meat with human genes in it simply to make profit. It is notable that they are only forced to do so because of the same corporate greed and scientific advancements. According to humans, everything is business. Humans are not at all concerned about other creatures; they only want to make money for satisfying their individual needs.

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Atwood’s Oryx and Crake depicts the idea that is, anthropocentrism can lead to the creation of a dystopian world. Generally, every human in this world yearns for the creation of a Utopian future. The Cambridge Dictionary defines utopia as “a perfect society in which everyone works well with each other and is happy.” But the thoughts and deeds of humans are leading them to a dystopian future. Atwood gives the illustration of this idea in her novel “Oryx and Crake.”

In the beginning of the novel, a reader can see that human population of the earth has been wiped out by a deadly plague. Then genetically manipulated group of beings that is Crakers, who are similar to but not the same as humans are surviving easily in the environment but, the last man, snowman struggles to survive. From this, what a reader can infer is that now, Snowman is living in a society, which is the result of Crake’s greedy, selfish calculations. Humans generally gave prior importance to time in their life, but in the morning when Snowman looks at his watch, he finds that it is not working. Snowman is in a world where crackers, pigeons, exist, which is considered as great scientific advancements. But as humans have learned more and more about technology, their clocks have stopped working. So, this illustrates that when man goes behind great advancements, they can lose the basic elements in their life. For example, Snowman has no any idea about accurate time and he tells that he was eating probably the last mango in that world.

The character Crake is the main reason for the destruction of humanity. He believes those things which are traditionally referred as “distinctly human”- love, art, language, self-awareness, knowledge of mortality, are a kind of evolutionary mistakes. He finds them to be “inelegant” solutions to the problem of life and survival. Crake’s solution to these problems, on the one hand is the invention of the crackers, whom he considers to be superior genetic combinations of humans, plants and animals that share neither human intelligence nor sexual desire. On the other hand, he solves what he sees as the problem of human beings by developing a plague that effectively wipes them off the earth. So, an anthropocentrically driven man’s misconception about love, sex, humanity has led to the destruction of human species itself.

Crake never shows any love for his parents, and Jimmy suspects that Crake killed his mother and Uncle Pete in order to test the deadly viruses that he was developing. Crake seems to view everything that contributes to human relationships as messy and unnecessary, tries to eliminate that messiness. From all these scenes in the novel, one can understand how human relationships will fare if rapid scientific advancements and corporate greed continue to have an increasing effect on the life of the individual. Trust and love are hard to find in this world. Greed in humans arises from their anthropocentric attitude. The book imagines a world where humanistic questions regarding ethics, morality, and responsible decision making have been pushed aside in the name of scientific progress. So, a reader can find that scientific progress will leads to the absence of humanistic thinking, which has a dehumanizing effect on culture.

Crake’s solution to different problems are the invention of the crackers, whom he considers to be superior genetic combinations of humans, plants and animals that share neither human intelligence nor sexual desire. On the other hand, he solves what he sees as the problem of human beings by developing a plague that effectively wipes them off the earth. So, an anthropocentrically driven man’s misconception about love, sex, humanity has led to the destruction of human species itself.

But love was undependable, it came and then went, so it was good to have money value, because then at least this who wanted to make a profit from you would make sure you were fed enough and not damaged too much.” These lines tell that in the flashback, Jimmy learns about Oryx had a horrible, joyless life. She had been sold to Uncle En. After his death, she had to work with an adult filmmaker named Jack. He taught her English in exchange for sexual favours. She is then purchased from Jack by a San Francisco artist, who saw her on TV. From her life, Oryx learned that there is price for everything. Crake meets Oryx through prostitution service sponsored by his school Watson and Crick. And then he hires her for project paradise. Though she is not fond of Crake as she is of Jimmy, she deeply admires Crake and his project. Because she believes Crake wants to end human suffering. But her concept about Crake and his project was wrong as instead of ending human sufferings, his vision was to wipe out the human race.

“Homo Sapiens, Sapiens was once so ingenious with language, and not only with language. Ingenious in every direction at once.” These are the lines from the novel which tells that Jimmy thinks back about humanity’s past greatness: a greatness that has been squandered, resulting in a post-apocalyptic society. Jimmy is an eloquent man who loves words and language. He is the last human on earth after the plague, but he is one of the last true human even before other humans die from the disease. His humanistic or general thinking as Crake calls it is what saves him, figuratively and literally. The novel depicts worries about a progress-obsessed culture which only looks forward, and fails to attribute meaning and significance to the past; this led the people to stop seeing themselves as members of a unified human culture: that might cause them to cease to be human. Crake is the reason for this as he tried to breed such cultural and humanistic needs out of the crackers. So, a man himself is the reason for the creation of such an undesirable world. It is a world controlled by profit seeking corporations, everything has been commoditized.

Everything is for sale. There are no moral considerations or concerns. The corporations are freely exploiting the people’s insecurities and weakness to sell sex, beauty, health, and the promise of happiness. In order to preserve their high profits, health companies have even begun to manufacture and release diseases to profit off their cures. This is as much as abuse of corporate power as it is as abuse of advanced scientific knowledge. Just as health, beauty, and happiness have a sale value, evil and violence have entertainment value and are thus similarly commoditized.

“Maybe the guards tried to get out of RejoovennEsense just like everyone else. Maybe they, too, hoped they could outrun contagion.” These lines tell that when Snowman visits the guard tower of a major corporate building. He realizes that there are no dead bodies inside the building, suggesting that even the guards were trying to run away from the mysterious contagion. There is no law and order outside of the corporate compound. Corporation’s security enforcement services protect corporate interest over individual interests. In such a society, a man who wants to live a meaningful life finds it difficult to survive there.
Corporations are the companies or institutions controlled by a group of greedy individuals. So, it’s almost clear that anthropocentrism is creating such an unwanted society.

In all aspects, this novel depicts a true dystopian world because even after the end of human race, Snowman’s and Craker’s lives are under the control of Crake. Before the human race’s end, their lives depict a clear undesirable world. Atwood has philosophically presented the concept of how anthropocentrism can lead to a dystopian or undesirable world in the novel. Humans are the main reason for the increasing pollutions, for satisfying their greedy mind, they cut trees, hunt animals, and even another man, which is in their own species. Recently the flood occurred in Kerala is a warning from nature. But still man is not ready to give up their anthropocentric way of thinking. But at last what will happen is that, the creation of a dystopian world.

In *Oryx And Crake*, the human race is characterized by a constant desire to achieve immortality. The creation of Anooyoo Spa and genetically mutated pigeons are the symbols of society’s need to preserve beauty and prevent death. This idea of immortality is also demonstrated through the crackers, who have no understanding of the concept of death and as a result exist in an eternal present. Then science without ethics is explored in the novel. Jimmy’s twisted and morally questionable childhood Crake is behind the collapse of humanity and the overall is a symbol of all of the negative possibilities that can result from scientific thinking detached from ethics.

Snowman thinks a great deal about his own species’ extinction of Homo Sapiens brought by Crake’s plague. In addition, he notes the current flora and fauna on the earth and which species are thriving and which are declining. He also compares his own poor adaptations to those of the crackers. He suffers from sunburn, infection, starvation, and more in the environment where crackers are perfectly suitable to live. In this book, humans go on controlling evolution, from creating new species and inadvertently causing the Extinction of existing species but this has resulted into a new story of evolutionary history. Through her novel, Atwood is trying to give a warning to her readers as she is not a prophet, she cannot ensure that dystopia will be the future of this world. Atwood tells that all these are possibilities. Humans yet have enough time to change their attitude. If they are ready to choose the right path of meaningful survival, then they can avoid the creation.

In the conclusion, I would like to state the relevance of this thesis in the current society. We all are now facing the pandemic covid 19, so our present world can be related to the Apocalyptic world presented in the novel *Oryx and Crake* by Margaret Atwood. Through this thesis I would like to state how the wording of Atwood about anthropocentrism is so relevant in our present situation.

**Acknowledgment**

I would like to express my sincere gratitude to my teachers and friends for their continuous support throughout this thesis, especially for their motivations. Their support has helped me in all the time of research and writing of this thesis.

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Structural Backwardness in the Kashmir Valley: Planning Implications and Development Strategies

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Abstract - Region specific development concerns have always been factored in the strategies of inclusive and sustainable development in India. Hence parameters of structural regional backwardness which is determined by spatial and socioeconomic characteristics have always been given due weightage. The Kashmir valley, one of the regions of the state of Jammu and Kashmir with a population of 6.908 million (2011) is of significant importance for regional and urban planners not only because of its great potential for growth but also because of its geopolitical importance, the recent incursions and the increasing demand for development. The valley suffers from a stagnant economic growth, low levels of urbanization, lack of social facilities and services, low agricultural productivity and disadvantages of location. Within this overall stagnation in the valley there are districts which show characteristics of structural backwardness.

This article is an attempt to study the phenomena of intra-state disparities in the Kashmir valley, located between the Karakoram and the Pir Panjal ranges in the state. It has only one million plus city, Srinagar, which acts as a pivot for the valley and is the only node where all higher order amenities and facilities are concentrated. Since the valley shares international borders with Pakistan and China, it is geopolitically very sensitive and of great strategic importance.

In this study an attempt has been made to, i) identify the indicators as well as the levels of regional development in the Kashmir valley; and, ii) a methodology which can identify the most backward districts and the regional planning issues that beset them. This has helped us to identify strategies to bring out a more balanced regional development in the Kashmir valley.

Index Terms - Backwardness, Development, Backward districts, Kashmir valley, Region.

I. INTRODUCTION

Differences among regions or states within countries are only one form of spatial inequality. Although, more significant are differences within single state. Inter-state disparities are unavoidable in view of the availability of the natural resources and diversity of earth’s surfaces, but why do differences in development status occur within a state? This phenomenon is certainly supported by some extra-natural factors, which could be the socio-cultural background and people’s perception and attitudes as well as bottlenecks in local government administration. As a result, there are wide differences in levels of social and economic welfare and also in the levels of technical knowhow.

In August 1947, when India achieved independence, attempts were made by the government to tackle the problems of poverty, illiteracy, food deficit and industrial backwardness. The Planning Commission was set up on 15 March 1950 to carry out the planning process. In order to make the development programmes more effective through people’s participation a new system of rural local government “Panchayati Raj” was introduced at the district level as per the recommendations made by the Balwantrai Mehta Committee Report (Mathew, 1994). It proposed a three-tier system of local self-government, the ‘Gram Panchayat’ at the village level, the ‘Panchayat Samiti’ at the block level and ‘Zilla Parishad’ at the district level. The administrative setup and the proposed system of agricultural and industrial based development helped the potential areas to improve further (Neale, 1985). In 1969, the Pande Committee identified industrially backward states/districts and Wanchoo Committee suggested fiscal and financial concessions whereby regional imbalances could be minimized. Similarly, Shivraman Committee 1978 identified problem areas as backward for planned development and Sarma Committee 1997 also conducted various studies for the identification of backward districts (Planning Commission, 1981).

II. CONCEPT OF BACKWARDNESS

Areas classed as "Backward" are particular areas or districts or groups of districts having bordered topological space and facing particular locational problems such as grim poverty, unemployment, low income etc. According to Friedman (1966), Backwardness is "structural" in two senses:

1. Locational disadvantage or spatial containment leading to lack of integration with the interregional economy.
2. Socioeconomic characteristics specific to social groups living in backward areas.
Regional disparities can be brought down in the real sense when all regions are encouraged to exploit their own development potentials and formulate development plans suitable to their needs, potentials and aspirations. If backward regions are helped by this way, they will have an opportunity to overcome their inherent weaknesses and achieve higher rate of growth and development (Kurian, 2000).

Planning commission has been the only agency at national level which is working for development of backward areas. It has proposed various policies and strategies through the five-year plans and also established committees for evaluation and implementation of such plans for backward areas. It is to be noted that besides the rural resource development schemes, several other programmes, such as the industrial development of backward areas through focal point/ growth centre approach, along with credit, rural marketing and administration, have been considered by the planning commission for the development of backward areas (Planning Commission, 1981). Therefore, it may be stated that the development of backward areas can be done by adopting different approaches.

III. MEASURING BACKWARDNESS

There had been done an attempt to identify the most backward districts in the country in 1960. As the Pande Committee and Wanchoo Committee were set up in 1969 to recommend the criteria for identifying backward districts in backward states whereby regional imbalances could be minimized or eliminated by arranging establishment of industries of all sizes in selected backward areas or regions through financial and fiscal incentives (Planning Commission, 1981). Rao (1977) has been employed the principal component approach by taking twenty-four indicators representing the sectors of agriculture, industry, banking and education for the identification of backward regions and to identify the trends in regional disparities in India.

The National Committee on Development of Backward Areas (NCDBA) appointed by planning commission in 1978 under the chairmanship of Shri. B. Shivraman, identified problem areas as backward for planned development (Planning Commission, 1981). The problems areas identified by the committee were:

- Chronically drought prone area
- Desert area
- Tribal areas
- Hill areas
- Chronically flood affected areas
- Coastal areas affected by salinity

A committee of the Government of India’s Ministry of Rural Areas and Employment (1997) conducted one of the most elaborate exercises for the identification of backward districts. EAS Sarma was principal advisor to the planning commission and the committee used a composite method with differing weights for parameters such as:

- Incidence of poverty
- Education
- Health
- Water supply
- Transport and communications, and
- Degree of industrialization.

The Sarma Committee identified 100 most backward districts which includes:

- 38 districts from undivided Bihar
- 19 from undivided Madhya Pradesh
- 17 from undivided Uttar Pradesh
- 10 from Maharashtra, and
- A smaller number of districts from other states

There were no districts from Gujarat, Goa, Kerala, Punjab, Andhra Pradesh and Tamil Nadu. The committee was considered the north-eastern states as well as Jammu and Kashmir as it felt that they had problems which were unique and peculiar. Many target-specific development programmes were initiated to address intra-regional disparities through district development agencies such as the Rashtriya Sam Vikas Yojana (RSVY), Backward Regions Grant Funds (BRGF) and National Food for Work (NFW), National Rural Employment Guarantee Scheme (NREGS) (Planning Commission, 2003).

Regional backwardness in development has become an extremely sensitive issue in recent times with serious social and political ramifications. The problem of regional backwardness in the levels of development is a universal phenomenon. Both developed and developing countries have witnessed this problem in the path of their socio-economic advancement, but its adverse impact has been felt more in the latter. This phenomenon is a natural outcome of the development process itself; wherein certain regions develop faster than others due to a number of factors. Regional inequalities are generally an outcome of numerous factors such as variations in natural and physical endowments, differences in social and attitudinal parameters, institutional structures and to some extent, the discriminatory policies of the state. There were given focus on location, space, resources and policies of a region in order to address the regional inequalities (Friedman & Alonso, 1964). This case study of Kashmir valley is based on the understanding of the factors which hinder
the growth and development process of Kashmir valley. An attempt has been made here to analyze some of the important aspects for which detailed information has been collected to comprehend the factors responsible for the backwardness in this region.

IV. STUDY AREA

Kashmir valley lies between the Karakoram and the Pir Panjal range in the Indian state of Jammu and Kashmir. It is also one of the three administrative divisions and natural regions of the Jammu and Kashmir state, consisting of plains of Jammu, the Kashmir valley and the cold mountainous desert of Ladakh. The Valley is encircled by mountain ranges characterized by snow covered high mountain peaks and has an area of 15,984 square kilometers. The total population of Kashmir valley is 6.908 million which is almost half the total population of 12.55 million of Jammu and Kashmir State (Census of India, 2011). Jhelum and its tributaries like Lidder, Indus, Bring, Vishav, Pohru, Sandran, and Surkhnag are prominent rivers of the Valley. The Kashmir Valley consists of the following districts: Budgam, Bandipore, Anantnag, Baramulla, Ganderbal, Kulgam, Pulwama, Kupwara, Shopian and Srinagar. It lies between the coordinates of 73° 55’ E and 75° 35’ E, and 35° 25’ N and 34° 45’ N.

Map 1: Location of the Study Area

Source: Census of India, 2011 & OpenStreetMap, 2016 (https://www.openstreetmap.org/)

Rationale for Case Study Selection

1. The Kashmir Valley has great potential for development because it has both natural as well as man-made resources.
2. It is considered “heaven on the earth” and has been a much in demand tourist destination because of its overwhelming scenic beauty and attractions.
3. It produces special agricultural products because of its climate such as Kashmir apples, almonds, cherry, walnuts and saffron which have a national market as well as international market.
4. Its handloom and handicrafts such as pashmina shawls, carpets, hand embroidery, wood carving, and papier mache products have an international market.
5. It is a favored location for proposed biotechnology, information technology and for innovative emerging knowledge-based industries.

Justification of the Case Study

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1. The Kashmir valley has strategic and geopolitical importance as it is near to the international border of Pakistan, Afghanistan and China.
2. Its total population (6.908 million in 2011) is almost half the total population of 12.55 million of Jammu and Kashmir State in the same year.
3. It lacks in development despite rich resource base. Poor industrial infrastructure along with the poor investment has reduced the industrial sector into sick industries.
4. Lack of governance and financial management has been responsible for the poor economic growth of the state.
5. It is known for tourist destination of domestics and foreign tourists. The tourist’s places like Gulmarg, Dal Lake, Pahalgam, Amarnath temple have crucial role in tourism sector.
6. It falls in seismic zone five and is vulnerable to natural disasters like earthquakes, floods, avalanches and landslides.
7. The Sectoral contributions of GSDP for State (2013-2014) had 21.07 percentage in primary sector, 22.39 percentage in secondary sector and 56.44 percentage in tertiary sector. Similarly, the Kashmir valley is also tending from primary sector to tertiary sector (Digest of Statistics, 2013-14).

Objectives
1. To identify indicators that lead to the disparities in levels of regional development in the Kashmir valley.
2. To identify the most backward districts in the Kashmir valley and to study their structural characteristics in terms of selected indicators of demography, urbanization, economy, agriculture, industry, transportation, social amenities and assets etc.
3. To suggest regional development strategies based on area specific drivers of growth.

V. DATABASE AND METHODOLOGY

The aim of this study is to analyse the key factors responsible for the existing disparities in regional development in the Kashmir valley. On the basis of selected indicators, the levels of development in the valley have been established at the district level through a composite index using the HDI methodology. The Structural backwardness has been analysed in terms of selected indicators of demography, urbanization, economy, industry, agriculture, transportation, communication and social amenities and assets. Literature reviews has been done pertaining to different backward regions with the help of journals, articles and books etc. Data has been collected from secondary sources. ArcMap has been used for preparing map. Finally, the implications and strategies has been formulated to the most backward districts of the study. Forty indicators which have been used for the identification of backward districts in the Kashmir valley.

The HDI (Human Development Index) methodology has been used in this study to indicate and analyse structural backwardness in the Kashmir valley. The backwardness of each district has been explained sector wise. The procedure of the HDI methodology is given below:
1) Calculate Minimum and Maximum of each variables.
2) It is calculated by the method of (Actual Value-Minimum value/Maximum Value-Minimum Value).
3) Calculate the average value for the variables by simply adding the values of all the variables and dividing it by the number of variables.

VI. RESULTS AND DISCUSSION

According to the Human Development Index (HDI) methodology Kupwara, Ganderbal, Kulgam and Bandipora are the four most backward districts in the Kashmir valley in terms of selected indicators of demography, urbanization, economy, agriculture, industry, communication, transportation and social amenities and assets. In these four backward districts, the composite index is lower than 0.30. Srinagar is the only district which has a composite index higher than 0.50 and is the most developed in the Kashmir valley. Kupwara, Bandipora and Ganderbal are the three insurgent border districts which are near the Line of Control (LoC) where as Kulgam is an inland district adjacent to Jammu region. The causes for backwardness of these districts are the peculiar physical features and lack of proper infrastructure and services. These are the few characteristics which are responsible for the low growth of development in the Kashmir valley. The following table shows the total composite of overall sectors.

Table 1: Sector wise Development Indices using HDI Methodology

<table>
<thead>
<tr>
<th>Districts</th>
<th>Urbanization</th>
<th>Demography</th>
<th>Economy</th>
<th>Social amenities and assets</th>
<th>Industry</th>
<th>Agriculture</th>
<th>Transportation and communication</th>
<th>Total composite index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kupwara</td>
<td>0.03</td>
<td>0.37</td>
<td>0.40</td>
<td>0.27</td>
<td>0.06</td>
<td>0.33</td>
<td>0.01</td>
<td>0.21</td>
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<td>District</td>
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<td>0.53</td>
<td>0.31</td>
<td>0.41</td>
<td>0.36</td>
<td>0.26</td>
<td>0.31</td>
</tr>
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<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>Badgam</td>
<td>0.09</td>
<td>0.42</td>
<td>0.48</td>
<td>0.42</td>
<td>0.26</td>
<td>0.83</td>
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<td>0.40</td>
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<td>0.39</td>
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<td>0.34</td>
<td>0.10</td>
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<td>0.43</td>
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<td>0.44</td>
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<td>0.40</td>
<td>0.18</td>
<td>0.00</td>
<td>0.73</td>
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<td>0.30</td>
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<td>0.46</td>
<td>0.19</td>
<td>0.29</td>
<td>0.47</td>
<td>0.24</td>
<td>0.34</td>
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<tr>
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</tbody>
</table>


Map 2: Development Index based on HDI Methodology

Kupwara, Ganderbal, Kulgam and Bandipora are the four most backward districts in the Kashmir valley as per the total composite index. The composite index of demographic indicators has been calculated with the help of HDI methodology in order to find out the level of development in the Kashmir valley. Kupwara, Ganderbal and Badgam are the three most backward districts in terms of demographic indicators. The composite index of urbanization shows that Srinagar district has high level of urban development whereas Baramulla, Bandipore, Anantnag, Kulgam and Ganderbal districts have medium level of urban development in the Kashmir valley.
Kupwara, Badgam, Pulwama and Shupiyan districts have low level of development of urbanization composite Index. These four districts are highly backward in terms of level of urbanization and number of towns with more than 20,000 populations. The composite index of economic indicators depicts that Kupwara, Kulgam, Shupiyan and Pulwama are the most backward districts in terms of level of development in economic indicators. The composite index of agricultural indicators shows that Kupwara, Badgam, Ganderbal and Bandipora are the most backward districts in terms of level of development in the Kashmir valley.

Kupwara, Ganderbal, Kulgam and Shupiyan have the lowest composite index in terms of industrial indicators in the Kashmir valley. On the other hand, Srinagar, Badgam and Pulwama are the most developed districts as all the major industrial establishments are located in these districts Bandipora, Anantnag, Shupiyan and Kulgam districts have low composite index of level of development. Hence, these are highly backward districts in terms of social assets, commercial assets, educational assets, energy assets and households’ amenities. But Srinagar and Baramulla districts have a high composite index of level of development in terms of social amenities and assets. The composite index of transportation and communication indicators is high in the Srinagar district as it is the capital of commercial activities and acts as a nexus point to all the other districts. While Kupwara, Bandipora, Ganderbal and Kulgam districts have low composite index of level of development pertaining to transportation and communication indicators. The selected indicators are given below:

Table 2: Demographic Indicators (2011)

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>District name</th>
<th>Total population</th>
<th>Total no. of households</th>
<th>Population density(sq.km)</th>
<th>No. of literates</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Kupwara</td>
<td>870354</td>
<td>106,777</td>
<td>366</td>
<td>439654</td>
</tr>
<tr>
<td>2</td>
<td>Badgam</td>
<td>753745</td>
<td>99,219</td>
<td>554</td>
<td>335649</td>
</tr>
<tr>
<td>3</td>
<td>Baramulla</td>
<td>1008039</td>
<td>145,990</td>
<td>242</td>
<td>545149</td>
</tr>
<tr>
<td>4</td>
<td>Bandipora</td>
<td>392232</td>
<td>56,794</td>
<td>378</td>
<td>185979</td>
</tr>
<tr>
<td>5</td>
<td>Srinagar</td>
<td>1236829</td>
<td>167,448</td>
<td>1056</td>
<td>748584</td>
</tr>
<tr>
<td>6</td>
<td>Ganderbal</td>
<td>297446</td>
<td>43,249</td>
<td>284</td>
<td>143276</td>
</tr>
<tr>
<td>7</td>
<td>Pulwama</td>
<td>560440</td>
<td>81,241</td>
<td>516</td>
<td>293958</td>
</tr>
<tr>
<td>8</td>
<td>Shupiyan</td>
<td>266215</td>
<td>41,947</td>
<td>853</td>
<td>136500</td>
</tr>
<tr>
<td>9</td>
<td>Anantnag</td>
<td>1078692</td>
<td>142,987</td>
<td>366</td>
<td>545532</td>
</tr>
<tr>
<td>10</td>
<td>Kulgam</td>
<td>424483</td>
<td>69,203</td>
<td>1051</td>
<td>209085</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Literacy rate</th>
<th>Sex ratio</th>
<th>SC population</th>
<th>SC population (in %)</th>
<th>ST population</th>
<th>ST population (in %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>64.51</td>
<td>835.45</td>
<td>1048</td>
<td>0.12</td>
<td>70352</td>
<td>8.08</td>
</tr>
<tr>
<td>56.08</td>
<td>893.64</td>
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<td>0.05</td>
<td>23912</td>
<td>3.17</td>
</tr>
<tr>
<td>64.63</td>
<td>885.13</td>
<td>1476</td>
<td>0.15</td>
<td>37705</td>
<td>3.74</td>
</tr>
<tr>
<td>56.28</td>
<td>888.64</td>
<td>392</td>
<td>0.10</td>
<td>75374</td>
<td>19.22</td>
</tr>
<tr>
<td>69.41</td>
<td>899.53</td>
<td>1068</td>
<td>0.09</td>
<td>8935</td>
<td>0.72</td>
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<tr>
<td>58.04</td>
<td>874.03</td>
<td>117</td>
<td>0.04</td>
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<td>20.53</td>
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<td>63.48</td>
<td>912.35</td>
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<td>0.07</td>
<td>22607</td>
<td>4.03</td>
</tr>
<tr>
<td>60.76</td>
<td>950.58</td>
<td>43</td>
<td>0.02</td>
<td>21820</td>
<td>8.20</td>
</tr>
<tr>
<td>62.69</td>
<td>927.04</td>
<td>1826</td>
<td>0.17</td>
<td>116006</td>
<td>10.75</td>
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<tr>
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<td>6.25</td>
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</table>

Source: Census of India, Primary Census Abstract, 2011

Table 3: Urbanization Indicators (2011)

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>District name</th>
<th>Urban population</th>
<th>Level of urbanization (in %)</th>
<th>No. of towns more than 20,000 population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Kupwara</td>
<td>104729</td>
<td>12.0</td>
<td>21771</td>
</tr>
<tr>
<td>2</td>
<td>Badgam</td>
<td>97912</td>
<td>13.0</td>
<td>15338</td>
</tr>
<tr>
<td>3</td>
<td>Baramulla</td>
<td>182500</td>
<td>18.1</td>
<td>71434</td>
</tr>
<tr>
<td>4</td>
<td>Bandipora</td>
<td>65361</td>
<td>16.7</td>
<td>37081</td>
</tr>
<tr>
<td>5</td>
<td>Srinagar</td>
<td>1219516</td>
<td>98.6</td>
<td>1256831</td>
</tr>
<tr>
<td>6</td>
<td>Ganderbal</td>
<td>47039</td>
<td>15.8</td>
<td>28233</td>
</tr>
<tr>
<td>7</td>
<td>Pulwama</td>
<td>80462</td>
<td>14.4</td>
<td>18440</td>
</tr>
<tr>
<td>Sr. No.</td>
<td>District name</td>
<td>Households with electricity</td>
<td>Households with electricity (in %)</td>
<td>Households with treated drinking water</td>
</tr>
<tr>
<td>---------</td>
<td>---------------</td>
<td>-----------------------------</td>
<td>------------------------------------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td>1</td>
<td>Kupwara</td>
<td>83,071</td>
<td>78</td>
<td>13,928</td>
</tr>
<tr>
<td>2</td>
<td>Badgam</td>
<td>90,190</td>
<td>91</td>
<td>30,163</td>
</tr>
<tr>
<td>3</td>
<td>Baramulla</td>
<td>138,180</td>
<td>95</td>
<td>54,721</td>
</tr>
<tr>
<td>4</td>
<td>Bandipora</td>
<td>45,469</td>
<td>80</td>
<td>9,617</td>
</tr>
<tr>
<td>5</td>
<td>Srinagar</td>
<td>165,403</td>
<td>99</td>
<td>137,350</td>
</tr>
<tr>
<td>6</td>
<td>Ganderbal</td>
<td>38,487</td>
<td>89</td>
<td>23,678</td>
</tr>
<tr>
<td>7</td>
<td>Pulwama</td>
<td>73,629</td>
<td>91</td>
<td>24,257</td>
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<tr>
<td>8</td>
<td>Shupiyan</td>
<td>35,282</td>
<td>84</td>
<td>10,395</td>
</tr>
<tr>
<td>9</td>
<td>Anantnag</td>
<td>114,899</td>
<td>80</td>
<td>34,276</td>
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<tr>
<td>10</td>
<td>Kulgam</td>
<td>47,913</td>
<td>69</td>
<td>5,662</td>
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</table>

### Household Amenities and Assets Indicators (2011, 2011-12)

<table>
<thead>
<tr>
<th>Households with using LPG/NPG</th>
<th>Households with using LPG/NPG (in %)</th>
<th>Households with latrine</th>
<th>Households with latrine (in %)</th>
<th>No. of schools (2011-12)</th>
<th>No. of school per 100 sq.km (2011-12)</th>
<th>No. of medical institutions (2011-12)</th>
<th>No. of medical institution per 100 sq. km (2011-12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15828</td>
<td>15</td>
<td>54,335</td>
<td>51</td>
<td>2053</td>
<td>121</td>
<td>267</td>
<td>20</td>
</tr>
<tr>
<td>15118</td>
<td>15</td>
<td>83,615</td>
<td>84</td>
<td>1709</td>
<td>125</td>
<td>225</td>
<td>16</td>
</tr>
<tr>
<td>33022</td>
<td>23</td>
<td>113,281</td>
<td>78</td>
<td>2330</td>
<td>165</td>
<td>308</td>
<td>28</td>
</tr>
<tr>
<td>8868</td>
<td>16</td>
<td>42,035</td>
<td>74</td>
<td>890</td>
<td>123</td>
<td>97</td>
<td>9</td>
</tr>
<tr>
<td>138119</td>
<td>82</td>
<td>164,002</td>
<td>98</td>
<td>998</td>
<td>708</td>
<td>171</td>
<td>121</td>
</tr>
<tr>
<td>10410</td>
<td>24</td>
<td>31,492</td>
<td>73</td>
<td>691</td>
<td>66</td>
<td>96</td>
<td>16</td>
</tr>
<tr>
<td>16828</td>
<td>21</td>
<td>55,836</td>
<td>66</td>
<td>1084</td>
<td>134</td>
<td>150</td>
<td>14</td>
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<tr>
<td>3727</td>
<td>9</td>
<td>25,628</td>
<td>61</td>
<td>623</td>
<td>102</td>
<td>90</td>
<td>15</td>
</tr>
<tr>
<td>28984</td>
<td>20</td>
<td>80,917</td>
<td>57</td>
<td>1802</td>
<td>62</td>
<td>235</td>
<td>19</td>
</tr>
<tr>
<td>4301</td>
<td>6</td>
<td>31,048</td>
<td>45</td>
<td>926</td>
<td>105</td>
<td>166</td>
<td>12</td>
</tr>
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</table>

### Occupied Census Houses

<table>
<thead>
<tr>
<th>Occupied census houses used as shop/office</th>
<th>Occupied census houses used as shop/office (in %)</th>
<th>Occupied census houses used as school/collages etc.</th>
<th>Occupied census houses used as school/collages etc. (in %)</th>
<th>Occupied census houses used as hotel/lodge/guest house etc.</th>
<th>Occupied census houses used as hotel/lodge/guest house etc. (in %)</th>
<th>Occupied census houses used as hospital/dispensary etc.</th>
<th>Occupied census houses used as hospital/dispensary etc. (in %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>16,512</td>
<td>9.49</td>
<td>2,137</td>
<td>1.23</td>
<td>158</td>
<td>0.09</td>
<td>459</td>
<td>0.264</td>
</tr>
<tr>
<td>16,781</td>
<td>9.46</td>
<td>1,556</td>
<td>0.88</td>
<td>135</td>
<td>0.08</td>
<td>322</td>
<td>0.181</td>
</tr>
<tr>
<td>26,957</td>
<td>10.86</td>
<td>2,854</td>
<td>1.15</td>
<td>392</td>
<td>0.16</td>
<td>528</td>
<td>0.213</td>
</tr>
<tr>
<td>7,931</td>
<td>8.43</td>
<td>885</td>
<td>0.94</td>
<td>81</td>
<td>0.09</td>
<td>145</td>
<td>0.154</td>
</tr>
<tr>
<td>43,041</td>
<td>17.62</td>
<td>1,388</td>
<td>0.57</td>
<td>1,356</td>
<td>0.56</td>
<td>372</td>
<td>0.152</td>
</tr>
<tr>
<td>7,324</td>
<td>9.97</td>
<td>620</td>
<td>0.84</td>
<td>117</td>
<td>0.16</td>
<td>163</td>
<td>0.222</td>
</tr>
<tr>
<td>15,427</td>
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<td>1,130</td>
<td>0.70</td>
<td>115</td>
<td>0.07</td>
<td>243</td>
<td>0.151</td>
</tr>
</tbody>
</table>

Source: Census of India, Primary Census Abstract, 2011

Table 4: Social Amenities and Assets Indicators (2011, 2011-12)
Table 5: Economic Indicators (2011)

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>District name</th>
<th>Main workers</th>
<th>Main HH industrial workers</th>
<th>Main HH industrial workers (in %)</th>
<th>Main cultivators’ workers</th>
<th>Main cultivators’ workers (in %)</th>
<th>Main agricultural workers</th>
<th>Main agricultural workers (in %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Kupwara</td>
<td>123837</td>
<td>54.06</td>
<td>2571</td>
<td>2.08</td>
<td>14585</td>
<td>11.78</td>
<td>9834</td>
</tr>
<tr>
<td>2</td>
<td>Badgam</td>
<td>132003</td>
<td>61.44</td>
<td>14401</td>
<td>10.91</td>
<td>34173</td>
<td>25.89</td>
<td>11560</td>
</tr>
<tr>
<td>3</td>
<td>Baramulla</td>
<td>187959</td>
<td>61.79</td>
<td>7650</td>
<td>4.07</td>
<td>31114</td>
<td>16.55</td>
<td>19159</td>
</tr>
<tr>
<td>4</td>
<td>Bandipora</td>
<td>75173</td>
<td>50.34</td>
<td>9526</td>
<td>12.67</td>
<td>10778</td>
<td>14.34</td>
<td>9423</td>
</tr>
<tr>
<td>5</td>
<td>Srinagar</td>
<td>330547</td>
<td>81.18</td>
<td>7650</td>
<td>4.07</td>
<td>31114</td>
<td>16.55</td>
<td>19159</td>
</tr>
<tr>
<td>6</td>
<td>Ganderbal</td>
<td>52949</td>
<td>52.48</td>
<td>1931</td>
<td>3.65</td>
<td>5227</td>
<td>9.87</td>
<td>5539</td>
</tr>
<tr>
<td>7</td>
<td>Pulwama</td>
<td>98306</td>
<td>52.17</td>
<td>3711</td>
<td>3.77</td>
<td>18816</td>
<td>19.14</td>
<td>6992</td>
</tr>
<tr>
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<td>62.36</td>
<td>1519</td>
<td>2.78</td>
<td>29183</td>
<td>53.35</td>
<td>3761</td>
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<tr>
<td>9</td>
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<td>36670</td>
<td>20.74</td>
<td>19664</td>
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<td>3.36</td>
<td>26771</td>
<td>34.4</td>
<td>8830</td>
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</tbody>
</table>

Table 6: Agricultural Indicators (2011-12)

<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>District name</th>
<th>Cultivable area (in hectare)</th>
<th>Cultivable area as % of reporting area</th>
<th>Area under commercial crops(hectare)</th>
<th>Area under commercial crops as % of gross area sown</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Kupwara</td>
<td>48118</td>
<td>72.26</td>
<td>2678</td>
<td>5.88</td>
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<td>Badgam</td>
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<td>65.18</td>
<td>11876</td>
<td>22.45</td>
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<td>Baramulla</td>
<td>69530</td>
<td>63.94</td>
<td>18310</td>
<td>27.86</td>
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<td>Bandipora</td>
<td>21464</td>
<td>62.61</td>
<td>3922</td>
<td>16.29</td>
</tr>
<tr>
<td>5</td>
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<td>8316</td>
<td>71.06</td>
<td>2438</td>
<td>23.82</td>
</tr>
<tr>
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<td>Ganderbal</td>
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<td>50.12</td>
<td>3693</td>
<td>19.76</td>
</tr>
<tr>
<td>7</td>
<td>Pulwama</td>
<td>38588</td>
<td>63.5</td>
<td>25370</td>
<td>44.02</td>
</tr>
<tr>
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<td>Shupiyan</td>
<td>25669</td>
<td>69.69</td>
<td>21391</td>
<td>84.86</td>
</tr>
</tbody>
</table>
Anantnag: 47861, 66.34, 23954, 33.53
Kulgam: 35834, 75.22, 13604, 34.58

<table>
<thead>
<tr>
<th>Net area sown (000 hectare)</th>
<th>Net area sown as % of geographic area</th>
<th>Total fresh and dry fruit production (MT)</th>
<th>Total share of fresh and dry fruit production (in %)</th>
<th>Total fish production (quintals)</th>
<th>Total share of fish production (in %)</th>
<th>Total livestock population (in lakh)</th>
<th>Total red meat production (lakh kg)</th>
<th>Total white meat production (lakh kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>45534</td>
<td>27.00</td>
<td>246987</td>
<td>11.45</td>
<td>8360</td>
<td>4.19</td>
<td>10.805</td>
<td>7.94</td>
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<td>5.46</td>
<td>12405</td>
<td>6.25</td>
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<td>9.31</td>
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<td>10.53</td>
<td>2.279</td>
<td>2.854</td>
<td>1.284</td>
</tr>
<tr>
<td>13798</td>
<td>13.20</td>
<td>66770</td>
<td>3.09</td>
<td>17100</td>
<td>8.61</td>
<td>4.044</td>
<td>6.877</td>
<td>1.56</td>
</tr>
<tr>
<td>32729</td>
<td>30.14</td>
<td>138739</td>
<td>6.4</td>
<td>8320</td>
<td>4.19</td>
<td>4.397</td>
<td>6.082</td>
<td>1.872</td>
</tr>
<tr>
<td>19564</td>
<td>31.97</td>
<td>251101</td>
<td>11.64</td>
<td>3620</td>
<td>1.82</td>
<td>2.924</td>
<td>4.314</td>
<td>1.125</td>
</tr>
<tr>
<td>47861</td>
<td>38.00</td>
<td>186372</td>
<td>8.64</td>
<td>9180</td>
<td>4.62</td>
<td>9.769</td>
<td>11.787</td>
<td>4.826</td>
</tr>
<tr>
<td>30679</td>
<td>44.00</td>
<td>172660</td>
<td>8</td>
<td>4900</td>
<td>2.47</td>
<td>6.299</td>
<td>8.164</td>
<td>3.097</td>
</tr>
</tbody>
</table>

Source: Directorate of Economic and Statistics, Jammu & Kashmir, 2011-12

Table 7: Industrial Indicators (2011, 2011-12)

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>District name</th>
<th>No. of registered small scale industrial units (SSI)</th>
<th>No. of registered SSI units per 100 sq.km</th>
<th>Employment generation in SSI units</th>
<th>Occupied census houses used as factory/workshop/workshed etc. (2011)</th>
<th>Occupied census houses used as factory, workshop etc-2011 (in %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Kupwara</td>
<td>1866</td>
<td>78</td>
<td>6744</td>
<td>1,258</td>
<td>0.72</td>
</tr>
<tr>
<td>2</td>
<td>Badgam</td>
<td>4206</td>
<td>307</td>
<td>29076</td>
<td>1,571</td>
<td>0.89</td>
</tr>
<tr>
<td>3</td>
<td>Baramulla</td>
<td>4272</td>
<td>127</td>
<td>18015</td>
<td>2,495</td>
<td>1.00</td>
</tr>
<tr>
<td>4</td>
<td>Bandipora</td>
<td>161</td>
<td>47</td>
<td>786</td>
<td>890</td>
<td>0.95</td>
</tr>
<tr>
<td>5</td>
<td>Srinagar</td>
<td>10163</td>
<td>7208</td>
<td>49961</td>
<td>3,611</td>
<td>1.48</td>
</tr>
<tr>
<td>6</td>
<td>Ganderbal</td>
<td>175</td>
<td>17</td>
<td>1128</td>
<td>591</td>
<td>0.80</td>
</tr>
<tr>
<td>7</td>
<td>Pulwama</td>
<td>2897</td>
<td>267</td>
<td>14344</td>
<td>1,642</td>
<td>1.02</td>
</tr>
<tr>
<td>8</td>
<td>Shupiyan</td>
<td>138</td>
<td>23</td>
<td>715</td>
<td>519</td>
<td>0.69</td>
</tr>
<tr>
<td>9</td>
<td>Anantnag</td>
<td>4452</td>
<td>153</td>
<td>19871</td>
<td>2,602</td>
<td>1.01</td>
</tr>
<tr>
<td>10</td>
<td>Kulgam</td>
<td>184</td>
<td>45</td>
<td>1159</td>
<td>819</td>
<td>0.72</td>
</tr>
</tbody>
</table>

Source: Directorate of Economic and Statistics, Jammu & Kashmir, 2011-12 & Census of India, Primary Census Abstract, 2011

Table 8: Transportation and Communication Indicators (2011, 2011-12)
A comprehensive strategy for reduction of structural backwardness consists of two Sets of approaches and it is mentioned that profits of one or two nodal growth points; creating better connectivity, marketing facilities, basic social infrastructure and consumer and producer co-operatives. The actions to be taken at the extra-regional,i.e., state level are linkages with the nearest core region’s markets and amenities; provision of investment opportunities so that profits earned from exports from the region’s specialized products stay within the region; ensuring substantial inflow of enterprise capital by providing good governance and inducing development through central government investment and subsidy programmes and indirect incentives. A comprehensive strategy for reduction of Structural Backwardness consists of two Sets of approaches and it is mentioned below:

VII. DEVELOPMENT STRATEGIES

The main characteristics of the Kashmir valley is the predominance of the agricultural sector, low development of economic growth, low degree of urbanization, inadequately developed infrastructure and low levels of investment. These characteristics have hampered the growth of regional development in this region. In order to establish a balanced regional development, this study identifies planning development strategies for the most backward districts in the Kashmir valley.

A comprehensive strategy for reduction of structural backwardness has been proposed for the four most backward districts of Kashmir valley based on a two-pronged approach; one containing action needed inside the region and the other consisting of the initiatives to be taken outside the region, i.e., at the state level. We find that the efforts that need to be made inside the region are development of one or two nodal growth points; creating better connectivity, marketing facilities, basic social infrastructure and consumer and producer co-operatives. The actions to be taken at the extra-regional,i.e., state level are linkages with the nearest core region’s markets and amenities; provision of investment opportunities so that profits earned from exports from the region’s specialized products stay within the region; ensuring substantial inflow of enterprise capital by providing good governance and inducing development through central government investment and subsidy programmes and indirect incentives.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>District name</th>
<th>Road length-2011-12(km)</th>
<th>Road length per 100 sq.km (2011-12)</th>
<th>No. of registered vehicles (2011-12)</th>
<th>No. of registered vehicles per 100 sq.km (2011-12)</th>
<th>No. of post offices (2011-12)</th>
<th>No. of post offices per 100 sq.km (2011-12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Kupwara</td>
<td>1339</td>
<td>56.28</td>
<td>7886</td>
<td>331.48</td>
<td>78</td>
<td>3.28</td>
</tr>
<tr>
<td>2</td>
<td>Badgam</td>
<td>1825</td>
<td>133.21</td>
<td>27351</td>
<td>1996.42</td>
<td>84</td>
<td>6.13</td>
</tr>
<tr>
<td>3</td>
<td>Baramulla</td>
<td>2265</td>
<td>112.00</td>
<td>34683</td>
<td>1034.39</td>
<td>126</td>
<td>18.00</td>
</tr>
<tr>
<td>4</td>
<td>Bandipora</td>
<td>638</td>
<td>89.00</td>
<td>1981</td>
<td>574.20</td>
<td>54</td>
<td>8.00</td>
</tr>
<tr>
<td>5</td>
<td>Srinagar</td>
<td>1365</td>
<td>968.09</td>
<td>197329</td>
<td>6453.90</td>
<td>69</td>
<td>48.94</td>
</tr>
<tr>
<td>6</td>
<td>Ganderbal</td>
<td>456</td>
<td>43.64</td>
<td>3582</td>
<td>29.67</td>
<td>28</td>
<td>2.68</td>
</tr>
<tr>
<td>7</td>
<td>Pulwama</td>
<td>884</td>
<td>124.00</td>
<td>25929</td>
<td>786.00</td>
<td>76</td>
<td>7.00</td>
</tr>
<tr>
<td>8</td>
<td>Shupiyan</td>
<td>573</td>
<td>122.00</td>
<td>3274</td>
<td>1024.00</td>
<td>15</td>
<td>2.45</td>
</tr>
<tr>
<td>9</td>
<td>Anantnag</td>
<td>1647</td>
<td>85.00</td>
<td>35913</td>
<td>1231.16</td>
<td>123</td>
<td>15.00</td>
</tr>
<tr>
<td>10</td>
<td>Kulgam</td>
<td>603</td>
<td>76.00</td>
<td>3128</td>
<td>762.93</td>
<td>49</td>
<td>10.00</td>
</tr>
</tbody>
</table>

Households with availability of television: 26,828, 54,170, 75,137, 25,399, 152,945, 20,350, 45,967, 19,896, 67,166, 25,825
Households with availability of mobile: 53,437, 65,783, 97,257, 31,256, 120,553, 24,498, 57,529, 29,737, 91,482, 46,828
Households with availability of car/jeep/van: 2,988, 5,091, 10,075, 2,237, 34,586, 2,313, 6,164, 3,634, 7,846, 2,421
Households with availability of computer/laptop: 2.8, 5.13, 6.90, 3.94, 20.65, 5.35, 7.59, 8.66, 5.49, 3.50

Table 9: Two Broad Strategic Development Approaches of the Region

<table>
<thead>
<tr>
<th>Approaches Inside the Region</th>
<th>Approaches Outside the Region</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Activation of one or two nodal “growth” points to provide higher order services as well as employment opportunities.</td>
<td>1. Linking backward areas (functionally and spatially) with the nearest core region’s markets and amenities.</td>
</tr>
<tr>
<td>2. A networks of local, regional and interregional roads.</td>
<td>2. Provision of investment opportunities so that profits from exports earned from the regions specialized products stay within the region.</td>
</tr>
<tr>
<td>3. Marketing and distribution networks.</td>
<td>3. Ensuring substantial inflow of enterprise capital by providing good governance.</td>
</tr>
<tr>
<td>4. Educational and vocational institutions.</td>
<td>4. Inducing development through Central government investment, subsidy programmes and indirect incentives.</td>
</tr>
<tr>
<td>5. Consumer and producer cooperatives.</td>
<td></td>
</tr>
<tr>
<td>6. Basics social infrastructure</td>
<td></td>
</tr>
</tbody>
</table>

There is needed to promote regional connectivity and provide post office facilities in Handwara, Karnah, Damhal, Hanjipora and Devsar tehsils of Kashmir Valley. There should be provision of mobile networking system, primary health centres (PHCs) and community health centres (CHCs) in rural areas of the districts of Kulgam, Kupwara, Ganderbal and Bandipora. Provision of toilet facilities in the tehsils of Gurez and Sumbal, Sonawari, Kangan, Lal and Wakura are also in urgent need. There is expected to upgrade the infrastructure of primary and secondary schools in census towns of Safa Pora, Wail and other backward tehsils. Similarly, biotechnology, IT (Information Technology) and medical institutes should be encouraged and established. Handicrafts and handlooms sector are supposed to be strengthen as it has international market. The sick industries are meant to be functional and operational in the backwards districts. These sick industries could be regenerated through special grants and financing. There must be provision of banking facilities and regional development banks in all tehsils of Kashmir valley. There must be establishment of storages and warehousing along national and state highways in order boost commerce and trading. There is needed to adopt land pooling technique based on public/private cooperation. Promotion of floriculture and sericulture can be promoted. Revamping governance in order to have peace in the insurgent areas/armed militancy areas. Moreover, it can be developed as a health tourism, eco-tourism, religious tourism, and heritage tourism destination.

VIII. CONCLUSION

This study indicates that Kupwara, Ganderbal, Bandipora and Kulgam are the four most backward districts in the Kashmir valley. These districts are specifically not developed in terms of urbanization, economy, industry, communication, social amenities and transportation. The causes are the peculiar topographical features, insurgency, low productivity of agricultural products, fragmentation of land, small market, sick industries, lack of basic facilities and ineffective governance. The economic sector in this study is traced from agricultural to service sector both in the Kashmir valley as well as in the state. The sectoral contribution of state GSDP (Gross State Domestic Product) had 21.07 percentages in primary, 22.39 percentages in secondary and 56.44 percentage in tertiary sectors respectively (Digest of Statistics, 2013-14). But now the tertiary sector, which is emerging as major contributor to GSDP and GDP (Gross Domestic Product). Agriculture has been predominant sector in this region which supports around 70 per cent of its population. It depends entirely on the income generated by animal husbandry and agricultural sector. Livestock of poultry and cattle are considered the most crucial tool for the enhancement of rural economy. Similarly, the production of blankets, carpets, shawls and pashmina shawls of Kashmir can earn handsome foreign exchange for the country. Rice is the principal crop of this region followed by wheat, maize and barley. Nearly 75 percentage of the country’s temperate fruits particularly apples are grown in this region. There is great scope for the
production of high value crops like saffron, black zeera and other spices in the region. Allied activities like fisheries, horticulture, dairy development, livestock and sericulture also play significant role in the agriculture sector.

The Kashmir valley has not been able to attract investments of industries. Thus, it has remained as an industrially backward region because of financial crunch, marketing problems and lack of infrastructure. There is less employment generation in small scale industrial (SSI) units in the four most backward districts in comparison with other districts. Similarly, the number of sick industries is high in this region. The handloom and handicraft centres are also in decline because of poor incentives and financing from the state and central governments. Industrial estates should be developed keeping in mind economic considerations like raw material availability, human resources, geographical location, proximity to the market etc. In order to encourage investments, government must play a leading role to build up the confidence of the private investors in this region. In the social sector, there are shortages of hospitals, schools, colleges, dispensaries, electricity, toilets and drinking water facilities in the four most backward districts. The post offices, road connectivity, availability of mobile phones, television etc are also poor in the four most backward districts of Kupwara, Bandipora, Ganderbal and Kulgam. The road networks are densely located in lowland areas in the region due to its physiographic features. Road lengths per 100 square km are higher in the Srinagar district as compared to other districts. The locational disadvantage and inadequate infrastructure are prominent reasons for the lack of proper road infrastructure. There should be precise governance system in the insurgent / militant districts areas in order to establish peace notably in the highly backward districts. The region is also known for tourism and emphasis should be given to health tourism, eco-tourism, religious tourism and heritage tourism. Therefore, there is needed to have planning intervention strategies in order to have inclusive balanced regional development.

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Enhancing Students’ Motivation: Speaking Challenging Clips via Facebook

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Abstract- This study aimed a) to improve learners’ speaking skill via the use of clips uploaded in Facebook, b) to enhance learners’ motivation in English speaking skill via the use of clips uploaded in Facebook. 10 participants majoring in Electrical Engineering and Civil Engineering took part in this study. The research instruments were a questionnaire, an observation form, a speaking rubric, and the semi-structured interview. The descriptive and interpretative methods of content analysis was used to analyse data in this study. The findings revealed that, first, the students’ English speaking skill was improved. Second, in terms of students’ motivation, it was higher. In relation to clips uploaded in Facebook, the positive feedback from participants’ friends who watched these clips in Facebook made them satisfied and felt positive towards English subject.

Index Terms- motivation, speaking skill, clip, Facebook

I. INTRODUCTION

English is one of the compulsory subjects that Thai students have been studying English for many years and many courses in schools and universities, including the tutorial institutes. However, it seems unsuccessful. Several reports revealed that Thai students have the low proficiency in English. (Zoom, 2013; Wachirawit, 2016; BBC Thai, 2018; Weeraphong, 2018).

EFL stands for English as Foreign Language. This refers to teaching English as a foreign language for those who do not use English as a primary language. For example, China uses Chinese as the official language everywhere. So, teaching English in China is the teaching English as a Foreign Language. Similarly, in Thailand, Thai language is used as the first and official language for communication. Teaching English in Thailand is in the form of teaching English as a Foreign Language.

The problems in Thai education can be from various factors. First, the curriculum does not support learners. In Thailand, it seems that learning English in Thailand is on the basis of studying for the exam (Wachirawit, 2016; BBC Thai, 2018; Weeraphong, 2018; Britishcouncil, n.d.). The focus is on grammar, reading, vocabulary, and writing. Listening and speaking skill are less emphasised. Next, the size-class is one of the great barrier. (Jedsarid, Kettawa, and Santana, 2015). Normally, it can be seen that each class contains 40-50 students with only one teacher in the class. As a result, with only one teacher cannot provide and support a large amount of students in a classroom thoroughly. Another factor is that when the teachers are in the class, they follow the course-books and let students practice in the class only. When the class finishes, students stop learning. It seems that students learn only in the classroom, they are not encouraged to spend extra time to study or inquire new knowledge or practice. (BBC Thai, 2018)

One of the important factors is the teachers’ qualifications. Both Thai teachers and native speakers are hired to teach English. However, it appears that some of teachers lack an appropriate qualifications. They may not graduate in education or related fields of teaching. Similarly, many native speakers who are teachers in kindergarten, high schools, or universities are hired to teach listening-speaking courses. However, there may be some of them unqualified because of the lack of ideal qualifications and experiences in teaching. (Jedsarid, Kettawa, and Santana, 2015; Phanitkul, 2015; BBC Thai, 2018).

In terms of students, it appears that, first, students lack motivation in study English. They seem to be against English. They also lack awareness of that English is important for them in their career path. Besides, they need to be more patient, more active, and more self-discipline. (Weeraphong, 2018; Britishcouncil, n.d.)

Rationale of the Study

English consists of four skills, reading, writing, listening, and speaking. One of the most problematic area is speaking. Although Thai students have been studying English many years, it seems that they cannot speak English in daily life or in a formal situation. This problem can be resulted from many factors. (Zoom, 2013; Wachirawit, 2016; BBC Thai, 2018; Weeraphong, 2018).

First, Thai students lack confidence. Thai students are not self-confident when they must speak English in any situations. Furthermore, Thai students feel shy when the classmate look at them and laugh or say something while they are speaking in front of the class or make a conversation with a teacher. (Jedsarid, Kettawa, and Santana, 2015; BBC Thai, 2018; Weeraphong, 2018; Britishcouncil, n.d.).
Second, students do not use English in real life. Most students only use English while they are in the classroom. In addition, in the classroom, the most important topics can be grammar, reading, vocabulary. These skills are quite emphasised in Thai schools and universities. While a few hours of listening and speaking for real life is taught. (Britishcouncil, n.d.)

Third, Thai students’ pronunciation do not sound like native speakers. Due to the problem of speaking or pronouncing the words in English, some groups of Thais believe that you are not smart if you cannot pronounce or speak English like a native speaker. This is one of the great barrier to practice speaking. (BBC Thai, 2018)

Fourth, Thai students may not be patient enough. They also lack of self-discipline and the career goals. Today, educational technology plays a vital role in language classrooms. Lots of teachers bring the applications that arouse the learners’ interest. They can practice speaking from these kinds of technology or social media. One of the most popular IT for language learning or social media could be a chat via or a clip upload in Facebook. (Britishcouncil, n.d.)

Tukko N. (2009) stated that nowadays, social media has played the great role in all walks of life. It is considered as the popular digital platform that many organisations make use of them. For example, school and universities can publicise their news about admission in the next academic year. A transportation section can inform the news about how to renew the driver’s license. The fan page about cooking can share how to cook food. From this popularity, Facebook is used as the platform for various purposes. In Thailand, the education settings normally upload the clips about learning through Facebook.

From the researcher’s observation, students often go through the Internet by Facebook as the first source of access. As a result, it would be interesting to investigate that whether students have a better performance in speaking skill via clips uploaded in Facebook or not. In addition, students’ motivation would increase or not via clips uploaded in Facebook.

**Objectives of the Study**

There are two main objectives as follows:
1. To improve learners’ speaking skill via the use of clips uploaded in Facebook
2. To enhance learners’ motivation in English speaking skill via the use of clips uploaded in Facebook

**Significance of the Study**

The findings from this study could be beneficial for both teachers and learners as following:
1. Teachers of English language would understand the learners’ characteristic or needs in teaching English speaking skill to them, both in terms of teaching strategies and how to motivate learners’ interest in English speaking skill.
2. Learners who are interested in improving English speaking skill would gain motivation for furthering their English speaking skill outside the classroom.

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**II. LITERATURE REVIEW**

**The definition of Motivation**

According to Longman Dictionary of Contemporary Online (2019), “motivation” is “eagerness and willingness to do something without needing to be told or forced to do it.”


“Motivation” refers to “the feeling of wanting to do something.” (Oxford Learner Dictionary, 2019)

From the three trusted dictionaries, “motivation” can be defined as the act of doing something with willingness or enthusiasm.”

According to Fadel and Khaled (2013), motivation has a great impact in someone’s learning process. Motivation can be divided by various aspects: First, it is categorised as a) intrinsic and b) extrinsic. Intrinsic motivation can be referred to a drive which comes from a person. For example, people enjoy doing activities or whatever they are interested in such as cooking, riding a horse, and drawing and painting. Another is extrinsic motivation. This kind of drive is generated from the outside, not an individual. For example, a student gets a bless when he/she does a good deed.

In terms of language learning, students should be motivated to pay attention and enjoy learning language. Various scholars have proposed how to motivate students in the language classroom in terms of speaking as the following:

a) A class with a communication should be set up. This can be done as a group activity. A flipped classroom is one of another good example to engage learners together.

b) English subject should be more practical. It is more interesting to let students should be encouraged to practice, not just listen to the teachers’ lecture all the time. When they get involved in the activity, they are happy and enjoy learning. One of the most appropriate teaching methods is project-based learning, which can enhance learners’ interest and motivation.

c) Teachers should provide a supportive-atmosphere classroom. When students are happy, they have motivation to do activity. The use of social media or IT learning in the language classroom is considered as one of interesting strategies.

d) Teachers should unite the students’ relationship. A classroom agreement should be set with your students before starting the class. Let show what you think about them. Try to encourage or motivate them to join the class activity with other classmates.

e) Comments or feedbacks should be reflected. Students are needed to be commented or criticised by their teachers carefully and considerately. If teachers show their care to the
students, they will respect you and have motivation in a language learning. Not only a teacher who acts as the evaluator, but their friends in the class can be the assessors.

**Activities to Motivate Speaking in the Classroom**  
(Clarke, n.d.; Vicky, n.d.)

a) Levels of Difficulty should be reduced. The teachers have to maintain students’ interest by providing exercises that is simple and suit the students’ ability. This is because they may lack self-confidence. As a result, the activity for speaking should be simple and not complicate as the first step. After that, teachers try to motivate them to speak as much as they can.

b) Background knowledge should be related. Teachers should relate the content of speaking with the learners. This is because when they have some background knowledge, they will feel more confidence, and then speak out. The topics should be discussed by the learners easily e.g. lovely pets and animals, subjects at school, sports, and food.

c) L1 usage should be accepted in the classroom. It is inevitable that, as the first time, students will use their mother tongue with English. This may be that they cannot use the correct vocabulary or they do not know how to speak properly. Teachers have to be patient if you command the whole class to use English. Otherwise, there is no one can speak English because they be not able to speak all in English.

d) Speaking should not be interrupted. When students speak out, there are absolutely errors such as pronunciation, sentence structure, or vocabulary. So, teachers should not interrupt them while they are speaking which may cause them embarrassed, frustrated, and lose self-confidence. After they finish their speaking, just tell or explain them about the errors.

**Speaking Strategies for Teaching**

According to Richards (2008), types of speaking can be divided into three categories.

First, talk as interaction. It refers to a conversation. When people meet each other, they have a conversation such as greeting, making a small talk, and making a new friend. These kinds of talks can be formal or informal which depends on the context or circumstance.

Second, talk as transaction. It emphasises on the purpose of the talk. Some skills for this kind of speaking are turn-taking, opening and closing conversation, using an appropriate style of speaking.

Third, talk as performance. It refers to public talk or public speaking. For example, classroom presentations, public announcements, speeches. This talk is in the form of monologue. There is a format as a fixed pattern, the style is quite similar to written language. The examples of talk as performance are giving a class report about school trip, making a sales representation, and giving a lecture.

Teachers play a vital role in language classroom. Teachers can be a lecturer who teach and give knowledge to students. Teachers can be a facilitator who supports learners learning. Teachers are also a mentor who gives feedback or criticism. Please be careful when a teacher gives a comment. This is because some students may be quite sensitive when they get a feedback. As a result, teachers must encourage students and build up their confidence. Teachers can be a role model who the students watch at the teacher and maybe sometimes imitate.

**III. RESEARCH METHODOLOGY**

This paper was the qualitative research. The data was collected from the students who took part in this experiment. This research methodology consisted of three parts: a) participants, b) data collection, and c) procedure of analysis.

a. Participants

Under this study, 10 non-major students took part in this experiment. They were 3rd-year students whose majors are Electrical Engineering and Civil Engineering, Faculty of Engineering and Architecture, Rajamangala University of Technology Suvarnabhumi, Thailand.

b. Data collection

a) Materials

Two conversations used for making the clips were (a) going to the cinema and (b) making sandwich. The first conversation expressed how to give direction, and the second was how to make sandwich. These two conversations were constructed by the researcher, then validated by the experts in field. The conversations were created by based on the real life conversations, the student’s ability, and Common European Framework of Reference for Languages (CEFR), so the language used was not too complicated for the participants’ ability in this study.

b) Instruments

Four research instruments were as follows:  
(a) A questionnaire was used as the first step to obtain the participants’ information. This questionnaire was divided into three parts: Part I aimed to obtain participants’ personal information (i.e. age, education, field of study), Part II was about examining the participants’ English language exposure, Part III investigated the participants’ access to the Internet/social media, Part IV aimed at finding out causes of unsuccessful English learning, and Part V was comments/suggestions.

(b) A speaking rubric was used to evaluate students’ speaking performance from the two conversations.

(c) An observation form was used to observe participants while they were in the class.

**Roles of Teachers in the Classroom (Cindy, 2007)**

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IV. RESULTS AND DISCUSSIONS

(d) A semi-structured interview was used as the last step to obtain participants’ in-depth details about their perceptions towards their personal problems when learning English, the goal of learning English, the clips uploaded in Facebook and other related information.

All the instruments were constructed by the researcher, then validated by the experts in the field. After that, these instruments were tried out with non-sampling before using with the targeted sampling.

c. Procedure of Data Analysis

a) Before starting the research study, the questionnaires were administered to the participants. After that, the data from the questionnaire were collected and analysed by the researcher in order to create the conversations which based on the participants’ ability.

b) In the classroom, the researcher observed and recorded what happened in the classroom. The researcher observed them and recorded what happened in the classroom. For example, what did they feel? Are there any improvement in terms of speaking skill? Did they pay attention to the class? How well did they collaborate in the classroom?

c) When the participants had a conversation, the speaking rubric was used to evaluate their performance.

d) Lastly, two weeks later after uploading the video clips, the participants were invited to the interview. They were asked about the video clips, their feeling when attending the class, their motivation, and other related information.

This section consisted of results, discussions, implications, delimitations, and recommendations for further studies.

Part I: Result Gained from Questionnaires

Table 1 English Language Exposure

From table 1, in relation to the frequency of getting to the English language exposure, it showed that most students (57%) got access to the English language exposure, followed by 38% of students accessed to the English language exposure. Last, 5% of them never access to the English language exposure.

In accordance with types of media in English language exposure, 69% of students liked to get access to English songs or music, followed by 13% of them preferred to get access to TV programs, series, drama. 10% of them preferred social media, chatting, blogs.

Table 2 The Access to the Internet/social media

In accordance with the popular social media, it showed that 92% of them preferred Facebook, followed by Line (89%). The others were quite less popular.
### Table 3 Reasons of unhappy English subject

Table 3 expressed the reasons of unhappy English subject. It showed that there were various factors made them unhappy with English subject. First, 98% of students revealed that they had poor background of English, followed by a teacher gave a bad feedback/comment without explanation (95%), a teacher blamed students (93%), and students were shy to speak in the classroom (90%), respectively.

### Part II: Result gained from Teacher’s Observation

The data obtained from this observation, it showed that, from the researcher’s view, it can be seen that most participants were satisfied with this class. They opened their mind and got along with the group very well. They felt that they got familiar with the teacher. It was obviously seen that when the teacher taught them about making sandwich, the second conversation, most of them felt enthusiastic to join this activity. It could be noted that most students liked to learn English via activity because they could understand the lesson better than sitting and listening to the teacher’s lecture.

### Part III: Result gained from the Conversation Speaking Rubric

In terms of participants’ speaking performance, before they made a simulated conversations, a speaking rubric was provided to the participants to let them know the criteria. Therefore, they could practice their conversations based on this rubric. When assessing the student’s speaking skill individually, it can be seen that students’ speaking skill have improved. Some of them had highly improvement in speaking skill while some of them gradually improved. This may be that they had a different background of English language and their habits of inquiry of English language. However, some participants who had quite poor background of English language seemed to have high improvement. This was because of the supportive atmosphere in the classroom and the feedback provided by the teacher (researcher) in terms of speaking skill.

### Part IV: Result Gained from the Interview

Two weeks later, after uploading the two video clips in Facebook, 10 participants were invited to the interview. The interview approximately lasted 10-15 minutes individually. In terms of their English language exposure, the participants revealed that they did not frequently get access to the English language. They felt that they were not familiar with it. In relation to their motivation, while they were in the classroom, they were very satisfied with this class. This may be that the atmosphere in the class was very friendly. They wanted to join this kind of English classroom. Moreover, they revealed that the teacher gave them a good advice, and the teacher supported students’ learning well.

In terms of video clips uploaded in Facebook, the participants stated that the feedback of the their two video clips were good. They were satisfied with it. However, it should be noted that, under this study, motivation played a vital role on participants’ language learning. This positive feedback made them more confident and being more motivated.

### Discussions

From the findings of this study, it can be discussed as follows:

1. It showed that the frequent problematic areas of speaking skill was that they had poor background knowledge of English subject, teachers gave a bad comment or feedback without any explanation, teachers blamed students in front of the
others, and students were shy to speak in front of the class. This is in line with Nadeem and Arshad (2010) that the problems of speaking English refers to these factors which are similar to the present findings in this study.

2. In relation to students' speaking skill, it appeared that before they attended this special classroom, they had poor English speaking skill. When this class finished, it seemed that most participants had high improvement on English speaking skill. This may be that there were only 10 participants in this experiment; so the teacher could support and took care of them well. In this case, it showed that the number of size-class was important.

3. Students’ motivation was higher than expected. This may due to that when a friendly and supportive atmosphere in the class were created, students enjoyed the classroom and willing to do activities in the class well. This was in line with Nasser and Majid (2011), Nazifah, Shafiq, Farhina, Othman (2012), and Mas (2016)) that the use of motivation created the great motivation in students to attend or learn English very well.

4. In terms of social media integrated in this study, it showed that social media did not increase student’s speaking performance. On the contrary, this kind of media interested students more attention to the classroom.

Implications

The findings from this study could be implied in the equalational settings as follows:

a. Learners should be encouraged to spend extra time to improve speaking skill and get involved in English language.

b. Learners should be motivated to keep practicing speaking skill although the class is finished. A speaking skill club or speaking activities should be set up regularly for students’ practice.

c. As a teacher, English should be taught as the mean of communication in real life, not a compulsory course in the schools or universities.

d. The supportive environment should be held to encourage students’ learning. Teachers should shift the role to be the facilitator as well. As a result, learners feel happy and open-mind to talk to the teacher.

e. Educational technology can be brought to the classroom a to arouse the learners as the active learners.

Delimitations

As the first plan, five conversations were going to be used in this experiment. However, due to the researcher’s duty and the university’s plan, it sometimes could not get along together with the students’ learning schedule. Finally, only two conversations were used in this study: how to go to the cinema and making sandwich.

Recommendations for further studies

In terms of the recommendation for further studies should be that how the motivation plays a great role on other skills-listing, speaking, or writing. In addition, other skills-listening, writing, and reading. Furthermore, according to the findings under this study, it appeared that social media, Facebook, influenced the learners’ interest and motivation. However, it was not revealed that social media could encourage the learner’s performance towards English learning. As a result, this aspect should be continually investigated.

V. CONCLUSIONS

According to the research objectives, it can be summarised that:

1. Before taking part in this study, the participants had the poor background, low motivation in learning English, or bad experiences in English learning at schools or university, considering the speaking rubric, the observation, and the individual’s interview, their speaking skill was higher.

2. Students’ motivation towards speaking skill in this experiment significantly increased. This could result from the supportive environment in the class, the teacher who acted as the facilitator, and the use of educational technology in the classroom. Therefore, students felt satisfied with this class and tried to improve themselves in terms of speaking skill.

APPENDICES

sample questions in the observation form
1. How did they feel today?
2. Are there any improvements in terms of speaking skill?
3. Did they pay attention to the classroom?
4. How well did they collaborate with their friends in the class?
5. What activity did they like the most?
6. How about their face expressions?

sample questions for semi-structured interview
1. How often do you use the Internet?
2. What program/application do you like to watch/listen?
3. What is your bad experience about learning English?
4. What English skill are you unhappy?
5. Why do you want to be good at speaking?
6. What do you feel when you read the comments from your friends?
7. Although the class is finished, will you want to continue improving your speaking skill?

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Abstract- There is strong niche for inference supported by empirical and theoretical grounds from profiled data, both primary and secondary, that one fact is universally eminent about COVID-19 pandemic. For the first time in the history of mankind a phenomenon came to dominate and change man's life so momentarily with obnoxious burden and consequential effects which is overwhelming while cutting across all facets of man's life and institutions. COVID-19 has induced newer culture and fine-tuned social group networking attitude and behaviour as well as gradually changing the working and interdependence of institutions in phases. The research on Sociology of COVID-19 employs an integrated theoretical framework thus: (I) Social PEN Theory of Structural Change to provide analysis and change in social structures and relationship among members of the society and family as primary unit structure and by extension communities’ needs and expectations as support under lockdown during the pandemic. (II) Social Evolutionism, the impact of COVID-19 is overwhelming, shaping structures and gradually changing the human society and in that process social evolution is unavoidable and unstoppable, it's not sudden but a gradual process increasing, from strength to strength, intensity to intensity and from time-to-time to inform further change of the society, a transition from modernism-to-postmodernism and into 'The New Normal' and beyond to establish Comteam positive stage of the society that is highly scientific. Again, 'The New Normal' is also synonymous to Marx Webers Ideal Society build on the basis of rationalization. Corollary to this complex process is explained by social evolutionism. (III) Postmodernism as a philosophy to define the dynamics of ‘The New Normal’ and beyond post COVID-19 society. (IV) Ecological theory to explain man's social and physical environment deserted for COVID-19 pandemic and its consequential effects at various levels during the lockdown and beyond into 'The New Normal' and postmodernism. The theories were intermittently paraphrased with data and variables analysed at different ranges of analysis and measured at appropriate levels of measurement during the study and demonstrate the nexus with elements of COVID-19 as a social phenomenon and presented thematic areas of general Sociology and issues that are sociological. This brings about change in man's life and relations to groups, socio-economic and political structures in parts and as a whole, reminiscent of 'structuralism' in Sociology and newer culture reaffirming the social thoughts of Edward B. Taylor. For example, ‘work from home’ has changed organizational culture, consequentially transformed behaviour and to some extent attitude of staffs and by extension the structures. Social distancing has reduced social group homogeneity and heterogeneity and the attached benefits around social grouping reminiscent of W.A. Ghazali’s sociological thoughts with effects on fundamentals which sustain social relationship among diverse human race from around the world. This research examines COVID-19: the sociology of the pandemic. It is a social impact research which seeks to investigate the momentum of the pandemic on social structures, relationships and institutions. It extensively dwells on thematic areas identified in this survey as areas of interests to sociology to explore its suitability for applied Sociology of COVID-19. The research examines four key areas that are thematic and methodologically cross sectional and real-time-narratives to explore on the social impacts and changes that have taken place and those likely to occur as a result of the pandemic. Analysis of qualitative data has established the nexus with empiricist finding that leadership response around containment of the pandemic as global emergency which was (and still is) found unparallel in the fight against COVID-19 within the continent of Africa and other nations to stamp it out. The research design is qualitative. It considers primary and secondary data, interview, electronic sources and content analysis were utilized to explore on Sociology of COVID-19 as a new vista of social impact research to aid policy bearing, direction and enhance academic credentials. Also, Sociology of COVID-19 integrates narratives and observations as some methodological consideration on thematic

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areas analyzed in general sociology entangled with cross section of the society as study population and randomly sampled respondents as snowball for study. This study employs mixed method of triangulation as method discovered and reflected in ‘Haralambus and Holborn Sociology’. It combines both qualitative and to some degree elements of quantitative blend with real-time narratives as some data utilized are measured at nominal level. Ratio and percentile are utilized which depict the quantitative bearing of this research and active utilization of verbal narratives or content analysis that are qualitative in posture and derivatives. The research highlights key challenges as problematic areas for examination and consideration was made around justifying the approach and research design scaffolding the architecture for the study. Broader objectives are formulated and broken down to specific to enable us achieve the most appropriate result. Key terms such as; modernism, modernity, postmodernism, post modernities, social PEN Protoneous p+, positive social value, social PEN electroneous (E-) social value are defined and operationalized and provide sociological perspective to ‘social distancing’ which debunk the terms ‘physical distancing’ as inappropriate while lacking social niche in this endeavour and imperatives of social grouping in designated high risks society and difficulties of community members to adhere to the COVID-19 guidelines and nonchalant attitude of not deploying face masks and other personal protective equipment gear (PPEG). The research also examines difficulties around adherence to social distancing guidelines, social grouping complexes and dynamic structures and community systems in vulnerable and designated high risks societies and inability of human to adhere to guidelines is to struggle for survival, social solidarity and biological issues also hinders adherence to social distancing, natural instinct and desire for social cohesion, human feeling, emotions, habituations confirming theoretical support from George Simmel’s sociology on ‘sociation’ and the survey has proffered solutions that are sociological as value addition to policy issues and recommendations based on stronger evidence; empirical and theoretical on the grounds of evidence of what works. When science is mention in social sciences management and development for social change and Sociology in particular, it’s to the credit of Auguste Comte; the founder of Sociology and master of positivism who reinvigorated his philosophy on the pedestal of science with emphasis and relevance on sense perception while describing the apex of society as scientific stage of human development. Literature and facts behind this research have supported the establishment of ‘The new normal’ and beyond postmodernism as a society driven by normative scientific cultural standards with pattern in its operations are indicatively procedural to determine man’s life and existence and operation of things. This is a proof to the confirmation of Auguste Comte’s scientific stage scaffolding the establishment of the apex of societal progress to depict change enabled by post modernities. The human society is evolving and changing. This is to the credit of Charles Darwin Evolutionism enabled by social PEN energy (+n) for moves of static phenomenon to get into a dynamic state of affairs as exponentially propounded by Herbert Spencer. Similarly, responsibility and commitment at the level of the high powered authorities: WHO, PTF and CDC to combat COVID-19 is marvelous with minimal gaps which are naturally unavoidable. The leadership and authorities have deployed huge P+ (protoneous capital funding in their desire to end COVID-19) as supports and E-electroneous (human resource capacity medical and otherwise for containment of the pandemic). Citizens’ cooperation was splendid at the height of the pandemic and suddenly dropped when palliatives seem to be insufficient to cover most vulnerable communities to alleviate their suffering and the desire for social mobility being human, especially at the time of the lockdown. There is strong evidence to support the facts that, there is sustained compliance to guideline, especially by government officials and private sector on skeleton service and enlightened individuals and ecological zones. Some countries in Africa such as Nigeria, Madagascar, south Africa, Kenya and Ghana have made curative and innovative attempts deploying indigenous know-how of design of basic equipments such as motorized ventilators and sanitizers among other countries who have done their very best to mitigate the impact of the pandemic. The first phase of ease of lockdown and the dynamics of reopening along the curve was dramatic shooting-up while changing and frustrating countries around the world such as COVID-19 ease of lockdown has degenerated as hangover while pushing the USA under fire to contain geometric increase of confirm cases coupled with Blacks’ uprising for racial discrimination as post COVID-19 social degenerations and issues of depression, stigmatization, anxiety and loneliness due to work from home, boredom and suicide issues are expected to be high by longitudinal projection and ‘Internet of Things’ (IoTM2M) is actively changing the world and many are becoming jobless as Telecom Technology is taking the lead in almost all institutions and societies. The research has operationalized concepts and explained variables and is measured at different levels to suit the architectural framework for the study. Investigation has been made on COVID-19 precautionary measures and burden on the society. This research has examined the dynamics around isolation centers, facilities and gerontological consideration in relation to COVID-19 pandemics, the position of political sociology vis-à-vis imperialism and development strategies post pandemic. The social impact of COVID-19 on family and labour force and labour power is immeasurable. The research has stressed the significance of discouraging human traffic connection, the essence and difficulties on ramping up testing, case identification and contact tracing for COVID-19 cases and conscious effort to flatten the curve to reduce the intensity and dynamics of the X and Y Axis complexes for achieving perfect ‘New Normal ’ and beyond that postmodernism and to Comtean positive stage of societal development. The survey on sociology of COVID-19 has showcased the critical issues and radical departure from metanarratives; public views and opinion were measured at different levels of data but predominantly dominated by nominal data with gender categories as male and female. To this end, the research has interrogated black uprising around the world for racism, protest staged, group behaviour and its escalation, police and manhandling of Ranshard Brook’s and the demised of George Floyd by kneeling down on his neck, killing him. Finally, the research has presented summary of major and minor findings, conclusion and provided recommendations as policy guide going forward dealing with COVID-19 pandemic and beyond ‘The New Normal’ postmodernism and Comtean positive positive stage of societal developments as scientific. Lastly, references are
This thesis is on Sociology of COVID-19 pandemic. It is a social impact research; a new vista and it employs cross sectional qualitative survey research method entangled with real time narratives as mixed method, exploratory and observational. It examines the causes and effects of COVID-19 pandemic on social structures and institutions at the height of the pandemic characterized by tremendous fear, sorrow and grief. The crux of the Sociology of COVID-19 is an examination of the dynamics of the pandemic and the dramatic alterations of social structures and social relationships around families, social pressure, cultural; artifacts and non-artifacts, norms and value systems which have been altered or transformed by the forces associated with COVID-19 pandemic and the implications of such changes on individual members of the society, communities and various governments around the world. The momentum behind COVID-19 pandemic and its effect on amplifying the behaviour, attitude and knowledge of the individual members of the society is enormous. It is an independent post doctoral social scientific research, solely conducted for academic purpose as ‘self help’ with the aim and intent of adding value to existing body of thoughts on sociological issues around COVID-19 pandemic, its complexes and dynamic structures and beyond ‘The New Normal’ as postmodernism and positive or scientific society in Comtean connotations of society. The social impacts of the pandemic are analyzed in thematic areas of interest to sociology to guage the efficacy of the context of the ‘Social PEN Theory of Structural Change’. The social PEN theory argues that, there are invisible Atomic PEN structural forces (+n) capable of bringing about social change in the society for example, the likes of Corona virus as an invisible and as well indivisible phenomenon and it has social energy of (+n) to enable moves, form and combine to produce severe structural effects with newer patterns and structures capable of changing man’s social life and it has impact on institutional structural shifts. Those patterns and structural shifts are by product of the previous society which in this context represent modernism or pre-COVID society to give birth to a newer social system called ‘The New Normal’ as a new lease of life as an indivisible social system which in Anthony Giddens classification of society referred to as ‘high modernity and beyond’ reflected in ‘Haralambus and Holborn Sociology’ Pg:895.

This research is NOT connected to any personal interest, groups or individuals and/or any organizational interest and its null of political undertones, but purely aggregates of survey research findings; theoretical and empirical base that may be useful for academic exercise and social impact debates on COVID-19 pandemic as a new vista in Sociology and COVID-19 emergency situation. The survey probes into immediate and long term consequential effects of the pandemic now and beyond ‘The New Normal’ postmodernism. This research receives NO internal or external grants, technical support, funding or stipend of whatever sort for its conduction.

One thing is universally crystal that, COVID-19 or Corona Virus will definitely perish, same as other pandemics experienced in human phased out of existence, but the effects and the forces left behind into Post COVID-19 as ‘The New Normal’ are powerful to further redefine our existence as human species on the surface of the planet earth for the changes associated with it is enormous. Some of these changes might be harsh to contend with, while others are friendly for improvement and may flip developmental fundamentals with tractions in their appearance and fashion. Again, Sociology of COVID-19 is interested in the dynamics of the past and the present changes that is gradually sloping down the society to newer norms and value systems for attainment of a state of normalcy and in between there would be crisis and conflict situations to ensure adaptation to the newer way of life as envisaged by structuralist such as Emile Durkheim and Talcot Parson. (Durkheim and Mauss, M, 1703; Giddens Anthony, 2009).

The conservative statistics of the affected persons on global scale for COVID-19 is estimated at 4,165,752 confirmed cases and 285,307 deaths as at 11th, May 2020 compared to 10,168,657 confirmed cases and 502,387 deaths as at 29th June 2020. However United States alone recorded approximately 80,000 deaths and 1,345,307 confirmed cases for COVID-19 in May 2020 and 2,549,069 confirmed cases and 125, 803 deaths as at 29th, June 2020. COVID-19 is an invisible virus and as well indivisible as to its' existence as real which has ravaged the universe of diverse human race. Corollary to that, COVID-19 pandemic is ravaging and changing the world albeit, gradual and that change must happen in phases reminiscent of social evolution of C. Darwin, W.W. Rousseau phases of development, Maslonian hierarchy of human needs or Comtean theoretical phases of human progress of scientific stage and so ‘The New Normal’ is not an exception to such gradualism in its evolution as a transition towards comtean positive stage of the society.( Maslow, A. H. 1970; Darwin, A. Comte; WW Rousseau; John Hopkins, 2020), Consequently, COVID-19 pandemic has entrenched social ills, difficulties and experiences. Worthy of note is its negative effects on individual members of diverse communities around the world in general, especially during the lockdown as it affects social mobility and the work closure has created tremendous gaps. What that means to Sociology of COVID-19 is that, the pandemic has enormous implications around families and severe economic pressure on individual households affected by the pandemic.(ILO, April 2020); (Globe and Mail, May, 2020). COVID-19 World, would experience what Francis Fukoyama referred to as 'the passing away', a pathway and roadmap to 'The New Normal' in Professor, O.Ogunika's coinage on society and transition of sociology as a discipline, in 1998 referred to as the 'sociology of one world' and Anthony Giddens often times referred to as high modernity and beyond in 'Haralambus and Holborn pg 895" it is the general believe of the critic's that, after the Corona virus scenario, economies and markets of the fragile nations would be in shamble. The inequality gap amongst individual members of
the society will either increase or decrease depending on the dynamics of 'The New Normal' for it’s all determined by the fundamentals of the COVID-19 World. (Anthony Giddens; 1973);( Olu Ogunika; 1998).

A number of changes are likely to happen during such transition and the future challenges that are sociological both latent and manifest as destination’s are apparent in many countries due to COVID-19 pandemics. Life after COVID-19 as 'The New Normal' is characterized by a numbers of automated services which will eventually, sustain connection between 'Thing-to-Things' and 'People-to-Things' and 'Things-to-Heterogeneous set of people' and then communication takes place instantaneously among the subjects not only within the local environment but also share such communication with diverse and heterogeneous communication networks and groups to inform value chain and delivery services or messages for social activities to inform development. (M. E. Sayed Sharestani, 2015).

Most people are waiting for the end of COVID-19, but in strict sense of social evolution, change and development are unending processes and COVID-19 has no end, the virus would perish but the impact would be there for long, so to speak. Simply because it’s an ongoing process and not means to an end, but an end onto itself. It is a social evolution that would continue to entrench change from strength to phenomenal strength, lifestyles and fundamentals of postmodernism until the Comtean positive stage in societal development comes to stay thus establishing the full blown 'New Normal' as an 'Ideal society' in Weberian sense and Sociology as the science of society to provide analytical examination of; Sub and Super structures and it’s implications around development in the history of mankind. The forces acting around COVID-19 are enormous and a lot needs to be learned to better understand ourselves as human and for moral and ethical consciousness of human race as COVID-19 is changing the World. The research highlights some of the structural impacts of COVID-19 and their implications on the immediate social milieu and by extension diverse societies from around the world in general.(Lyotard Francois, L 1884; Anthony Glidden, 1990).

COVID-19 has crippled economies of nations worldwide and some are faced with galloping conditions with severe structural bleeds that may have enormous consequential multiplier effects on many households and their survival as well as their social life, family and political structures and decisions of our leaders may be of concern for COVID-19 has posed challenges that are by extension sociological which require discourse around improved welfare, revival of family values and socialization of the younger ones through programmatic actions both latent and manifest solutions that are sociological. Many perceive corona virus from the view point of having bio-effects that may kill or rather eliminate human instantaneously (or is it gradually and case in point is the UK Prime Minister was once admitted in the hospital at the Intensive Care Unit ICU for corona virus).

Thus, 'The Social PEN Theory' suggests that, past pandemic corrections of structural collapse can be achieved by (1); mobilization and reinvigoration of the PEN components of social protonous P+ (capital reintegration and sufficient funding for liquidity, encouraging stimulus packages and palliative as response to immediate and far reaching problems associated with COVID-19 pandemic ensuring revamping and resuscitation of the devastated structures and systems in the first instance and as safeguard for future pandemic and increase preparedness to contain the challenges of 'The New Normal') and beyond postmodernism and comtean positive stage of the development of society. (2) the social electroneous E- component of the social PEN theory is (human resource capacity, mobilization and audition of skilled capacity; both IT, technologional and labour of citizens that can withstand the dynamics and challenges associated with complexes of 'The New Normal' in the next phases of societal evolution).

And, (3); the social Neutroneous N component of the social PEN theory of structural change advocates for societal support for the calibration of the P+ and E- components to context, i.e. (political structure's onerous support through collective representation and collective consciousness of the citizens and societal norms and values systems as the support and conscious efforts to enable the calibrations and further recalibration of the PEN components, especially the P+ and the E- context and relative equilibrium for change and social transformation of the existing structures devastated by COVID-19 pandemic to fit the prerequisites and/or normative cultural standard of 'The New Normal' as the requirement for change and adaptation to the newer environment of postmodernism for social progress of mankind). The social PEN theory argues that structural change and recovery from the pandemic can only be possible when the three components of the (P+E- and N) play role equivalent and simultaneously so, for change to happen and in this context, to achieve perfect structural change and transition to postmodernism as the world of science. (Dr. Mustapha Bintube, 2020); 'The Social Atomic PEN Structural Theory of Change' International Journal of Scientific and Research Publication Doi: ttp://dx.Doi.org/10.29322/IJSRP and European American Journal, 2020).

However, there are approaches ranging from philosophical, formal and general sociological viewpoints that should provide analytical examination of COVID-19 quagmire. Some of the structural and systemic dynamics around social life in the 'The New Normal' and beyond, postmodernism could be understood from longitudinal sense of the changes that should happen in man's life with the influence of IT in Post COVID-19 pandemic postmodernism as enormous that, today people work from home with the support of IT as 'The New Normal' unlike offices in modernism albeit, with severity around boredom, anxiety and stress for social isolation due to fear of contracting COVID-19 pandemic while science is increasingly becoming dominant and relevant so much so that, it has proved the Comtean positive stage of man's developmental phase and change of society from theological to metaphysical and beyond that to scientific stage 'The New Normal' postmodernism. (Lyotard Francois, L 1884; Anthony Glidden, 1990).

Although COVID-19 has fractured smaller businesses with increased vulnerability to cyber attacks, data fraud, pillfering and looting especially, during the lockdown and ease of lockdown, social distancing and work from home have the potential of thwarting social relationship as well as slimming down human presence around ecological zones and social environment for practical connectivity as over 120 countries were subjected to lockdown at the peak of the pandemic. Conversely, the lockdown is different stroke for different folks. For some members of the society it is an opportunity to restrategize and rethink going forward after the pandemic, while for others it may mean monumental siege as nearly 500 million people are estimated to...
risk poverty situation due to lockdown at the height of COVID-19 pandemic. Again, COVID-19 has equally dislocated a number of priorities as well as negatively transformed the life styles of significant members of diverse societies across the globe. It is a situation that can best be described as a double-edged sword with challenges and enormous burden on families, groups, communities, societies and governments at all levels all over the world. (S. Probst, N. Carrington; A.A. Howat; 2020; World Economic Forum: Insight Report, 2020). (G. Emefiele, 2020), (Marsh and Maclenan etal, May 2020).

So, is it safe to say that, COVID-19 is ushering in a radical structural change into a new world, a society to be determined by the social PEN energy (+n) of indissolvability as one, pivotal on science and the dynamic of social protoneous P+ and social electroneneous E- and the support of social neutroneous N integral for structural change as the impact of COVID-19 on the present day society has been overwhelming? Or is it a leeway to a new world? Or a transition from capitalism to a society synonymous to Marxian coinage of ‘egalitarianism’ in which all men are the same? ‘The New Normal’ is not an unknown social phenomenon or setting, but a social system that emerges from the recovery of lost glory of the previous society as natural selection upon forming and combining political economy aided by the social PEN energy (+n) in all spheres of man's life hitherto devastated by COVID-19 pandemic as it evolves from the previous patterns created by man. The ‘New Normal’ as renewed kind of society is a transition from modernism or modernism substituted by postmodernism in almost all of its ramifications which requires time to consolidate and stabilize for recovery and sustainability. Hence, the present day society can never be the same with life before year 2020 and the new changes would continue to differentiate and consolidate and it would be gradual, some invisible while others visible, and the changes caused by the pandemic, some reversible while others irreversible and are all indivisible as to their existence as social reality. (Karl Marx and Engels, F. (1950[1808]); (Dr. Mustapha Bintube, 2020); 'The Social Atomic PEN Structural Theory of Change'

There is the notion that lack of adequate preparation to nip COVID-19 pandemic in the bud and its subsequent escalations is a matter which numerous critics and commentators attributed to the world’s power wrangling. The USA and China are in face-off, capitalism is under severe threat while communisim and socialism are no longer tenable and the world is graduating into 'The New Normal'. Beyond that, it is saddled with the burden of American blacks’ revolt (or is it disobedience; an outright protest with popular slogans as; 'Blacks Lives Matters' against racism and subsequent stage of protest for alleged police brutality in the murder of George Floyd and Ranshard Brook’s and many other invisible unauthorized police brutality as claimed by the protesters which had happened in the past, but gone down the drain. George Floyd’s case has degenerated to further escalation of sustained systemic frustrations, anger, anxiety, displeasure and unhappiness around colonialism, subjugation, perceived exploitation of the Blacks by the Macworld and to some larger extent historical slavery as the protesters claimed. (Karl Marx (1964, [1840]); (Marx Weber; 1947).

Similarly, there was push and pull around credibility and responsibility of whether or not one of the two countries; USA and China is responsible for the spread of COVID-19 pandemic, especially its escalation. USA is blaming China and China is turning 'donkey ears'. USA President was asked by a journalist at the White House press conference that COVID-19 is a catastrophe of global magnitude and why is it so? The USA President in response felt that question was so nasty and retorted, 'Ask China'. USA and China are in face-off using threat words at each 'bloc', suspicious of each other while COVID-19 is ravaging humanity around the world with enormous negative impacts on structures; primary, secondary and tertiary and the masses are suffering by day and erupted ethno-racial crisis and domestic violence for palpable lack of capacity of some individual members of the society’s to attain social responsibilities at family levels and that by extensions and multiplier effects affects on child socialization and psyche among other social ills that concerns Sociology of COVID-19.

There is no gain saying that, COVID-19 pandemic has caused monumental structural imbalance and systemic shift in almost all facets of man’s life. Sociology of COVID-19 focuses on those changes and examines their implications on individuals, groups, diverse societies and institutions; formal, semi-formal and informal. For example, on its escalation and impact in January, 2020, and measures to arrest the pandemic through policy guidelines occasioned by subsequent lockdown has affected the income and jobs of numerous members of the society, especially the informal workers were hard hit as it declined to 60% globally. This negative impact has sociological implications on the families, relations and dependents of those whose jobs were at risks for COVID-19 pandemic. Again, the expected decline, according to experts, is more likely to affect Africa and Latin America. Also, there is evidence to support the fact that COVID-19 has disrupted 436 million enterprises, 232 million are retailers and whole sellers globally and COVID-19 has disrupted 1.6 million informal workers globally, (ILO, April 2020). Corollary to that, available studies have suggested that Corona Virus is relative to geography and therefore, the impact varies from country to country and those in the United States of America (US) are ten times more likely to be infected and four times likely to die of COVID-19 pandemic however, asymptomatic are not that infectious as the real carrier of Corona virus.

The dominance of IT and man’s activities in post COVID-19 society as postmodernism are felt everywhere and life is been dominated by IT in all spheres of existence ranging from hospitals, market places, schools, work places, eatery to ATM dispenser and payments for purchases and other transactions are done electronically online with the use of value-MasterCard supported by IT as 'Internet of Things' (IoTM2M) post modernities, variables for it's definition and that has been the way of life in mordernism long before the advent of the novel Corona virus pandemic and that would be sustained and further differentiates and transforms into 'Machine-to-Machine Communication' (M2M) and its relevance and significant are retain and projected furthermore in it's trajectory right into 'The New Normal' and beyond as improvement upon man's life enable by science and empiricist fundamentals as 'smart' way of life in the society. (M. E. Sayed Sharestani, 2015); (India, Ministry of Communication; March, 2020).

There are theoretical and empirical grounds as to establishes nexus with what this research envisaged to achieve as there exist post modernities as evidence on how things in our homes are...
smartly managed from afar through internet connection and it's observed fact that, nowadays human society is driven more by 'Internet of Things'; as a two tier model which enables sending of information sensed by things or actuating the social environment through IT facilities and the basic sensing and actuation of services to quickly connect with other services provided by 'Smart Things' in our homes, offices and other public domain with other 'Internet of Things Appliances' and that would automatically lead to the automation of various forms of 'Internet of Things' to deliver on specific tasks on the internet life beyond 'The New Normal' as postmodernism this milestone in the history of mankind is reminiscent of Auguste Comte's classification of society as 'positive' or scientific stage. These are some of the dynamics that are more likely to happen beyond 'The New Normal', a post COVID-19 society postmodernism utilizing 'Internet of Things' as rapid revolutionary communication network and assist in the diversification of production in industries and man's social existence and as scientific innovation for the improvement of humanity as opposed to the tough, archaic and analog ways of doing things around us and at our homes, a situation to confirm the theoretical underpinning around Auguste Comte scientific stage of development. (M.S.E. Shahrrentani, 2015); (India, Ministry of Communication; March, 2020).

There is the need for policy responses to protect the low income earners, especially the workers in informal businesses in poorer countries from around the world. The risk posed by COVID-19 on labour force and labour power globally is so severe and the most hard-hit are accommodation and food services. Also, existing evidence had showed that, there were sociological implications on gender based issues, domestic frictions and concern over feminism as during the lockdown for COVID-19 pandemic, many people have lost their jobs and in Ontario Canada alone, about 2.2 million people lost their jobs. In April, 2020 alone, the data and statistics reveal that about 689,200 people lost their jobs and unemployment rate rise to 11.3% in Ontario Canada. The job loss of almost 87% during the lockdown, just within two months and the sociological implications on both micro and macro-demographic characteristics of those affected were significantly on women from the private sector. About 577,200 women lost their jobs compared to 514,800 men and are mostly from the industrial sector and that event alone has the potency to severely pressurize their families and for the single mothers it’s a catastrophic an early warning signals for broken homes and major threat to the socialization of the younger ones. The job loss has also affected wholesalers and retailers as 230,900 jobs were lost while accommodation and food services account for 215,800 job loss. At least one out of three jobs was affected during COVID-19 pandemic. (ILO, April 2020); (G. Emefiele, 2020) 'The New Normal' is new lease of life as social transformation of the previous or pre-Corona society modernism to a newer society postmodernism with evolutionary strength differentiating the society to open up newer windows for change in man's life as we work from home and transact businesses online and other fundamentals to a higher life than that of the previous society with distinct features that are somewhat, similar and as well slightly different in comparison to our former life style before COVID-19 pandemic which our generation must witness as phase change in life and therefore, it's normal as the theory of natural selections claims. However, at the other end of the spectrum, there exist an inevitable systemic transformation guaranteed by the social PEN energy (+n) while societies require more social proponent P+ capacity, social electroneous E- human resource capacity and capital integration to bounce back largely due to the momentum of COVID-19 pandemic to enable us pick the pieces for Socio-economic and political recovery and sustainability. (Dr. Mustapha Bintube, 2020).

'The New Normal' as the name implies is an 'Ideal Society' and this is to the credit of Max Weber as Weber constructed an ideal type of rationale-legal bureaucratic organization with the following characteristics as; activities required to achieve organizational goals are distributed in a fixed way as official duties well rationalized. This feature of a rational legal bureaucracy has stressed the importance of Kinsley Davis and Wilbert E. More theorizing on stratification system for each official has a clearly defined area of responsibility for the attainment of organizational goals in a rational legal bureaucratic setting. Complex tasks are broken down into manageable parts with each official specializing in a particular area. Bureaucracy's complexes and dynamic structures of institutions are intertwine just like the thoughts of Max Weber and Karl Marx are inseparable because you cannot talk about economic system that is achieved via e-institutions without the proponent P+ capital for liquidity of systems and electroneous E- (human resource capacity IT and otherwise ) as advocates of social PEN theoretical components beings prime source of decision making at all levels as COVID had engaged the E-component capacity for bureaucratic know-how dealing with the pandemic at the centre of decision making at the level of UN and policy formulation at level of various governmental levels as bureaucrats and/or administrators are working round the clock tirelessly briefing media to get out of COVID-19 quagmire. (Marx Weber; 1947). (Karl Marx (1978[1867]) (Robert K. Merton; 1968) (Spencer H. 1971).

Subsequently change would take place in the process. The impact of COVID-19 is sharper, overwhelming and has created a number of scenarios which have changed our lives and those changes are dramatic and the effects are immeasurable. Lockdown and complete seizures of human activities on the surface of the planet earth, during COVID-19 pandemic had greater effects on our lives, some of the changes are reversible while others are irreversible and would continue to evolve to its greater heights with consistent change to shape our lives as individual members of the society.

There are great changes around systems and structures around us and are slowly galloping and inflation is creeping deeply into the very fabric of the society due to COVID-19 pandemic and the panics for scarcity or shortages of commodities necessitates for market price speculation and that increased hoarding of foods stuff during COVID-19 pandemic for the fear of unknown with severe effects on low income earners’ families and the lower working class especially in capitalist societies. Also, Issues of interest to Sociology of COVID-19 as existing literature has provided evidence that, some of the events characterized by racism, stigmatization and protest with obnoxious implications on homes which are said to be on the increase only during COVID-19 pandemic. The case of George Floyd erupted and Ranshard Brook's recap the struggle, Vancouver police recorded 20 hate incidences in 5 month compared to 12 altogether in 2019 mostly
directed on Eastern Asians. They were looked at with disdain by accusers as COVID-19 blossomed from China. The attitude of the public on Chinese people was disturbing and the level of stigmatization and hate was said to be on the increase. Data obtained reveals that an insulting statements directed at Eastern Asians were recorded as 'go back to your country; that is where it all started'. All these happened after COVID-19 pandemic has blossomed. (Globe and Mail, May, 2020).

The Chinese were seen with suspicion all over the world for the Wuhan escalation of the novel Corona Virus and Africans manhandled and humiliated in some jurisdictions. There were hate-fuelled incidences, racism and protesters littered around the streets and major roads of USA and UK are more pronounced. And, there were agitation and bigotry in Canada and such scenarios appeared to be strength for the Chinese and they lamented of physical, mental and psychological imbalance for such accusations just being citizens of China and the labeled against their person. For COVID-19, the Chinese all over the world are in great fear, anxiety and some are depressed for the unnecessary harassment. (Globe and Mail, May, 2020).

As COVID-19 'risks outlook, preliminary and its implications' suggest that, the lives and livelihood of over 500 million households are facing threat of poverty. All these are social conditions which form an integral variable that provides weights for the science and discipline of Sociology at large. Some analysts opined that, in April, 2020, more than 102 export restrictions were placed by 75 countries on goods and critical medical supplies and drugs and should this situation remains constant for 'The New Normal', it will have enormous sociological implications and health seeking behaviour of the members of the society, communities, families and households would feel the brunt and those directly affected by the pandemic would grumble and for the damaging effect there would be much more of systemic rumbling. Aside escalation of COVID-19, there seems to be poverty, the rate is higher and individuals who lived below poverty lines as another factor which correlate the rate of transmission and makes it difficult for the government and relevant authorities to achieve significant milestone around contact tracing and isolation of infected victims more especially in low income earning societies (G. Emefiele, 2020; Marsh and Maclenan etal, May, 2020).

The theory of evolution has reinvigorated the fact that, human society evolved and such evolutionary strength according to the social PEN theory is an invisible social phenomenon, but it happens in its indivisibility and the structural changes are visible at later stage of structural change and development. It's gradual and so it attains its visibility stage while nursing 'The New Normal' which at the moment is rather infant evolving and therefore, it has to undergo stable, but guided activities of man's ensuring phased change of the society to attain relative social equilibrium. The activities of the members of the society in post COVID-19 society and the dynamics of the institutions within the ecosystem and global power relations as determinant for the stabilization of 'The New Normal' as society which exemplify a complex whole and are PEN indivisible. (August Comte, 1986; Darwin, C. 1859); (August Comte; 1986).

Social evolution is to the credit of Charles Darwin and Herbert Spencer. The former emphasized on the survival of the fittest and the latter corroborated that, human society is never static but rather dynamic and therefore change is necessary social condition and the changing nature is that of the 'survival of the fittest'. COVID-19 has changed the world and equally induced major shift in human thinking and entrenched power wrangling for global power balancing. Sociology of COVID-19 believes that, the process and forces which ensure the change to 'The New Normal' is enabled by the dynamic process' and 'the interplay and interdependence nature of phenomenal; natural and social fact and it is gradual and would happen overtime as illuminated by Charles Darwin. (August Comte, 1986; Darwin, C. 1859); (August Comte; 1986).

The phased change of the society, due to the impact of COVID-19 pandemic is unstoppable and it is beyond an individual control to put an end to it, but will happen though gradual, guided and controlled to some extent by man's conscious actions, activities and relations to institutions, science and entrenchment of technological modernities for social progress to ensure change and the effects would be felt almost everywhere, some overt while others convert and sleeper for the stability of 'The New Normal' as another phase in our existence which come with numerous social and natural phenomena sugeneris as 'social facts' for its definition. (Darwin, C.1859); (Durkheim and Mauss, M, 1703; Giddens Anthony, 2009).

COVID-19 has challenged leaders of various nations and they are taking bold steps ramping up testing, making concerted efforts around case identification and isolation with pathways for contact tracing, all are possible with the power and authority established and sustained around leadership for success going forward dealing with COVID-19 pandemic. For example, the USA under the leadership of Donald Trump has appropriated 113 Billion USD (One Hundred and Thirteen Billion Dollars) to achieve testing and at least 1.9 million of her citizen have been tested in the second week of May, 2020 through hospital and community testing programmes. Similarly, there were complexes which border the leadership especially, human traffic connections and difficulties around contact tracing are seen as Herculean tasks overcoming Corona virus. And, the Rockefeller foundation has since presented guidelines on phased reopening plan of about 48 states of the USA in the third week of May, 2020 as phased modifying measures with tremendous precautionary measures around biosafety were reinvigorated for safety and security of US citizens. (D. Trump, 2020);(John Hopkins, 2020) (D.Kieghe, 2020).

'The New Normal' is achieved by man's relations to institutions supported by IT facilities and technologically mundane postmodernism as a sort of society driven by scientific and higher sophistication with less human labour and social group participation. In that sense, social group segregation/social distancing is rather, a new norm and 'social Telesis' as opposed to social dynamic situation to reinforce George Simmel's 'sociation' translated to German 'Vergesellschaftung'. 'The New Normal' is a way of life, and in postmodernism, the way of life may no longer be in accordance with the previous definition of socialization as it was practiced in modernism, a corona virus ridden society that has changed the global thinking. For example; social distancing may be a relative thing to mean, 'he who contemplates of marriage between the whites and blacks, is more likely to also assume to live in the same street with the whites or the blacks' (Hogan, 2006; Giddens Anthony, 2009).
'The New Normal' which is evolving and synthesizing to transit to PEN structural visibility of normalcy albeit gradual. But, there is a pointer to its trajectory and whatever decision taken sooner rather than later by the governments, institutions and people that matter from around the world, would in no small measure affect things around us and to determine the working of the newer world: postmodernism with effects on our lives and transform the future and that happens through global consensus building, stability and change to 'The New Normal' stability and sustainability.

Although, COVID-19 is public health issue, but its impacts has nexus or bearing with social structures, economy and so it does with polity and by extension shifts in our social lives and fundamentals in general. The consequential effects of COVID-19 on social, economic and political structures as institutions had equivalently and it trickles down to communities and societies from around the world, and thereby changing individual's and group's attitudes and behaviour in search of and in the quest for finding solution to attain normalcy. (Lyotard Francois, L 1884);(Parson T. Bales, R.F. 1955; Parson, T. 1977); (Durkheim, E. Mauss, M, 1703; Spencer, H. 1971)

COVID-19 has increased panic buying and hoarding of food items was on the increase for the fear of unknown leading to artificial high prices with disrupted supply chain and high demand due to COVID-19 pandemic. To correct the ills of COVID-19 may require serious public health reinvigoration, psycho-social support and counseling to reduce its impacts on members of the society. The escalation of COVID-19 with flying banner and shining armour has really galvanized the entire globe and with numerous changes in all spheres of man's life. Some of these changes are permanent and irreversible while others are temporary and dissoluble. For example, the 'ease of lockdown' came with numerous politics and social tensions such as anger and frustration from the individual members of the society.

Amidst these controversies is the fact that the world is changing, though gradual, and that has underscored the claim of social evolutionism. COVID-19 may disappear over time, but the impact it will leave behind would definitely change the world and it is happening albeit, gradually and socially PEN invisible and are in phases to affect social, economic, political, business and educational systems. For example, the sociological implications of the gaps in labour force is that, COVID-19 has thrown many families and individual households into crisis and shift in family structures is the rule and not an exception where jobs are under severe threat of loss with negative effects on individual worker's nuclear and extended family systems and the worse hit family may be either heteronomous and matriarchal or consanguine and matrilocal residence in which the former is dependent with weaker source of livelihood and the latter, the wife, saddled with the burdens of the family and exercise enormous power with influence over the father together with their relations may be constrain and restrain by the momentum of COVID-19 pandemic as the labour force has been altered by COVID-19 and labour power are being shifted, in some cases loss of jobs from lockdown and social distancing a nightmare around the globe. (ILO, April, 2020);(W. Bosyauni; 2020); (T. Honjo; 2020)

COVID-19 has transformed global culture and has shifted many aspect of it both artifacts and non-artifacts. This is reminiscent of the social thoughts of Edward Bronson Taylor on Culture and George Simmel's Sociology on 'Sociation' 'Dyad' and 'Triad' relations to provide us with better understanding of the dynamics of COVID-19 pandemic from around the globe. There are variables and/or indicators at community level to provide credible insight that should allow us have better grasps of COVID-19 and its transmission in relations to variables such as population density, homogeneous or heterogeneous and the extent of transmission among community members through social interactions. (Edward Bronson Taylor, 1891); (G. Simmel; 1948);(Durkheim, E. Mauss, M, 1703; Spencer, H. 1971).

The behaviour of diverse human groups from around the world, their attitudes, value systems, knowledge and belief systems may contradict the distancing guidelines and are afraid of being infected of COVID-19. This is to the credit of (Burgess and Parks) 'Ecological Theory' and to some extent, 'Cultural Transmission Theory' as it shared a large network of researches with 'Ecological Theory'. (H. Kankiya, 2014; S.O. Smah, 2013).

II. KEY CHALLENGES/PROBLEMATIC STATEMENT FOR THE RESEARCH

As the world is now moving away from face-to-face context of social interaction with work from home, social gathering and community meeting are banned (is it suspended or put on hold) due to COVID-19 epidemic as caricature of the philosophy governing postmodernism and as a driver for COVID-19 reality for social, economic and political change enabled by social PEN forces (+n), society is ravaged by Corona virus pandemic as social distancing becomes the rules and not an exception. There is panic around fragile societies which is obviously provided for by the rate at which it transmits across nations, cultures, traditions and regions of the world with enormous anthropological implications is actually impactful with enormous capacity/potential as it's slowing down global socio-economic and political activities of human in their respective countries with serious threat around social relationships as sociological fundamental which define individuals social life and existence. Should corona virus increase in its intensity, (may God forbid), what would be the fate of those who get their daily meals from the opportunities unveiled by social gatherings and events in the society? Some people have to move in and out of their houses and participate in social gathering for their survival, which requires coming together in mass to achieve social purpose in life? What will happen to the down trodden masses, especially those in fragile communities in remote rural areas where social security is tied down to relations?

As COVID-19 escalates in Wuhan China, to the level of pandemic, the media all over the world – print, electronic and new media went agog on COVID-19 influenza. Consequent upon that, Sociology of COVID-19 is interested in the social aspects of the pandemic and its contractions through social interactions, impact on social structures and sociological safeguards to reduce severity of the virus on humanity in general.

From all indications, one can only get infected of Corona virus (COVID-19) through social interactions, hence the need for social distancing as mitigating measure. I was so disturbed that I wrote to Professor S.A. Zuru, Pro-Chancellor, University of Petroleum, Effurum, Delta state on the 29th of February, 2020 when Corona virus was barely a month old in Nigeria just to share thoughts and perspectives with him on its escalation. The conversation went thus: Pro-Chancellor sir, comparative analysis of the two clips,
(the one you sent to me and that which I posted in response), suggest a compelling question on Corona virus.

One question is eminent here sir, the epidemic called Corona Virus is known to have neither a vaccine at the moment nor does it have an antidote. So, what is China disinfecting and/or fumigating and sterilizing in Wuhan? Professor sir, With all sense of respect, don't you think that, this quagmire called Corona Virus is sociologically inclined establishing nexus with Maxwell Atkinson theory of ‘Coroners’ on suicide, in Ethnomethodology-Sociology of Zimmerman and Harold Gafinkel” - Haralambus and Holborn: pg. 885.

There are numerous challenges achieving social distancing and enforcement of COVID-19 guidelines to free the society of the pandemic and associated negative effects of the pandemic on man's social life. Most high risks societies around the world by their very nature and setting, in the first instance, are densely populated with numerous errors in Postmodern-Architectural designs and specifications while lacking in town planning principles with more houses poorly built on faulty foundations. This situation is a palpable challenge as achieving social distancing seems a nightmare. Most victims of COVID-19 are in absolute poverty with ill-health status who cannot afford to buy disinfectants and alcohol based sanitizers to use for safety measures and are more worried of hunger than the real Corona Virus. How do we protect ourselves of COVID-19 pandemic? As we may recall Abraham H. Maslow of human needs, the problem around poor people is physiological needs, the urge to get basic needs for survival as food, portable drinking water and shelter. Without fulfilling those needs they cannot afford to buy hand sanitizers, face masks, etc. This increases the level of their vulnerability for COVDI-19 pandemic. So, how can we ensure social distancing?

There exists another challenge of lack of enlightenment and sensitization to create more awareness as it is seemingly lacking as social contacts at community level is unavoidable for the mass of population density and dynamic of interactions. The daily press briefings by the appropriate agencies and authorities require expansion of coverage of its activities to penetrate the society and to trickle down to the grassroots level for the masses to hear the government’s advice and recommendation on COVID-19 issues to keep the citizens well informed. To understand the effects of the pandemic on individuals and society at large, there is the need to provide an applied sociological study in thematic areas in sociology for critical analysis to unveil ways of improving social distancing measure, understanding the effects on short, medium and long term and on how to promote community awareness as safeguards against COVID-19 pandemic and the nexus between COVID-19 and its impact on social structures and institutions such as family system, groups, diverse cultures and how it impacts social change and relationship among human race in diversity.

Again, there are problems around overcoming cultural forces which allow handshake in congregation within communities during weddings, naming ceremonies, funeral services, market places that are congested and other processions as their cultural imperatives demand. So, what can we do to be safe of COVID-19 pandemic? Social distancing is a nightmare in fragile societies and may turn out to be failed and fruitless largely due to the fact that traditional and cultural fundamental define community members’ way of life and achieving social distancing is a nightmare. The demography of the fragile societies also suggest social distancing a nightmare due to rampant birthrates, congestion and procession during festivities and routines for places of worship, funeral and other similar inter-ethnic festivals and meetings a nightmare to observe social distancing in most fragile societies.

The social distancing and lockdown as measures to curtail spread of COVID-19 has severe socio-economic and political implications as well as the survival of especially, the downtrodden masses in remote communities; their survival comes first before anything in most fragile societies, hence some break the guidelines and the need to have stringent measures to contain the violations of law and order promulgated by the higher authorities to safeguard members of community from being infected by the carriers of the virus. There are numerous existential threats from within the community for inter-community relations and human traffic connections as it is natural for humans to move as they remain socially mobile. The guidelines and lockdown has not been easy for members of fragile societies are finding it difficult to contain it as their sources of livelihood are somewhat blocked and palliative to cushion their hardship are in short supply hence, move around in violation of the guidelines.

There are more than enough reasons and issues for members of various communities to abuse and self administer drugs as most hospitals are closed while others are deserted apparently with no doctors and the options left for the masses are to get referral to COVID-19 isolation centres with the fear of being infected, hence they avoid hospitalization completely with dare consequential effects of such change in behavior as drugs abuse. And, what do we stand to benefit from analytical examination of this situation from the viewpoints of sociology of COVID-19? Closure of most healthcare centres and paucity of health services may generate situational tension capable of escalating into distress leading to eventual trauma, depression, anxiety and psycho- physiological conditions ultimately leading to death and in some cases to aggravate suicide conditions and domestic violence for excessive regulations and inadequate integration of palliative and stipend as support to members of the society with numerous issues around counseling and establishing therapeutic relationship among members of the fragile societies. So, what do we need to learn from the Sociology of COVID-19?

And, what would happen after the pandemic? We need social psychology to handle that and more often than not, the role of medical sociology cannot be over emphasized in giving social analytical advise and sequence of narratives to help paramedics to understand the social factors and reasons for contamination of COVID-19 in various communities and hospital for overcoming the pandemic.

What is sociology of COVID-19 saying on the social aspect of COVID-19 patients and relationship with health workers and it's medical implications? Socio-economic and political development issues and governance are halted for COVID-19 social distancing measures and members of the fragile societies are stranded with no social amenities of life and we require sociology of development for better explanation and to map out post COVID-19 world leadership and governance issues to liberate the masses.
and to create hope for better tomorrow and what has been the focus of the sociology of COVID-19 on that? There are problems around congestion in places of worship such as mosques and churches as rapid epicentre for transmission of corona virus which informed government decision to close down worship places and to reopen when the pandemic is over and sociology of religion is there to tell us much to better understand the synthesis to subdue crises and clear hope of the masses who have nothing but religion as source of hope and revival for better tomorrow so what do we stand to learn from sociology of COVID-19 on that? The social distancing order as philosophy to drive postmodernism has scaled and pushed many out of businesses, especially in fragile societies for social distancing measures as characteristics which define fragile societies and many are out of job today as motorcycle riders, tricycle riders and informal business which allows coming together of many persons to achieve social economic and political purpose in life and such a scenario is a palpable nightmare, especially to members of the fragile societies as we usher in postmodernism world enabled by corona virus and COVID-19 pandemic and social distancing a serious issues which takes away means of livelihood of the poor masses. So, what would happen after the pandemic? The downtrodden masses are lamenting and seeking for reversal of those measures against their survival and livelihood. Will that get the attention of the authorities? Certainly society would evolve to differentiate and open up opportunities for the fit ones to have a substitute job as residual paid job to make ends meet as the tenets of evolutionism suggest. There are also domestic issues for COVID-19 and social distancing may be maintained by wife and children but for the roaming husband may be a source of concern and fear of corona virus importation to the family and in some cases the rate of domestic violence is on the increase and domestic workers who come from outside to do routine cleaning and washing may also be on the guilt side and at times looked at with disdain with the fear of COVID-19. Individuals are in lockdown and the quest to have share of their palliate relief materials that is apparently inadequate makes members of fragile societies to fight over to collect and in the process get infected or become more vulnerable to COVID-19 as individuals are seen push, pull drag to have their share of palliative and some fight for apparent insufficient food items being distributed by the government and concerned philanthropic individuals and well-spirited members of the society. Some churches and mega mosques also extend hands of gesture to support poor and needy members of their respective places of worship. So, what do we learn from sociology of COVID-19 on that? The first phased ease of lockdown in most fragile societies is rather adding salt to injury as most banks were jam packed and most people do not use face mask and as the standing order of some official places instructed to offer skeletal services require customers to use facemasks to enter and some people borrowed others’ facemasks to gain entry. It was rather a nightmare and observing the social distancing as philosophy which drives postmodernism are actually zero and the number of cases from the day one of the ease of lockdown shoot up and increase the curve along Y axis of index cases graph against X axis per capita population density. COVID-19 is really spreading, which perhaps left many asymptomatic as the incubation period is rather long. This left many with mild to moderate symptoms and the aged are also passing away due to their age and associated fear and ailments due to fragility and apparent lack of immunity to fight back corona virus in most fragile societies. So, how can we be safe of COVID-19? From around the world, there were cases of people who tested positive for COVID-19 and referred to isolation centres just for them to be dancing around and some got back to the society to come back when it’s time for either lunch or supper to be fed by government as another source for working against hunger in some fewer societies across the world that are fragile and many are being arrested and charged, in some cases convicted for violations of COVID-19 guidelines order and enforcement principle. The NCDC has been seen on Television on daily basis cautioning members of the society to safeguard and that includes the use of social media messaging and daily press briefing by PTF for donkey years yet many tend to violate the stay-at-home order during the lockdown time and the confirmed infected cases are on the increase. The tests and other requirements for confirmation are centralized and results are not quick in coming for further actions in dealing with COVID-19 pandemic.

III. JUSTIFICATION FOR THE RESEARCH ON THE SOCIOLOGY OF THE PANDEMIC

The crux of the Sociology of COVID-19 is to provide analytical examinations of the dramatic changes in thematic areas of man's life and existence; alterations of social systems, modifications and transformation of man's entire life due to the impact of COVID-19 pandemic are worth researching. Again, there is the need to explore a ground for sociological debates improving on social distancing; social ills, destitution, suffering and cognitive dissonance entrenched by fear and to provide sociological literature as reference point on COVID-19 pandemic. Also, there are tremendous issues and facts which make social distancing difficult, if not impossible or nightmare and this research is determined to unveil the way forward as solution in addition to the dispute among scholars on the why and how distancing should be described or defined. This research would generate sufficient data for referral and policy aids for policymakers and practitioners and serve as pedestal for longitudinal production and prevention from contracting the virus. It has enormous academic benefit in understanding sociological issues behind the pandemic. Also, it is so appealing to a researcher to make enquiries and raise fundamental philosophical questions that are compelling on happenings and events around man’s social milieu due to COVID-19 pandemic and the effects on the changes on man's livelihood has underscored the imperatives of this thesis. More so, worth knowing of it all is our social relationship in the society as members and the effect of social distancing and the effects of the pandemic in general and the need to know “what” and “why” of the dynamics on ‘change in social structures’, ‘contact tracing within communities’, ‘social groups distancing’ and ‘social interactions’ through which people get contracted of COVID-19 and all of these concerns Sociology of COVID-19. The focus of Sociology as a discipline is society and face-to-face social interactions and to some extent the transition of the society in phases from hitherto stable pre-Corona society as somewhat, simple with semi and informal structures evolved into another.
phase characterized by chaotic COVID-19 era and to another phase of post COVID-19 world of 'The New Normal' as it is evolving to define human society by technologies and the power of science and IT for uniformity and normalcy is worthy analytical examination by sociologists. At the core of the Sociology of COVID-19 lies the belief that post COVID-19 society as a new phase of man's social existence ('The New Normal') may not be the same with what was tenable before the year 2020. Normalization can be achieved as doctrine of the theory of natural selection as a way of life and this is to the credit of (Charles Darwin) who made us to believe it as one of the basic tenets of evolutionism. As corroboration to the overwhelming thoughts of Darwin, (Herbert Spencer) proved that human society is never static but it is dynamic hence, changes from one phase to another phase is unavoidable situation and, 'The New Normal' as a way of life perhaps, would come to stay in phases and it is unavoidable. This is a theory rather than speculation, guess or assumption and that happens gradually. Human society would from then require more sophistication and science to exist with certain norms, basic rules and fundamental principles as it would have normative cultural standards to define life and as well as guide to a new lease of life of 'The New Normal'. Sociology of COVID-19 is there to provide timely, consistent and theoretical understanding of the complex and dynamic structures of those phases as it affects man and social systems in our social milieu.

IV. OVER ARCHING OBJECTIVE OF THE RESEARCH

The broad objective of this research is to examine the social impact of the pandemic and to demonstrate the adequacy of the 'Social PEN theory of structural change' in giving sufficient explanation on COVID-19 pandemic and its consequential effects on social structures and man's life in the society and by extension into 'The New Normal' and beyond. The findings from this research enable us to benefit a lot from the thematic areas on applied sociology of the pandemic and to outline the preventive and/or precautionary measures that are socially inclined and response to contain COVID-19 as global emergency situation. The research also seek to achieve more on the 'why' of the difficulties around adherence to social distancing guidelines as, especially in social groups and communities and in the end it seeks to provide sociological findings and solutions from the bulk of data analysed and inferred to the populations from which study sample was drawn. Lastly, it is to highlight sociological steps to be taken to improve on measures, social distancing and social life during and after COVID-19 pandemic. The research is also to establish a new vista in sociology to be known as ‘Sociology of COVID-19’. The thesis is to uncover the philosophy governing postmodernism as a driver for newer changes due to the momentum of the pandemic and as cutting edge research, employs an integrated theoretical framework that seeks to uncover challenges and changes faced in all spheres of human endeavour. General Sociology as a science of human society, applies various scientific methods, ranging from qualitative to quantitative, ethnographic approaches, Anthropological, historical and excavations, rules and measurement technique. Sociology of COVID-19 is to X-ray COVID-19 pandemic and examine its impact and offer suggestions that may provoke conversation in finding immediate, short and long term solutions that are sociologically tenable and tackle some of the social problems caused by COVID-19. This research would identify clog in the wheels of progress inhibiting achieving social distancing measures in designated high risks societies and to suggest newer ways for enhanced social distancing within the peculiarity of cultural context of society of research that would be integrated for best practice and result. When the virus was mentioned in January, 2020, it was so mind boggling that several compelling but sociological questions readily came to my mind; they were so appealing for social scientific examination within the realm of social consciousness.

V. SPECIFIC OBJECTIVES OF THE RESEARCH

This research examines the following specific questions to achieve the overarching objective stated above. Thus:
(1) How can 'The Social PEN Structural Theory of Change' explain consequential effects of COVID-19 Pandemic into 'The New Normal' and beyond?
(2) What do we need to learn from the thematic areas on COVID-19: Sociology of the pandemic?
(3) What are the precautionary measures and responses to contain COVID-19 as global emergency situation?
(4) Why adherence to social distancing guidelines is difficult in social groups and communities?
(5) What are the sociological steps to be taken to improve social life during and after COVID-19 pandemic?

VI. THESIS PROFILE, OPERATIONAL DEFINITION OF KEY TERMS, CONCEPTS AND VARIABLES

The theme of this research is Covid-19: Applied Sociology of the Pandemic and The Dynamics Beyond 'The New Normal' in the Context of Social PEN Theory of Structural Change. The research was conducted between January and July, 2020. It was carried out and as well report written by Dr. Mustapha Bintube, (ECRTD, UK). Dr. Bintube is of the National Assembly, Directorate of Senate, Department of Journal and Visiting Senior Lecturer, University of Maiduguri, Department of Sociology and Anthropology, (Unimaid), Nigeria.

The advisory team for this research is made up of the following professors in the field studied thus: (1) Professor S.A. Zuru, Pro-Chancellor, University of Petroleum, Efurum, Delta state, (2) Prof. Waziri Ahmed Gazali; Sociology, University of Maiduguri, Nigeria, (3) Prof. Emmanuel Onyeozili, Sociology, University of Maryland Eastern Shore, USA, (4) Prof Sam O. Smah, Sociology, National Open University, Nigeria, (5) Prof. Musa Abdullahi, Sociology, University of Maiduguri, Nigeria. (6) Prof. Darlington Iwarinmie-jaia; Sociology, University of Port Harcourt, Nigeria,(7) Professor Hamza Kankiya; Sociology, Bayero University, Kano and Dr. Mohammed Ibrahim, Sociology, University of Maiduguri, Nigeria has contributed to the research. This research has the following sub-themes thus: (1) Abstract with the following Index Terms- : Sociology of COVID-19/ The New Normal/ Social PEN Theory/ Social distancing/Applied Thematic Sociology of COVID-19/Social PEN Invisibility; PEN visibility and PEN Indivisibility/Social PEN Protoneous P+ capital Social PEN Electroneous E- human resource and Social PEN Neutroneous N neutral value as societal norm and value system for Calibration of any social system to attain social context and
relative equilibrium for change. COVID-19: The Sociology of the Pandemic. (2) Introduction (3) Key challenges/Problematic statement for the Research. (4) Justification for the research. (5) Broad objective of the research; (6) Specific Objectives of the research; (7) Ethical Value consideration, Scope, Significance and limitation of the research; (8) Operational Definitions of Key Terms, Concepts and Variables.

Concepts defined and operationalized are: (1) Sociology of COVID-19 as a cutting edge research and social impacts analysis of the social elements of the phenomenon of COVID-19 in thematic areas in relations to the branches of general Sociology and Anthropology.

(2) Social distancing simply connotes, moving away from social group to be safer and taking responsibility to ensure safer society. It’s purely 'social' and the definition of 'social distancing' has been supported by established sociological literature in the work of (Hogan Sociology', 2006, Pg: 331).

The terms “social distancing”, "physical distancing" and "Social Telesis" were first coined and operationalized by Hogan in 2006 pg. 331 and pg. 332 respectively. The most appropriate one out of the three to describe human social grouping vis-à-vis distancing from groups to take cover from COVID-19 is the term 'Social distancing' and NOT 'physical distancing'. However, as corroboration to Hogan definitions, this research discovered that, social distancing is more appropriate terms to be utilized and therefore, there is nothing like physical distancing when talking about social interactions as enabler for the transmission of COVID-19. (Lester F. W. 1968).

Social distancing is also supported by global paradigms on COVID-19. It has a philosophy as well as epistemology loaded as guidelines and policy of the WHO and CDC on COVID-19. Social distancing is to discourage person to person transmission of COVID-19 through social interaction. Therefore, to avoid being infected, members of the society need to be socially distanced from one another and safeguard themselves with face masks and as well adhere to the high powered authorities briefing at the level of the United Nations, UN and Centre for Disease Control, CDC guidelines and at various governmental levels on principles on social distancing.


'The New Normal' is interchangeable with Postmodernism and beyond as PEN indivisible society of Post COVID-19 environment driven by science and technology. It is synonymous with Comtean connotation of society as positive stage driven by scientific fundamentals to its greater height. Consequently, ‘The New Normal’ is post pandemic society driven by social PEN energy of (+-n) and dominance of the role of P+, E- and N to enable 'The New Normal' to come into force due to the effects of COVID-19 which have been overwhelming, shaping structures and gradually changing the human society and in that process social evolution is unavoidable and unstoppable, achieving full blown 'New Normal’. It is not sudden but a gradual process to inform further change of the society, a transition from modernism-to-postmodernism and into 'The New Normal' and beyond to establish Comtean positive stage of the society that is highly scientific and synonymous to Marx Webers Ideal Society that is highly rationale. This complex process is also explained by social evolutionism.

(4) Social PEN: The three integral components of the 'Social Atomic PEN Structural Theory of Change' which must work simultaneously and in harmony to inform structural change. Social Protoneous (P+) is positive social value as capital integration and funding support for liquidity of any system for change. Social Electroneous (E-): negative social value as human resource capacity both IT and Telecom Technological capacity and individual capability, natural or acquired by man in the society through training to support change for development. Social Neutroneous (N): the societal norms and values systems to serve as calibre to support protoneous (P+) and electroneous (E-) to calibrate and further recalibrate any social structure or system to context and relative social equilibrium for change to happen (societal support).

(5) The New Normal: What is key to the stabilization of the society to attain 'The New Normal are the newer scientific norms and the role of e-institutions and the emerging structural fundamentals would have influence on social, economic and political activities of societies to enable the change in phases in post COVID-19 society while such reconstruction requires adherence to normative scientific cultural standards around marshal plans for development to inform reconstruction of the devastated societies to attain normalcy. To reinforced the viewpoint on the role of Telecom technology, and some of the dynamics beyond 'The New Normal' is explicit. Postmodernism is a turning point in the history of man's existence with major systemic and structural shift to define complexes and dynamic structures beyond 'The New Normal'.

(6) UN: A high powered authority of the United Nation. (7) PTF: A high powered authority of Presidential Task Force on COVID-19 for the implementation of policy on guidelines for the control and protection of citizens against COVID-19 pandemic. (8) CDC: Centre for Disease Control frontliners.


VII. ETHICAL VALUE CONSIDERATION, SCOPE, SIGNIFICANCE AND LIMITATION OF THE RESEARCH

This research is constrained by time as well as politics by few unscrupulous elements jamming researcher’s head with subjects by misconstruing genuine research findings with coloration against the researcher. The survey is also constrained by the dynamic nature of COVID-19 pandemic. However, the survey is a glimpse of the social impacts of the pandemic, a global scenario and continentally invigorated an African perspectives and beyond. It's not a case of specific country but global context. The findings and results which emanate from this study have nothing to do with the stands of any African country or her government and/or any of the agencies, but a cross-sectional and narratives on COVID-19 pandemic and anonymity as methodological components of this research and purely a post doctoral independent research carried out as 'self sponsored thesis and/or monograph' under the guides of seven (7) reputable professors in the areas studied.

However, the finding is accessible for any end user to drive utility in a positive passion and as they desire for sociological debates. The findings are to add value to existing body of thoughts. The research mainly focuses on keenly selected countries as sizeable, representative, closely observed and studied for 7 months from January-July, 2020. Countries’ names are not mentioned herein for unanimity and issues around ethical values, confidentiality and avoidance of politics as one of the cardinal principle of social scientific research. However, the consent of the few interviewed online through Skype and face-to-face are sorted to maintain confidentiality and informed consent. They are protected as their names and locations including countries of origins are made anonymous as ethical requirement in social scientific research. However, a few among the advisors in the advisory column above have full knowledge of the countries observed and subjects studied, hence advised to withhold the source as anonymous to avoid confusion and mix-ups around politics of using findings against the researcher and ethical value consideration. Also, the research is constrained by the lockdown and interstate social immobility; hence the researcher faced difficulties around travels, accessibility, double checks and pilot as most respondents were e-interviewed on Skype oftentimes, active phone conversation. An expensive and time consuming with data collection and titrating chains of information supplied in addition to the few interviewed on face-to-face basis only, albeit, it closes up gaps, pitfalls and chasm with interview schedule.

The findings and recommendations from this research may be useful for policy makers and practitioners and hope to be of value to national, regional and/or global discourse while going forward dealing with COVID-19 pandemic and its associated effects that have transformed and induced structural changes, challenges and issues that are ‘Sociological’.

VIII. METHODOLOGICAL DESIGN; MODIFIED CROSS-SECTIONAL QUALITATIVE SURVEY

The research employs cross-sectional, exploratory qualitative survey entangled with real time narrative as mixed method with observational approach from January to July, 2020; a global context and continental glimpse of Sociology of COVID-19. The research employs analytical examination of critical Sociological issues and changes due to COVID-19 pandemic and beyond and the provision of narratives and observational methods that are sociologically invigorated. The subject matter combines examination with cross sectional survey research while actively utilizing research schedule for data collections and content analysis with fewer elements of quantitative while triangulating the approach as mixed method to enable longitudinal projections and flexibility around predictions of life after COVID-19 pandemic and the changes that may likely take place overtime albeit gradual due to the impact of COVID-19 pandemic. The study population was randomly sampled as respondents snowball for study. The researcher was keen to source data with sense reliability and validity on their origin as nothing is hidden about COVID-19 pandemic for it is obvious as household name. Triangulation as reflected and method discovered by (Haralambus and Holborn Sociology, ) is mixed method combining both qualitative and, to some degree, elements of quantitative blend with real time narratives as some data utilized are measured at nominal level. Ratio and percentile are utilized which depict the quantitative bearing of this research and active utilization of verbal narratives and content analysis that are qualitative in posture and derivatives. The research on Sociology of COVID-19 employs an integrated theoretical framework thus; (I) Social PEN Theory of Structural Change to provide analysis and change in social structures and relationship among members of the society and family especially during lockdown and when the pandemic was at its peak.

(II) Social Evolutionism, the impact of COVID-19 is overwhelming shaping structures and gradually changing the human society and in that process social evolution is unavoidable and unstoppable, it's not sudden but a gradual process increasing, from strength to strength, intensity to intensity and from time-to-time to inform further change of the society, a transition from modernism-to-postmodernism and into ‘The New Normal’ and beyond positive stage of societal development as envisaged by August Comte and this complex process is explain by social evolutionism.

(III) Postmodernism as a philosophy to define the dynamics of ‘The New Normal’ and beyond post COVID-19 society. (IV) Ecological theory to explain man’s social and physical environment deserted for COVID-19 pandemic and its consequent effects at various levels during the lockdown and
beyond into 'The New Normal' and postmodernism. The theories were intermittently paraphrased with data, literature and empirical evidence and variables are analysed at different ranges of analysis and measured at appropriate levels of measurement of variables during the study and demonstrates the nexus with elements of COVID-19 as a social phenomenon and presented thematic areas of general Sociology and issues that are sociological. The research highlights key challenges as problematic areas for examination and consideration was made around justifying the approach and research design scaffolding the architecture for the study. Broader objectives were formulated and broken down to specific to enable the researcher achieve the most appropriate result. Key terms such as; social distancing, modernism, modernity, postmodernism, post modernities, social PEN Protonous (+P+), positive social value social PEN electroneous (E-) social value are defined and operationalized and provide sociological perspective to 'social distancing' while this research debunks the terms 'physical distance' as it lacks social niche in this endeavour and imperatives of social grouping in designated high risks societies and difficulties of community members to adhere to the COVID-19 guidelines and nonchalant attitude of not deploying face masks and other personal protective equipment gear (PPEG) to confirm social distancing as the most rightful term to support precautionary measures against COVID-19 pandemic.

The sources of data are published literature and journal articles, lecture series, while some are unpublished content. While making comparative study of credible metamarratives built around electronic materials and information shared from credible sources from within African and abroad. They depict caricature of the epidemic called Corona virus as typical characteristics of postmodern society occasioned by COVID-19 pandemic. The researcher sorted and acted upon informed consent and anonymity of the study populations while bearing in mind issues around ethical value consideration and confidentiality as some sources of data are coded anonymous to protect the source of data.

IX. THEORETICAL FRAME WORK: THE SOCIAL PEN THEORY OF STRUCTURAL CHANGE

The research employs the following theories to make the framework as an integrated one to better analyze the social elements related to COVID-19 pandemic and to explore thematic areas in sociology as sociology of COVID-19 thus:

(I) Social PEN Theory of Structural Change: 'The New Normal' and beyond. The whole process of bringing back the lost glory and recovery from pandemic is facilitated by the social PEN energy of (+n) and man's activities as support in achieving desired result in the subsequent phases of our existence. The blossoming nature of the dreaded, hydra-headed monster called COVID-19 (Corona virus) in January, 2020 appeared to many around the world just like a tsunami. What we call COVID-19 or if you like Corona Virus has created (and is still creating) tremendous fear in the minds of many around the globe. Primary quantitative data on infected cases and death associated with COVID-19 as evidence reveals that, most deaths from COVID-19 are somewhat, due to lingering bad health conditions and crisis around inadequate health facilities, deteriorated and poor health systems to support the fight against COVID-19 pandemic.Dr. Mustapha Bintube (2020); The Social Atomic PEN Structural Theory of Change' International Journal of Scientific and Research Publication Doi: http://dx.Doi.org/10.29322/IJSRP.

(II) Social Evolutionism: is pioneered by Charles Darwin and Herbert Spencer and (S. Graham, 1957) notes that Park and Becker talk about sacred and secular societies, which also describes evolution from end to end. Sweedlum et al, 1956 further notes the organic transition and/or evolution of phenomena, as Redfield uses the terms ‘folk society’ and ‘urban society’ Similarly, Boko Haram as a social phenomenon also evolved from its simpler stage to a more complex one which can be described as; ‘Geo-mechanistic-jihadist’ periodic attackers to ‘Geo-organistic-jihadist’ periodic attackers. Similarly, society evolves from PEN Lone pathological to PEN molecular, PEN elementary, PEN composites and to a more organic PEN indivisible stage. (M. Bintube, 2015, 2015, European American Journal of Sociology and Anthropology Research eajsar). (Auguste Comte, 1986; Darwin, C. 1859); Auguste Comte; 1986).

(III) Postmodernism as a philosophy. Consequently, Sociology of COVID-19 examines the complex and dynamic structures of post modernism as a philosophy which provides a leeway for the change in phases in human evolution guided by the norms, basic principles, scientific and mundane cultural orientation and standards to define. (Lyotard Francois, L 1884; Anthony Glidden, 1990)

(IV) Ecological theory to explain man's social and physical environment affected by the pandemic were utilized to show theoretical nexus or links with COVID-19 pandemic and structural change. More so, what informed the used of an integrated theory is the fact that, no one theory is adequate to comprehensively explain or enable prediction and/or description of all elements of a phenomenon as COVID-19 pandemic as social reality, dynamic as is it still evolving for the consolidation of the 'The New Normal' and beyond postmodernism. (S.O. Smah;2013)

The theoretical framework to support this research is 'The Social PEN Theory of Structural Change' which advocates the need to configure the PEN components for rapid change to take place. That is crucial to cope with the future challenges and it is necessary social condition for change to happen and as well adaptation to the environment of 'The New Normal'. COVID-19 has changed the behaviour, attitude and knowledge of the individual members of the society. To contain the challenges of the post COVID-19 World, 'The new Normal', the social PEN theory of change is telling us that, what has happened during the pandemic has left a monumental history in our entire life time and to attain normalcy for social greatness, societies are to focus on, and should get three things done to contain the dynamics associated with postmodernism and that has to take place simultaneously to contain the complexes of 'The New Normal' and beyond.

COVID-19 is a brakeless train, a sure transit to globalization and beyond postmodernism while erasing borders and collapsing human activities, making individual members of the society socially as PEN invisible around major roads and deserted streets, lonely and empty trunk A, B and C roads. Its control requires perfect invigoration of the social PEN fundamentals P+, E- and N for balancing and calibration for change, hopefully for better tomorrow for us and generation yet, unborn. The social PEN theory typically holds that individual members of the society carry social PEN energies (+n) within them which make it possible for
them to attract one another and such attractions also enables transmission of COVID-19 as an invisible social phenomenon through social interaction, especially in our today's world of high technological penetrations dominated by COVID-19 pandemic. Man is reacting and counter reacting consciously or subconsciously to social PEN invisible disease called COVID-19 with enormous capacity to bring about structural change and man's life is dominated by technologies and COVID-19 is everywhere in man's very social milieu to inform change in behaviour due to social PEN energies of (+n) as COVID-19 has changed the entire social relations and interactions, especially for social distancing and his very social milieu dominated by IT facilities that are preponderated in cities, urban, semi and suburban areas disturbed by CO-VID19 pandemic. The impact of such IT facilities on man's behaviour, coupled with the fear of being infected with COVID-19, has affected his relationships with other members as well as his decision may inform further actions or inactions that may affect his relationship with groups and others in the society. The relationship of man to his ecosystem has social PEN invisible fundamentals which are significantly linked to his existence as human and the impact of COVID-19 is high and socially alarming and immeasurable to cause change in all spheres of his existence as individual member of the society. These dynamics may bring about relative change in structures of relations around him with (P+E- and N) capacity for further change and development of mankind. The social PEN structural theory of change argues that, the combustion from heavy duty machines releases socially PEN invisible charges, the likes of COVID-19 and man's social environment is dominated by all sorts of charges, but they are invisible in the atmosphere which calls for the use of facemasks as mitigating solutions overcoming invisibility of the most dangerously high COVID-19 ravaging the society with consequential effect on our everyday activities as human with capacity to change in our attitude, thinking and behaviour. Dr. Mustapha Bintube (2020); The Social Atomic PEN Structural Theory of Change' International Journal of Scientific and Research Publication Doi: ttp://dx.Doi.org/10.29322/IJSRP.10.07.2020.p10353.

They are also effects of vibration of waves, telecommunications equipment and installation such as 4G and 5G as man's creation which have relationship with human activities in the society. All these combine to have social PEN invisible forces for structural change with effects on individual social life in the society, same as the COVID-19 that is socially PEN invisible. It is real in its social PEN indivisibility and the dynamics between man's social activities and IT driven facilities, installation and equipment, developed to improve humanity have the potency of producing charges which bring about change and such socially PEN invisibles forces of (+n).

For instance, from mast signals, radio waves and similar frequencies and radioactive dissonance and mobile networks that are socially PEN invisible which change the behaviour of man with impacts are everywhere and significantly correlated with social, economic and political life of man for social change to bring about transformations in all spheres of man's life, that has the pedestal to spring the society to usher in post COVID-19 human world.

This scenario affects man's social ecology and the social PEN structural theory of change holds the belief that by extension, influence to bring about structural change as well as change in human cells which affects and by implication modify our behaviour and relationship of man with other individual members of the society, be it positively (+) or negatively (-). In that case, the social PEN structure is the vehicle which drives the society forward and a leeway into post COVID-19 world. It can be described as the force which enables change in the society and institutions for social progress of man and his society, in some instances.

To have an all-encompassing understanding of structural change, individual members of the society are not only to know the social PEN structures, but should also establish the strength of the (+n) to enable the direction of the society to discover social facts such as COVID-19 and the mitigating precautionary measures of being safe and as civic duty to safe others from being infected of COVID-19. The direction of any existing social phenomenon can be understood employing the social PEN structural theory of change for better tomorrow in the world dominated by invisible forces established to bring about transformation of individual life in the society. Success and result dealing with COVID-19 is a matter of a conscious effort reinvigorating the social PEN fundamentals for change and as well to overcome the invisible forces which exist in our very social existence within the ecosystem.

The theory argues that society must configure the social PEN elements, reinvigorate and entrench same to calibrate structural issues associated with COVID-19 pandemic and that must play role equivalent and simultaneously so for balancing elements hitherto a clog in the wheels of advancement of the human society that was holding back the society from ending Corona virus through human social actions and to achieve structural change for a post COVID-19 world characterized by postmodernism; a society of human with tremendous social, economic and political opportunities, but only through instantaneous power of information technology (IT).

**Thematic Applied Sociology of the Pandemic: Theoretical and Empirical Review, analysis and Discussion of Critical Sociological Issues**

This section presents analysis and discussion of thematic areas in general Sociology as it concern COVID-19 pandemic, critical issues and antecedent that are historically located, politically potent, economically relevant and socially significant in relations to COVID-19 pandemic. However, discussion of major and minor findings; theoretical and empirical would be presented at the end of analysis of data on social impact and changes that may be likely experienced in post COVID-19 pandemic and the dynamics into 'The New Normal' and beyond postmodernism to confirm Comtean scientific stage in the development of society and the thematic areas are presented below:

**Sociology of COVID-19: Precautionary Measure**

Sociology of COVID-19 is there to tell us the finding from the survey, literature and empirical data on the perception of the cross section of the society as respondents in relation to COVID-19 pandemic, their attitude, behaviour relations to change structures, social relationships and general impact of COVID-19 on the society and how influential the power behind COVID-19 to change the behavior of individuals at the community levels and by extension propensity of narratives and counter and narratives build around COVID-19 pandemic.

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First and foremost, in the absence of drug and vaccine, the conventional precautionary measures against COVID-19 pandemic are individuals mindset and human consciousness to be on the alert against the ills of COVID-19 pandemic, self isolation and avoidance of crowds and social gathering. Above all, adherent to the WHO guidelines and CDC advisory and protocol against COVID-19 pandemics is uncompromisingly sacrosanct.

For me, COVID-19 is beyond what it means to other people. The pandemic is different thing to different people, hence it is a relative phenomenon which requires conventional scientific and uncontradictory as vaccine and drugs for complete healing than the fishing expedition and traditional approach lacking in methodological imperatives in terms of perception, knowledge, attitude, behaviour and practice of diversities around COVID-19, its prevention, control and mitigating precautionary measures. The fact that the virus is there is even an underestimation. It is there 'live and direct'. The virus may disappear overtime but its impact and effects may be permanent and can cause enormous shift and monumental structural change of unimaginable magnitude around the world in social, economic, political and educational structures and institutions of human existence.

COVID-19 is a huge burden on the society, which requires step-by-step approach and conventional measures dealing with it scientific; medical to calm the virus and sociological for the examination of the effects on the society for development. That also requires better understanding of specific issues and professionalism dealing with human beings and it also requires having adequate knowledge about the people; through case study for knowing their medical history, anthropological to more of their culture and sociological for better understand of their society, communities and way of life of those whose lives should be protected against the harms of COVID-19.

Some of the precautionary measures as, among other things include; hygiene and personal protective gear; as the use of facemasks, individual self discipline to desist from unnecessarily torching of eyes, nose or mouth with bear hands, frequent use of alcohol-base hand sanitizer, encourage and periodic wash of hands for at least 20 seconds under a running tap is to be promoted to guards against COVID-19 pandemic. Others are social distancing from crowds, group/collective behaviour is banned, avoidance of handshake; instead, encourage elbow greeting, cover mouth and nose with the help of elbow while sneezing or under severe or whooping cough to discourage dispersion of the droplets, especially when having flu and maintain at least 6ft physical distancing while in an active face-to-face conversation. (Dr. Anthony Faucci);(Dr. T.S. Chandrasekar, Dr. K.R. Yogesh; 2020). It is also, advised that, people should avoid unnecessary licking lips with tongue to reduce vulnerability and should cultivate the habit of dislodging and/or disembarking cloths used as they return home from work and as well avoid touching objects from around their houses as they arrive immediately, until after regular bath and soaking of cloths into a detergent water and thoroughly wash hand disposed before settling down at home. It is also believed that touching any object around as one returns from outside the house may leave the virus in suspense and COVID-19 has the capacity and potential to live in suspense for at least about 9 hours.(Dr. Anthony Faucci);(Dr. T.S. Chandrasekar, Dr. K.R. Yogesh; 2020). However, there are pieces of advises from experts and medical practitioners from around the world. Dr. T.S. Chandrasekhar and Dr. K. Raja Yogesh jointly in their article entitled "COVID-19's Guts Connections" pointed out that, in addition to the global best practice and advisory from the WHO and CDC, precautionary measures against COVID-19 pandemic, they emphasized on a 'healthy Toilet Hygiene' and confirmed to us that, COVID-19 also, affects Gastrointestinal tract too. COVID-19 they further noted presents symptoms as difficulty in breathing. In their analysis they noted that about 50% of COVID-19 patients present predominant digestive symptoms as their primary complain with symptoms such as lack of appetite and respiratory complains. (Dr. T.S. Chandrasekar, Dr. K.R. Yogesh; 2020).

They further added that, apart from nasal and respiratory secretions, COVID-19 is also actively and shed in the stools of infected patients and advised that, toilet should properly be closed before flushing to avoid bio-aerosols and avoidance of lavatory use immediately after usage by a person of unknown status of COVID-19. A healthier, positive attitude toward convenience with some degree of consciousness, they added, may help break the chain of the infection.

Furthermore, there are also instances of people using an integrated traditional non-orthodox, non-conventional approach as opposed to the orthodox drugs and vaccine in the fight against COVID-19 as precautionary measures of averting the infection. For examples, some advised on traditional non orthodox cure in relation to respiratory nasal congestions vis-à-vis mucus formation, dissolution and passage to the stomach by use of hot liquids gargling to flush the airways down to the stomach with hot liquids. COVID-19 has the capacity of deposition of mucus in the throat to disrupt air flow in airwaves and to the lung and the nasal chamber, thereby suffocating the victim to death and further added that, that is the more reason for the use of ventilator to force oxygen into the victim's lung to sustain the life of the COVID-19 patient. Some also, advised that, among other precautionary measures against COVID-19 is the use of Victim-C, Chloroquine and citrus fruits to enhance immune system and the use of onions they also, claimed help disinfect the bio-system and the ecosystem and as well help decongest the lungs. Similarly, effort to neutralize deposition of mucus in the throat also help save the victim and frequent drinking of hot liquids gargling to flush the airways with turmeric and moringa leaves in hot salt water help reduce the intensity of the infection in human body.

They argue, hot water dissolves the thickness as well as change the viscosity of the mucous in the lungs thereby improving breathing of the victim. Oftentimes, gargling hot liquids with some little force may be of help to dissolve the mucous and change the activity of the infection in human body to clear the airwaves for an improved breathing of oxygen.

For an overall safety and improved precautionary measures against COVID-19 pandemic, the government, as an action system, has to take the burden of supplies and distribution of free facemasks, alcohol base hand sanitizers and enlightenment campaign at the grassroots level and community sensitization on the dangers of COVID-19 pandemic as well as on general bio-safety in the war against COVID-19 pandemic.

To achieve an all encompassing approach to stamp out the scourge of COVID-19 then, there is the need for better understanding of, and having deeper knowledge about specific agency, knowledge about the clients (COVID-19 patients) both symptomatic as well as...
Sociology of Covid-19: Government Official Briefings, Centre for Disease Control (CDC) Taskforce and the Role of Mass Media

The media briefing by the Presidential Taskforce (PTF) is spectacular detailing questions and answers session with the journalists from all angles that affect COVID-19 pandemic. As COVID-19 escalates in Wuhan China, to the level of pandemic, the media all over the world, both New and Masss, became agog with COVID-19 influenza. Consequent upon that, Sociology of COVID-19 is interested in the social impact of the pandemic and it’s contractions through social interactions among community members.

Effective communication is important if not necessary and from all indications and by all parameters, the level of enlightenment at the community level requires certain degree of improvement to reduce vulnerability among members of the society. To properly deal with the situation, governments across all levels need to purchase a wheel portal-cabin community viewing centres and make designation of at least, two stations at strategic points in each community to reinvigorate on enlightenment to enable members of various communities to have access to government information and official media briefing as some times power failures and blackout may hardly allow for chain of communication and the good work of the PTF to trickle down communities and citizen get informed for awareness of government determination, will and onerous effort to stamp out COVID-19 pandemic. (Presidential Task Force; PTF Watch, 1020)

The need for the government to improve on cooperation and enhance relationship with the media is very important as must radio and TV stations nowadays are privately owned and focus more on commercial activities for coverage to enhance IGR than carrying public issues on their programming and the need to bridge people with the government activities for democratization, good governance and success going forward dealing with COVID-19 pandemic. That should be done not only in fragile societies around the world but it also has to includes, the most developed nations.

From all indications, one can only get infected of COVID-19 and/or Corona virus through social interactions, hence the need for social distancing and media activities such as jingle, adverts and the need to provide an applied sociological perspective for critical analysis of the xenophobic pandemic in thematic areas of interest to sociologist and beyond that, other branches of Sociology and by extension other courses in humanities that may appreciate a somewhat standard view of the pandemic vis-à-vis government efforts and media activities to calm down the situation. Sociology of COVID-19 establishes sociological nexus between COVID-19 and its impact on social structures and institutions such as family systems and how it impacts social relationship among human race in diversity for lockdown and distancing measures. (Presidential Tasks Force; PTF Watch, 1020)

And, there should be effective and uninterrupted communication between government official such as the CDC, PTF, the media and police, community leadership and members to report any emergency case and breakouts at community levels for proper indexing of Corona patients and cases to enhance national health planning and as well report violation of COVID-19 guidelines, law and order enacted for the control of the epidemic which is crucial and that would improve data for planning to overcome COVID-19 pandemic in our communities and by implications enhance the work and enable the PTF to achieve it’s terms of reference as they always work round the clock tirelessly to actualise their mandates and therefore, citizens support is crucial and sacrosant in that regards.

The determination of any government to end COVID-19 pandemic largely depends on the level of liaison, engagement and cooperation with the media for public enlightenment, sensitization, mass mobilization and community leaders and members participation and inputs, especially individual members of the society who live at the epicenter where the virus is ravaging. And, the initiatives of the government to closely work and as well seek for the support of private sector participation on PPP especially, the network providers GSM mobile companies for constant and instant messaging, the activation of citizen's mobile phones with toll free help lines and free data for the period of the pandemic would go a long way to allow message sharing and promotion of fight against COVID-19 pandemic.

X. Sociology of COVID-19: Trunk A, B and C Roads, Community and Neighborhood

COVID-19 has pushed almost everybody off the roads. Major roads, inter and intra city roads, bypass and express ways are all empty at the peak of the pandemic for the enforcement of lockdown order and compliance by residents. This has been commendable coupled with the fear around Corona virus pandemic. A chance to pEEP into the major ways to obtain data for this research reveals that, the law enforcements officials, especially the police and members of the task force (PTF) and checkpoint mounted almost at every 500 metres as one drives along those roads with serious checks, identification and reasons to the satisfaction of the law enforcement officials.

The only socially visible vehicles on the road were those of the taskforce and perhaps, those who convey food items for palliative and countryside small market serendipity centre to serve the city with perishables goods and food items such as vegetables to cushion the hardship of those under lockdown as three days were set aside as market days in a week. Major roads that were ideally busy with traffic jam causing serious delays in mobility with high frequency of accident suddenly turned to ghost roads as if humans never existed or drove on those roads before, especially around Abuja the Federal Capital city of Nigeria. The area councils are also compliant to the guidelines, disciplined to observe same. The taskforce is really working and operations commendable as nothing can be found in all the trunks A, B and C inter and intra city roads. (An AIT Exclusive; 2020); (Financial Times; May, 2020); (O. Peterson, K. 2020); (Heraclitus of Ephesesus; 2020).

XI. Sociology of COVID-19: Crime and Deviant Behaviour, Mobile Court and Enforcement Task Force

Sociology of COVID-19 is an analysis of the dynamic criminological issues happening; events, scenario and narratives formed around law making and orders imposed for the control of excesses of human on lockdown and during COVID-19 pandemic,
the conflict situation arising thereof and adherence to guidelines and principle governing COVID-19 pandemic. Many take advantage of the ills of COVID-19 to perpetuate and entrench crime and criminality, especially at the community level with high pilfering and ransacking citizens on lockdown and in some instances clash with the enforcement officials. The sociology of COVID-19 is there to give us an insight on criminologist’s sense, researches and models on prevention and its control. It is to provide integrated, diverse and contemporary approaches and perspectives that are tenable, home supported and home-enabled for each state, its peculiarities in terms of geography, people and cultural influence to differ in attempt at ending COVID-19 pandemic from around the world for better tomorrow. Sa’ad, Mohammed Ibrhami and Sam Smah need to be appreciated for their huge criminological sense and compass going forward dealing with COVID-19 pandemic from the prism of criminology as a science for crime prevention and its control. (H. Kankiya, 2014; S.O. Smah, 2013),(prof. Sa’ad; M. Ibrahim, 1998, 2010).

Again, some people do not have any ill motive or deliberate intention of violating the laws and guidelines during the pandemic, but end up being trapped by circumstances beyond their control. They got arrested and convicted as violators while others deliberately, go out during the curfews and lockdown imposed to test the resolve of government. Corollary to the above, such kind of persons can easily be called as COVID-19 pathological disobedient and non-conformist individuals in the society for their excessive entrenched anti-social behaviour of roaming around the streets and major roads, getting others infected of Corona virus, especially during lockdown and at the expense of the law abiding citizen.

Sociology of COVID-19, examining such situation also requires theoretical understanding of the basics and conflict situation with empirical evidence and data for analysis of contemporary happening, issues and event in relations to the violation of law and order in the society during the lockdown for COVID-19 pandemic and beyond. Sociology of COVID-19, also deals with the social and psychological determinants for the commission of crime and various methods of apprehension and punishment of individual offenders, the social reforms that will allow orders made for the containment of COVID-19 pandemic to flourish and to achieve the purpose.

Sociology of COVID-19 is reminding us that, government measures to end COVID-19 pandemic should be more civil than criminal approach to deal with the pandemic. Therefore, the strategies should be localized to cover more of community effort and deploy more power to the base of the community for the residents to own it and as well cooperate to work with the government officials to achieve success going forward dealing with issues around COVID-19 pandemic especially, at the time of curfew and lockdown.

COVID-19 pandemic and its dynamic structures call for an immediate remedy, homegrown and home supported as solution to nip the criminality in the bud before blossoming to a proportion and magnitude that may require more and more proteanous p+capital and electronic E- resource component of the social PEN theory for solution.

Therefore, the need for policy formulation, implantation and law enforcement in the short while is required pending productions of vaccine and drugs to contain the quagmire and that help enhance law and order and as well enforcement guidelines for COVID-19 pandemic. Sociology of COVID-19, interrogates change in aggressive behaviour and attitude; manifest and latent motives of the individuals of harming fellow humans in lockdown. There are cases of burglary and theft, domestic violence and unrest in some communities by group of youths who hitherto were engaged either as taxi drivers, motorcycle or tricycle riders and daily paid jobs are today stranded for social grouping and physical distancing measures and were thrown out of their jobs and as remedy of last resort for livelihood engaged in law breaking.

However, the police are extremely, doing well to maintain law and order and to provide security for citizens as they contain such excesses on almost daily basis. At least, not less than 900 persons were convicted by the mobile court at the height of COVID-19 pandemic for violation of lockdown order. Control of a phenomenon like COVID-19 pandemic, requires a distinct approach from the conventional one in dealing with crime and criminality prevention and its control as a new way of tackling the pandemic.

The fight against COVID-19 can only be won if the government is ready to win the hearts and the minds of the citizens by providing enough palliative to ameliorate their suffering with enhanced trust and create confidence for total elimination of COVID-19 pandemic from the society.

The law enforcement must be polite, friendly as always in Africa and not necessarily, being coercive. Most members of the society are being coerced and instilled with fear through the mass media as some of the threat and punishment shouldn't be seen as solution, but rather a friendly and humane approach to deal with the pandemic. But, if severe punishments are considered with force, then it means that the laws and orders for COVID-19 is abinitio a failed assignment. (H. Kankiya, 2014; S.O. Smah, 2013),( M. Ibrahim, 1998).

Those who comply to the government actions laws and orders do so for they exemplify good citizens with self respect and enormous responsibility for ending the COVID-19 pandemic, through improved bio-safety while observing almost all the precautionary measures including the stays at-home during the lockdown for COVID-19 pandemic as well as have tremendous self respect not to be addressed as violators, deviants or ex-convict for breaking the laws in their life time.

While the other set or classification is that of people who may react badly, even violently for punishment meted out on them for contravening the laws and order while undermining government actions set out for the control of COVID-19 pandemic and therefore, may even be worse to further caused problem around arrest because they get even more violent to escalate and create numerous scenarios as it is evident, especially when subjected and punished for the violations of law and order for COVID-19. Therefore, sociology of COVID-19 emphasizes such people should be handled professionally and there should be more policy issues and principles in handling them to conform to the law and order for the control of COVID-19 pandemic.

The peace, happiness and livelihood of the community members under the lockdown for COVID-19 pandemic is crucial and their survival as citizens is mandatory as guaranteed by the constitution. Therefore, any effort that has taken the hope of the masses on
lockdown into accounts to fight COVID-19 stands to win Corona virus pandemic. Community members must be at the centre of the fight against COVID-19 and voluntarism at different levels of community is sacrosanct and fundamental for individual’s safety and protection of their properties on lockdown and beyond to make perfect the struggle to end the pandemic and achieving success going forward in the war again COVID-19 pandemic and beyond.

There are challenges dealing with community members during COVID-19 pandemic; some abide by the rules while others go on the contrary. That may be influenced by a number of factors; some are environmental while others are socio-economic and cultural forces as the main driver for the commission of crime and violation of law and order during the sit-at-home for COVID-19 pandemic. The attitude of the citizens toward COVID-19 is not encouraging at all and their knowledge of corona virus seems to be dim while faced with glaring poverty, hunger, diseases and starvation due to lockdown. They are falling sick by day for COVID-19 and some are dying. The hospitals are also deserted and lacking in the most appropriate equipment and health facilities to handle corona cases. Such a situation calls for an immediate intervention and calibration of approach for change in strategies and improved palliatives to deal with the situation under COVID-19 pandemic. The social organisation around the law and its enforcement is also another issue to take into account to deal with COVID-19 pandemic as members of the society are forced to suddenly, comply with such laws overnight without sufficient notice and provisions for alternatives, options and gradual adaptation to the new way of life brought about by COVID-19 pandemic require some time for general shift in behaviour.

In the month of April, 2020 more than 900 offenders were charged and convicted for various offences related to COVID-19 guidelines ranging from not wearing face mask, social gathering and street roaming among other offences stated within the purview of the terms of reference of the TPF. Some offenders were fined while others subjected to community service and the most suspected ones with mild symptoms or asymptomatic were asked to observe mandatory 14 days of isolation and quarantine, test and repeated test to ensure they are safe and by extension the community in which they live before reintegration.

Sociology of Covid-19: A Clarion Call To Defeat The Pandemic as Global Emergency and Leadership Response

When Corona virus exponentially escalated as a global emergency, there were spontaneous and rapid global responses among leaders of various nations of the world to contain it. The fight against COVID-19 as an emergency situation has received eminent political will. Global leadership co-operation in dealing with COVID-19 is commendable for its promptness and alignment with the United Nations goals and World Health Organization (WHO) guidelines and Centre for Disease Control (CDC) as common front of onerous spirit of camaraderie has been demonstrated in no small measures by the leaders across the globe and the front liners,(WHO Centre for Disease Control; 2020); (Presidential Tasks Force; PTF); ( D.Kieghe; 2020 ); (Financial Times, Yoval Noah; 2020).

The escalation of COVID-19 has witnessed an unrelenting and unresolved commitment of leaders all over the world with enthusiasm, zeal and determination of the leaders and governments at various levels to consciously and collectively gear up to defeat the pandemic as a global emergency. Corollary to the meta-narratives built around Corona virus, the phenomenon has put many leaders around the world on their toes to nip the virus in the bud to contain the emergency situation. (S. Probst; N. Carrington; A.A. Howat; 2020)(Financial Times, Yoval Noah; 2020)(World Economic Forum: Insight Report; 2020).

Similarly, for an overwhelming solution, measures were taken by the leaders and infrastructures were put in place, health system enhanced and awareness around public health has been improved at different levels and the leaders have supported the war against COVID-19 as an emergency situation with special budgetary expenditure for containment and primary healthcare system has been rejuvenated. On the other hand, public health commentators are exhaustively creating awareness on social media, through cell phones and other ways to calm down frayed nerves generated by Corona virus. While scholars of various disciplines, diplomats, philanthropist, bureaucrats, media men, technocrats and representatives of all sectors of the society were seen busy and engaged in talks at all levels of leadership while doing their very best to suppress the tension generated by the escalation of COVID-19 and never desire to rest until Corona virus killer pandemic is contained as an emergency situation. (S. Probst; N. Carrington; A.A. Howat; 2020)(Financial Times, Yoval Noah; 2020)(World Economic Forum: Insight Report; 2020).

Leaders of various nations are taking bold steps ramping up testing making concerted efforts around case identification and isolation with pathways for contact tracing all are possible with the power and authority established and sustained through leadership. For example, the USA under the leadership of Donald Trump has appropriated 113 billion (one hundred and thirteen billion dollars) to achieve testing and at least 1.9 million of her citizens have been tested in the second week of May, 2020 through hospital and community testing programmes. There were complexes which border the leadership, especially that of the USA for human traffic congestion and difficulties around contact tracing are seen as herculean tasks in overcoming Corona virus. And, the Rockefeller foundation has since presented guidelines on phased reopening plan of about 48 states of the USA in the third week of May, 2020 as phased modifying measures with tremendous safety around bio safety were reinvigorated for safety and security of the US citizens.(Presidential Tasks Force; PTF); ( D.Kieghe; 2020 ); (Financial Times, Yoval Noah; 2020).

Corona virus has come with its enormous threats which call for leadership response to better our existence as human. The virus is rapidly spreading, so to speak, to wreck further havoc. Therefore, the leaders must take bold steps of ending it and that should be done immediately to rescue humanity. COVID-19 at its peak, has engaged attention of diverse leaders around the world and backstroke scholars of various disciplines; all these seek for solution. Corona virus has created nightmare, it has injected unnecessary cognitive dissonance, inflicted pains, unhappiness and anger, which must be tackled and dealt with squarely to restore hope, solve personal and by extension social problems peculiar to their existence as human. All these can be achieved through good leadership, strong political will and timely delivery to contain the pandemic.

To achieve that, we require credible and responsible leadership to make an approach that is more of humanistic dealing with the public to desist from breaking the laws made to contain COVID-19 pandemic. Therefore, any approach rolled out should be home-
supported and home-enabled for such laws and policies to work and as well make impactful result. It has to be in a manner more civil and result-oriented than strategies for conventional crime prevention and control. Ending COVID-19 pandemic in the society may seem to be like putting a round peg in a square hole; the approach must reflect the physical environment, culture, behaviour and tradition of the people for whom such laws were made to handle and dealt with COVID-19 pandemic.

The war against COVID-19 pandemic must be a collective effort of the citizens to support the leadership; government and community must support and work hand in hand and in harmonious manner in the struggle to defeat COVID-19 pandemic. Credibility, accountability and accurate reporting of COVID-19 cases and violation of order is important for planning dealing with palliative and deployment of the most appropriate measures as solution is necessary ending COVID-19 epidemic from around the world.

Community leaders and stakeholders at community level should be constituted or swap existing committees, assign role, mandate and terms of reference to handle COVID-19 issues as short term and mitigating measures before discovery and production of vaccine and drugs to contain the pandemic.

Albeit, it is palpable and glaring that leaders of various nations are taking institutional measures to curtail the xenophobic (or is it quagmirc Covid-19) to its knees, it is the general believe of the critic’s that, after the Corona virus scenario, economies and markets of the fragile nations would be in shamble, inequality gap will increase and there would be mass death of fearful members of the family, suicide rates would shoot up, anxiety, depression, burnout for cognitive overload would be high in many societies and social inclusion would be enhanced. Women would have more power, their rights and privileges would be ensured to the credit of feminism. In addition, human trafficking connection is on the increase and about 40,000 persons from China and Asia roam in May 2020 and they have to be subjected to observe mandatory 14 days minimum quarantine period and must be tested to confirm status for COVID-19 to access social mobility. (Presidential Tasks Force; PTF); (D. Kieghe; 2020).

**Sociology of Covid-19: Medical, Gerontology, Facilities and Isolation Centres**

The notion behind Sociology of COVID-19 is that societies with weaker health system have higher vulnerabilities around public health, sanitation and hygiene and are said to have the higher chance of being infected by an individual carrier of the virus. Nonetheless, the stronger nations are no exception to the devastation of COVID-19.(WHO Centre for Disease Control; 2020); (Presidential Tasks Force; PTF); (D. Kieghe; 2020).

In fact, its implications on demographic characteristics of community seeking for better health and health practitioners is rather high as many around the world are being infected, some with mental health issues and distress for cognitive overloaded and burnouts, irrespective of their gender, education, age, income and profession. Sociology of COVID-19 is telling us that the pandemic has implications around corona virus patient's health, behaviour, environment, attitude and that of the practitioners.

There are key issues which concern sociologist dealing with the health aspect of the pandemic ranging from; knowledge about specific agencies in relations to confirmed cases, knowledge about specific patient of corona virus as client and knowledge about specific contract i.e. between corona patient and the health workers. Aside this, there is the need to have adequate understanding of the patient's value system for accepting him for who he is without necessarily looking at his status and to avoid stigmatization of the person with COVID-19.

The global health crisis caused by Corona virus has provoked universal discourse while causing disruption around local, national and international travels for accessible world class health facilities and medical health to support mental, emotional and psychosocial needs of the health seekers and patients with special cases to get health services at the peak of the pandemic and trained health experts and professional together with health and supply value chains have been disrupted thereby reducing -medical tourism around the world.

The social PEN theory typically holds that, humans are faced with enormous problems around socio-economic and political issues which generate enormous consequential effects, especially at the time of COVID-19 lockdown. For instance, social-health related cases as Corona virus pandemic would have been controlled before they escalate. Those structures are at their social PEN invisible stage because we can hardly notice as they will be at their Atomic stage of PEN invisibility and indivisibility. The theory of social PEN is telling us to check for those invisible structures that are highly Atomic in relation to health issues troubling members of the society. Those with health challenges are more likely to be consumed by Corona virus than able bodied men and those who strictly adhere to social distancing guidelines are likely to be safe. (Elizabeth K. R. 1969)

However, efforts are in top gear to defeat the COVID-19 epidemic as social/physical distancing as mitigating measures is difficult to be observed by the public apparently due to the very nature of human existence as social mobile and cohere for coexistence dominated by cultural PEN forces of (+n) to enable movement from one point to another. The social PEN theory is telling us that controlling Covid-19 to rescue society from being harmed and for improved health behaviour among members of the society, there should not only be E- (human resource capacity) and P+ (capital funding), but we also require the N as calibre to calibrate and further recalibrate the actions, attitude and activities of the agencies and authority concern while dealing with public health issues and fundamentals with honesty and transparency in leadership to end COVID-19 pandemic as global emergency to rescue humanity from the quagmire.

Hospitals requires infrastructural development and supplies as Personal Protective Equipments Gowns (PPEG) for the protection of health workers, Cardiac Monitor to support and monitor intermittent respiratory dynamics of Corona patients and alcohol based hand sanitizer and antiseptic for general sanitation and improved hygiene of the health workers. Thermometer Motorized to check and gauge temperature but most of these are lacking and COVID-19 is ravaging our communities and those hospitalized are left at the mercy of mushroom health systems even at that it has been overwhelmed due to the rapid contamination of the virus making members of the society vulnerable, especially those with underlying health conditions. (Dr. Anthony Fauci); (Dr. N. Alkali, 2020); Dr. Mustapha Bintube (2020); 'The Social Atomic PEN Structural Theory of Change' International Journal of Scientific and Research Publication Doi: ttp://dx.Doi.org/10.29322/IJSRP
Skilled workforce is also key in dealing with those with Corona virus. Specialized skill is required in dealing with them in addition to proper counseling by establishing therapeutics relationship to enhance psycho social support for hopeful recovery. Sociology of COVID-19 is also concerned with the social aspects of the Corona patient’s illness and general attitude toward COVID-19. ( Dr. N. Alkali, 2020); ( K. Dr. Kepala, Dr. PP Devan; 2020).

The distribution of the confirmed cases, dead and discharged of COVID-19 patients, and the relationship of COVID-19 patients and isolation centres and the health workers in the hospitals and their social role i.e., patient, nurses, doctors, welfares officials and social workers’ roles and their relationship with one another and that of the victim of COVID-19 greatly concern medical sociologist for change and improved health of individual members of the society. (Dr. Anthony Fauci); ( K. Dr. Kepala, Dr. PP Devan; 2020);

The role of institutions in relations to the aged referred to isolation centres, structures and facilities for referral are essential in fighting the scourg of the pandemic. Dealing with the pandemic requires an enhanced public health strategies for its isolation, and contact tracing that seem to be somewhat, difficult if not impossible, say in African countries with glaring lack of social demographic identifiers and deficit protoneous (P+) capital funding for managing and improving health services and electronous (E-) human resource capacity elements of social PEN theory for general change in the patients attitude toward health seeking and health behaviour for improved health.

The role of social workers and social welfare officials is emphasized for an enhanced health system and public health practice, especially in densely populated communities and fragile societies where its spread is rampant and social/physical distancing is a nightmare. This calls for a conscious action and alternative solutions that are sociological to mitigate its spread.

In recent times, a number of approaches have been taken to get rid of COVID-19 pandemic. The Oxford University, for example, has claimed to have discovered vaccine production as solutions for COVID-19 and it is still underway. Similarly, advanced nations such as USA, China, etc are working tirelessly to achieve this feat. ( D.Kiegh; 2020 ).

However, some African countries such as Madagascar and Nigeria have made an attempt to come up with solutions though organic liquor production and claimed to have what it takes to cure COVID-19 patients. The Madagascar cure for COVID-19 is made up of Neen leaves, Pawpaws leaves, Lime, Garlic, Ginger, Guavas leaves, Mango, boiled and taken three times a day as cure for the sick person and preventive measure for COVID-19. (Nmbuziseller; 2020)(R. Kafadia; 2020).

Still, there are ongoing effort to subdue the killer Corona virus pandemic which has backstroke individuals in the society with timely reflection on Elizabeth Qubler Rose 'Dead and dying', a social thought to remind us of stages of passing away and the frequency of death and dying from COVID-19 epidemic is at alarming proportion as it depletes human race on daily basis in postmodern society.

Again, Sociology of Covid-19 is a reminder of social PEN reinvigoration to overcome the pandemic by employing the PEN elements to bring about desired change dealing with health issues in relation to COVID-19 pandemic as we require the P+ (capital funding which is necessary and prime as well as integral components to define infrastructural support and procurement for improved healthcare facilities in the onerous tasks of dealing with COVID-19 as global emergency.

Most cases of hospitalization on referral were carelessly handled in some hospitals around the world not because they wish human to die, but it was glaring that there is palpable deficit around health system, hospital equipment and facilities that are necessary handling COVID-19 cases are lacking or in a way dilapidated which necessitate people passing away. The P+ and E- elements of the PEN theory are crucial and the role of the N is even more important as the calibre for balancing to ensure success in dealing with the pandemic henceforth for better healthcare delivery to rescue humanity and to ensure bio-safety and precautionary measures in badly affected communities around the world.

Dealing with COVID-19 requires equipped hospital with an Intensive Care Unit (ICU) as life support engine room and enough beds and getting to reduce the concentration and impact of the virus and oxygen cylinders/ plan for more oxygen as Corona virus reduce the rate at which oxygen gets in and out of the system as respiratory disease with mild, moderate and severe symptoms and its incubation period requires more days making it difficult to know carrier at face value. (World health Organization; Centre for Disease Control; 2020).

Albeit, Corona virus is more severe on those with underlying health conditions as persons who are with health fragility enabled by ecological influence and this is to the credit of (Burghes and Parks) and (Thresher and Shaw) Urbanism and it's zonation in relation to dead for COVID-19 pandemic and its consequential effects on human life which is tremendously social resounding the thoughts of (Bwala,1998) in Urbanism and those with terminal illness suffer the most from Covid-19 virus. (Nmbuziseller; 2020)(R. Kafadia; 2020).

The Corona virus pandemic is rather a nightmare so dangerous, sending people to their early graves. Whether the existence of the virus is true, social construct Peter L. Berger and Thomas Luckmann or the magic of reality Richard Dwarkins as some social and political commentators insinuate as a common sense of global magnitude, reminiscent of Maxwell Atkinson theorizing in phenomenology Alfred Schultz and Ethno-methodology, the sociology of Harold Gafinkel and Zimmermann, but the gist around COVID-19 has succeeded in building metamarrow around language game by authenticating its credibility for legitimacy of the claim for COVJD-19 pandemic and its existence as impactful and killing many around the world. (Jeremy Bentham; 1780); (Atkinson, A. 1978); ( P.L. Berger, Thomas Luckmann; 1967 ); ( Zimmerman, D.H and Wieder, D.L. 1971); ( R. Dawkins; 2011).

Consequent upon that, there are consistent, incisive lines of thoughts that are sociological to illuminate more for our understanding of postmodernism and its attendant ills such as dramatizing on corona virus by members of the public and that is reminiscent of interactionism, the sociology of George Herbert Mead and Williams I. Thomas, the 'Play stage' and the 'game stage' respectively. ( William I. thomas;1918-1920); ( Mead, G. H. 1934).

On the cure of COVID-19, some universities in African such as the Ahmadu Bello University (ABU), Zaria in Nigeria in conjunction with the Pharmacy Department of Medical Science has claimed to have discovered cure for COVID-19 in May, 2020.

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The University is also, said to have designed and developed an ICU ventilator and a 4-in-one automatic hand sanitizer in conjunction with the Equipment Maintenance and Development Centre of Mechanical Engineering of the University.

Similarly, the ABU, had later in April, 2020, advanced to also transform the ventilator into an ultra-modern portable E-vent automatic ventilator to be called ‘Respire-19’ as part of the University’s effort to augment the government of Nigeria in the war against COVID-19 as global emergency.

The cure for COVID-19, developed by the ABU, in Nigeria was claimed to have been developed from local plants that are available in different parts of the country. The team leader has promised the public that upon discovery of the medicine, the public would be informed of every step taken leading to its discovery. But, the proportion of different plants used in the production of the Anti-COVID-19 would be kept confidential as it serves as the intellectual property of the University.


Sociology of COVID-19 is to tell us more about life in urban and semi urban or city centres, country-sides, satellites and/or serendipity centres during COVID-19 lockdown and the behaviour and attitudes of the members of the society and the changes that have taken place due to social immobility. Sociological analysis of life in urban centres is to the credit of Louis Worth in the thesis ‘Urbanism is a way of life’ and same to Burgess and Parks in their theory of urban Zonation or the concentric zone model of Thresher and Shaw which has shared a large network of research with the former and expanded by the latter. (Burgess; Parks 1965).

However, the taxi and bus drivers who run around urban centres before COVID-19 pandemic and who on daily basis bring in the lower working class from the suburbs to help struggle and return them back on stipends are also stranded and their means of livelihood has been put on hold due to COVID-19 pandemic. Although, the congestion in the urban centres that has always been causing problem, fights and tension has drastically reduced at the peak of COVID-19, tension, conflict, frustration and domestic violence are rather increasing at family and community levels instead.

The life and social mobility in market places are never the same, but the attitude of the public is rather not encouraging as its apparently seen at variance with the guidelines and principles for those wearing face masks, for instance, they pulled it down, as if it’s a fashion thing or let’s do as they say way of wearing face mask. That happened mostly in suburbs where markets are not well organised. In the residential areas too, people mostly tend to forget and mingled with peers at some level of interaction and at later time they get conscious of the guidelines and tend to abide by it. There is also life in transitional zones which is relatively well spaced than the residential and market places and they may behave well provided they are enlightened to understand the consequences of COVID-19 pandemic. The industrial zones, as the name connotes, may probably be empty due to concentration of industries with little or no residences. The theories are telling us to understand severity in transmission understanding the complexes of each of these layers and as well help us understand the setting of the society in relation to policies on palliatives, enforcement, reinforcements and enlightenment campaign to help get rid of COVID-19 pandemic. (prof.M.H. Bwala, 1998).

Life in highly urbanized city centre is known to be expensive, largely due to the heterogeneous nature of the demographic fundamentals as the significant numbers or segment of the population are believed to have shared different norms and value system and are mostly workers in either government or private organisations and who are by their very profession socially mobile as opposed to the lower working class in the same society. COVID-19 has disrupted supply chains in most societies. The fact that humans exist as a system with independent and interdependent relationship for survival and coexistence, some members of the society and their entire survival largely depend on the degree of social mobility among those with sound economic base and COVID-19 has sealed the entire society at the expense of those within the lower strata and are dying or often times falling sick in both urban and semi-urban zones.

This is evidence when COVID-19 pandemic blossomed, especially on Sundays the life has always been low or Friday and life returns when the wage earners and employees return to their jobs to enable the lower working class and the traders to take advantage of such movement and then struggle around to make their livelihood. The recent development as a result of COVID-19 lockdown has seized and sealed the entire society and those at the lower stratum are dying of hunger and their immune system is getting lower by day due to lack of nutrition and proper diet to help sustain their system and to ensure good health and palliative are not forthcoming to supplement their condition as expected. Most communities have large population with weaker economic base, especially the low income earners in the urban centres. Life has been so tough and challenging for them. In Urban centres, everything is costly and life is money demanding and the rents are also high compared to the suburb, countryside’s and serendipity centres where casualty of COVID-19 is somehow higher than the city centres where enlightenment is high.

The spread of Corona virus at its peak was rampant, mostly in urban slums and fragile segment of the population and insecurity and social disorganisation is high in urban, semi urban suburb and serendipity centres. These have to be checked often by the taskforce on COVID-19 and enforcement official are to focus mostly on their safety and security of the general public. That helps in enforcement of COVID-19 laws and orders including social life in an urban slums and fragile communities where tendencies of transmission is rather high and frequency of violation of laws and orders, not only for COVID-19, but any other law is order of the day as the tenets of the concentric zone model suggests. Sociology of COVID-19 as guide to highlight and bring to fore the factors and social conditions which make it possible for people committing crime and deviant behaviour antithetic to COVID-19 order and the expectations of the generality which undermines the constituted authorities and laws on COVID-19 pandemic.(H. Kankiya, 2014; S.O. Smah, 2013),(M. Ibrahim, 1998).

People in the urban centres abide by the rules and they oftentimes are vigilant in maintaining social distancing and follow all the guidelines against COVID-19 and are therefore, relatively safe. A highly heterogeneous urbanized town where businesses are high and booming as ancient city centre are facing casualty and recording deaths due to lack of enlightenment at community level.
There are increased cases of juvenile delinquency, domestic violence at community and household levels and the cases of battery among spouse and child abuse during lockdown for COVID-19 pandemic. In some communities, it is rather palpable that mob actions and antisocial collective behaviour are entrenched by COVID-19 pathological disobedient non-conformist individuals while undermining law, order and powers of the government on control on COVID-19 guidelines. (Olu Ogunika, 1998); (Haralanbus and Holborn 2008); (Burgess and Parks 2019).

The most complex and heterogeneous city centres are apparently empty and the only one that is visible on the roads are cars or vehicles parked at the lots when the lockdown was at its peak in contrast to the low density and low intensity homogeneous towns and villages where there were movement and the implications of the transmissions was said to have been high and this is evident taking a glance at COVID-19 updated index cases and death, discharge charts.

Those at the bottom of the strata had faced serious trouble than those occupying higher position or whose labour were hired by either public or the private organisation and those who provide them services were stranded and lockdown hence the rate of COVID-19 pandemic and cases on daily basses and increased hunger, starvation is the order of the day. Some groups of youths staged mob actions against their own communities, ransacked and looted the general public, especially in highly commercialized city centres and the law enforcement was neutralizing their actions against government’s laws and orders. (S.O. Smah, 2013); (Olu Ogunika, 1998); (Haralanbus and Holborn 2008); (Burgess and Parks 2019).

A highly organised elite residential areas or environment seem to be complying with the law and order with minimal presence of people in the street during COVID-19 lockdown compared to slums and downtown neighborhood where people move around at will and some do not even believe the existence of COVID-19 and therefore, continued to spread the virus. It’s obvious that, the law enforcement efforts of the government may not cover the populations ensuring credible enforcement for lack of logistical support and population strength that should go round all the communities to ensure enforcement of COVID-19 order, discourage members and to ensure compliance.

Lack of education and enlightenment has contributed in no small measures to the violation of COVID-19 orders and a highly enlightened society obey the rules simply because, they understand the implications of breaking the order and therefore all their streets and major roads were empty and they also have enough means of sustenance than the poor masses who must go out on daily basis to get food on the table despite COVID-19 pandemic and more often than not trapped for being scapegoat during the lockdown for COVID-19 pandemic.

Some lower working class lack better understanding of what is happening and believe that COVID-19 is not a threat to them. Consequently they violate the rules set for the control of COVID-19. For them, hunger is even more damaging and more dangerous than Corona virus. In some remote communities, the people do not even know what COVID-19 is. In fact, they cannot even pronounce “Corona virus”, talk less of understanding the implications of their actions in undermining the law and order. (S.O. Smah, 2013); (Olu Ogunika, 1998); (Haralanbus and Holborn 2008); (Burgess and Parks 2019).


The social distancing as precautionary measures for bio-safety is apparently zero in most fragile societies. A fragile society is a weak society lacking in healthcare system with high vulnerabilities in almost all aspect of life and short supply of amenities with tremendous public health related issues and dominated by slums. While illuminating us on the features of fragile society, he pointed out, a fragile society, would be hit the most by COVID-19 as it lacks structural organisation with poor environmental sanitation all over.

The conditions of the local markets that are lacking in organisation are potent hub for the proliferation of Corona virus. The behaviour of members of fragile societies on food is another source of concern with diminishing power to run essential services and storage of food and drugs for preservation and water to promote hygiene and public health. A fragile society, he further added, encourages congested structures and houses with unprofessional, substandard building designs; socially proximate with high level of dysfunction of family values system.

The healthcare workforce is relatively small even at that, the few are ill motivated to contain confirmed cases of corona virus with myriad of diseases burdens with no surgical capacity. A fragile society ravaged by corona virus is lacking unique demographic identifier for social programming to inform socio-economic programmatic action plans with weak registration systems for trace, prevention and control of not only Corona virus but any social ill that may ravage the society in the nearest future.

The fragile societies need to step up to contain the challenges as COVID-19 ravaging the world and fragile societies are lacking common testing kits and looking forward to receive donations and the supply chains are disrupted. This scenario is so troubling and so Corona virus ravages fragile societies. COVID-19, Owen notes, the nature of traditional landscape of most fragile communities is in short supply of the crucial features of Owen’s definition of postmodernism are either thinner or completely non-existent in most societies that are fragile. (David Kieghe, 2020).

**Sociology OF COVID-19: The Dynamics of the X,Y Axis and Conscious Effort to Flatten the Curve to Discourage Human Traffic Connection and Social Mobility.**

Drugs and vaccine productions for Corona virus are still undergoing an Atomic PEN structural synthesis and are yet to be discovered, but the good news is that, of the total worldwide confirmed cases of corona virus in the months of March, 2020 disclosed 40% of those affected are ill and on admission in various hospitals across the world, 56.6% have recovered from the sickness; while 3.4% have gone to rest in peace due to the dreaded corona virus killer pandemic ravaging the world.

There are problems around micro and macro demographic explosion with huge change in density, for example, China has recorded (80,738) confirm cases as at May, 2020 with slight increase as it rose to (84,288) as at June 14, 2020. While Italy’s death toll was (312) in May it rose to (4,638) with confirmed cases of (236,989) in June, 2020. Spain was in the range of (733) confirmed cases and (366) dead in May and rose to (243,928) confirmed cases in June 2020. Iran recorded (674) and (17) dead, Iran was (6,566) confirmed cases in May rose to 187,427 as at
14th June, 2020 and (194) dead in May rose to (8,837). France was (1,209) had lost (19) to COVID-19 while as at 14th June 2020 France had (193,746) confirmed cases and (29,401) dead with greater consequential effect on macro-demographic transition, shift and tension that can only be corrected through vaccine, drugs and active planning around demographic formal (statistics) and use of valid and reliable empirical data and statistical measures as guide for policy formulations to better the social wellbeing of their population for better future.

It's obvious that Covid-19 has changed the global population patterns and structures with 'demographic normal' and that has enormous implication on global population size and density for change. Sociology of Covid-19 also tells us that the population demographic gap experienced for COVID-19 pandemic may never be the same largely due to population transition and migration. For example, the USA has recorded (80,239) deaths on the 11th of May, 2020 and the curve skyrocketed to (115,436) on 14th, June 2020. Similarly, confirmed cases was (1,345,307) in May rose to (2,074,526) as at 11th of May, 2020. It is important to rescue the population from COVID-19 epidemic for better understanding of population change and management for key policy decision.

The fear of rapid transmission of the virus has instilled tremendous panic and cognitive dissonance. For example, conservative estimates of confirmed cases for COVID-19 in some jurisdictions was 13 index cases per day before ease of lockdown and suddenly, two weeks after the ease of lockdown and ban on sit-at-home lifted, the frequency of the confirmed cases rose dramatically along the Y axis raising the curve and skyrocketed index to 50 per day as at 11th, May, 2020 as opposed to conscious activities that would flatten the curve and the death rate was on the increase. A cursory glance at the conservative estimate of data on death from illness associated with COVID-19, the Y and X Axis dynamics around the curve which was made available by the WHO, CDC in March, 2020 is as follows: Tuberculosis (3,014); Hepatitis B (2,430), Pneumonia (2,216), HIV and AIDS (2,110), Malaria(2,002), Shigellosis(1,644), Rota Virus (1233), Seasonal Flu (1027), Noro Virus (548), Whooping cough (440).

Fragile societies are characterized by poor health system that requires a more comprehensive, credible and vibrant technologically advanced machines as feature of postmodern world to control the epidemic. There is also the need for constructing or programming the health system with socio-programmatic action plans and improved social behaviour for distancing to reduce the calamitous quagmire and its transfer. There has been increased of death rate due to deadly COVID-19 with severe consequential effects on the macro- population density of many countries around the world as South Korea has recorded confirmed cases of (7,478) with (53) dead. Germany (1112) cases and none dead. This statistical value was obtained as at March 2020.

However, Sweden, Belgium, Norway and Singapore had recorded an average of 100 confirmed cases for COVID-19; none was dead except Hong Kong that has 3, Austria 2 and Australia 3 dead. All of these can be understood from the viewpoint of macro-demographic, formal (statistics) for analysis of the severity or otherwise, negative impacts of COVID-19 on a given mass population (macro-demography) and change in population density due to COVID-19.

**Sociology of Covid-19: Philanthropic Gesture, Volunteerism and Family Palliative for Amelioration of Suffering**

Qualitative empirical evidence from sampled communities in Africa suggests that there are numerous problems around palliative as support to cushion the hardship being faced by the less privileged individuals under the lockdown for COVID-19 pandemic. There are issues of concern around family as a unit structure and system to support communities with a view to ameliorating their suffering under COVID-19 lockdown.

Qualitative data obtained from snowballled sample of community member suggest there were unre relenting and humanitarian gestures received from philanthropists as gesture to ameliorate their suffering. The voluntarism efforts to support government in noticeable areas of gaps, especially law enforcement on social distancing guidelines and lockdown orders had suffered largely due to lack of uniformed and defined context and framework for engagement to help volunteering and support in distribution of palliative relief materials for COVID-19 pandemic.

However, that wasn't the case in volunteering engaging medical and paramedics who had framework supported by hospitals bureaucracy and organizational structures, principles handling emergency cases and situations, prompt actions and rules guiding hospitals as guide to their approach in voluntarism as framework and context to help COVID-19 patients at various hospitals. Owing to the fact that cases related to COVID-19 pandemics are emergency situations coupled with the nature of its fatality and higher risks being on the front line advocacy for COVID-19, most countries of Africa, especially in Nigeria, special allowance has been earmarked on daily basis to motivate those on the line of duty in many isolation centres across the country to volunteer in assisting government and to further help victims of COVID-19 at various hospitals across the nation. Thus; a defined organizational, bureaucratic structures as support for a defined approach achieving voluntarism in the fights against COVID-19 is to the credit of (Marx Weber's bureaucracy).

The negative social effect of Corona virus as feature of postmodern world has provided opportunities for some cruel while harming and extorting others for their entrenched personal gain and conflict of interest. Several cases are being examined, but there are cases of deceitful philanthropic gesture and support of sharing or reselling used and contagious surgical masks and that is harmful for family members to lure the fragile individuals in the society in the name of prevention to further compound the situation, especially the naive and timid members of some families in the society who believe in anything goes as mitigation measures, prevention, control or medication for the controversial quagmire COVID-19, a mutation associated with enormous social problem to drain individual purse, especially in the rural areas; as a high risk or fragile zones and in some cases in the urban centres.

Philanthropic gesture, voluntarism and family palliatives during COVID-19 have been poor to support compliance for COVID-19 guidelines and general principles despite the fact that the government has made provision, but there was problem around the distribution pattern. The guidelines on COVID-19 mandate individual members of the society to-stay at-home, but on the other hand, it is a known fact that, human beings, by their very nature are mobile, sociable and accommodating. As a result, they...
move around to make ends meet and ensure the survival of their family members in the face of paucity of palliatives that would cushion their hardships.

Unless the presence of the government is felt, individuals would continue to wonder around and find ways of violating the guidelines, some deliberate, while others are pressurized by hunger and starvation, apparent lack of support, especially during the lockdown period. Therefore, a credible compliance with guidelines on COVID-19, especially the sit-at-home and social distancing from groups require prompt action by the government and philanthropists in the supply of foods and non-food items for enhanced compliance with the general principles governing COVID-19 pandemic across the world.

Paradoxically, COVID-19 phenomenon has its own advantage, especially for selected families who perceived the attitude of the breadwinners does not encourage stay-at-home, the lockdown has reduced tension and anxieties of most wives for having their husbands around and abundantly so. For example, for some women or wives who were distanced from their spouses or who persistently nagged for they hardly see their husbands around to spent time with them (or for the benefit of their children’s socialisation for better upbringing) are happy today with their husbands at home for the sit-at-home guide for lockdown during COVID-19 pandemic.

With enough palliatives to support families on lockdown during COVID-19, community members would do everything humanly possible to reciprocate by supporting the government achieve desired result in the fight against COVID-19 pandemic. Otherwise, there would be resistance on the part of the people as potential pathways for civil unrest, demonstrations and conflict around communities already under the attacks of COVID-19 pandemic. Deployments of palliatives need to be encouraged and from time-to-time to make individual members of the society to recognize that government efforts are felt to ameliorate their suffering. For the government to achieve that, the importance of data and statistics to improve on planning and actions going forwards require latent and manifest functional system in support of efforts ending COVID-19 pandemic and that, cannot be over stressed.

The fight against COVID-19 has been an issue of major concern not only engaging the attention of the world leaders but also communities and the entire general public from around the world were being disturbed and for some their dreams cut short due to COVID-19 pandemic. Volunteerism is rather weak and random due to lack of credible context and framework for engagement in voluntarism, especially at community, grassroots levels to deal with the global emergency; COVID-19 escalation, which caught many unprepared for alternative measures and options as precautionary to deal with it. The well-meaning, spirited individuals have done their very best and their sense of humanitarianism is commendable during the lockdown for COVID-19 pandemic.

Volunteerism in the fight against COVID-19 pandemic also requires collective commitment of the stakeholders at various levels of professionalism in the ongoing engagement and fight against COVID-19 pandemic. As the Social PEN theory E-suggests, the medical, and paramedics on the front line advocacy for human resource-backup and capacity to improve on the life saving efforts during COVID-19 pandemic and as well offer first Aid treatment. The Sociologist volunteers and contributes in providing thematic analysis of social problems bedeviling the society and community systems during COVID-19 pandemic with a view to providing pathways for social approach dealing with COVID-19 pandemics.

Similarly, other experts and specialist such as mental health, psychologist and psychiatrist help work at the family level to offer psycho-social support to victims of COVID-19 and depressed community members and social welfare officers to give proper counseling and mental health advises and community health workers to volunteer in providing support and guidelines on how to keep communities and environment clean and adherents to COVID-19 guidelines and general principles as stipulated by the WHO and Centre for disease control from around the world. All these experts and many more specialists are needed to volunteer to handle one aspect of the society or another as backup capacity to overcome COVID-19 pandemics that has been ravaging the universe. The fact that COVID-19 is deadly and the rate of its spread is so high and catastrophic, volunteerism is sacrosanct as support and mechanism for increase capacity and backup to defeat the pandemic.

The volunteering effort of the community based civil society organisation is important as it will go a long way to help handle creating awareness and sensitization, especially at the community level on strict adherence to guidelines on social distancing to avert transmission of the virus and to carry out specific role in their areas in support of the government to achieve an all round and systematic approach dealing with COVID-19 pandemic especially, at the community level.

There is no gain saying that, the law enforcement officials are not enough to cover the whole society, especially in ensuring law and for the general protection of individual and community lives and properties especially, at this time of lockdown for COVID-19 and the rate of crime and criminality is on the increase which requires volunteerism as backup to help the police and other civil organisations to work in the provision of security and ensure law and order for the general peace of the communities on lockdown during the COVID-19 pandemics.

To achieve sound and result-oriented volunteerism to help save the society from the ills of COVID-19 and by extension associated social problems, the governments at various levels need to reciprocate volunteerism by supporting the volunteers to ensure their helping hands during COVID-19 in support of their communities is improved and therefore, government to beef up security infrastructure for an enhanced volunteerism and provide them with motivation and greater protection of participants in vigilantism, especially providing them with all the Personal Protective Equipments (PPE) as safeguard against COVID-19 virus in their personal level voluntary support to complement the effort of the governments while working with the conventional security and curtailing neighbourhood conflicts, child abuse, delinquency, rape, theft, gender-based violence, street corner gangster activities, among other ills capable of undermining peace, safety and security of communities in lockdown for COVID-19 pandemic.

The volunteer would also be of help working with the local police and law enforcement officials especially, to cover gaps when
necessary, achieving overall safety and general security of their respective communities on lockdown for COVID-19 pandemic for communal peace. Organising volunteers and engaging stakeholders to actively participate in communal security during COVID-19 pandemic, the individual volunteering should be screened to ensure they are not exposed to the risks associated with COVID-19 virus and other criminal attacks.

For effective and result-oriented volunteerism, there should be proper legislative framework to support COVID-19 and other related matters which may also, includes, to help protect the individual volunteering in the wars against COVID-19 pandemic. There should also be specific role allocation for effective performance as emphasised by Kinsley Devi’s and Wilbert E. More in their stratification system Many countries have deployed palliatives during COVID-19 pandemic but because of lack of framework, organisation and role allocation for officials to distribute it for the target less privileged on lockdown everything gone down the drain, in some cases siphoned and purchased of items for relief diverted and in some cases there were blames that those food shared as palliatives lack proper quarantine as check for safety and fitness for human consumption at entry point to the country and that created suspicion around those items and food to be shared may cause serious harm to the end user.

Should there be defined framework to tell us a well stratified division of labour in palliatives distribution and its well invigorated, for any case of infractions, the society would have those to be held accountable and specific official may be responsible for either deviating or lopsidedness and/or deviating from the set standard dealing with issues around palliative and its distribution during COVID-19 pandemic. However, that was not the case in medics and paramedics volunteerism in the hospital where specific roles are being allocated for effective performance as it’s the known fact that, the hospital has routines and structured rules and specification on who would do what when and how as defined by the organizational structure and bureaucracy.

If roles are not defined within the context of job delivery in volunteerism for COVID-19, it hinders proper evaluation of distribution patterns and may equally cause disruption and inequality in the distribution patterns of palliatives thereby creating potential obstructions of peace. It is also potent to bring in politics for segregating some members who did not benefit from the palliatives and therefore, looking at the sensitivity of the needs to have human resource capacity as back-up to the existing officials, warrants volunteerism is no longer an option but a necessity and civic duty, especially for those whose capacity are required during COVID-19 pandemic so that together we build a better place for all and to collectively nip COVID-19 in the bud for better future, virile and vibrant community systems that should come out of COVID-19 pandemic strong, formidable and socially PEN indivisible.

Volunteering to overcome COVID-19 pandemic also includes the role of the local authority and conventional governance structure must also be alive to their responsibilities in support of the volunteers and work closely with one another, avoid rivalry and above all, ensure peaceful co-existence and harmonious inter-agency co-operation to ensure equality, justice and even distribution of palliatives amongst the citizenry. That will increase trust and confidence of the citizen to be on the part of the governments and by implications support any governmental projects, policy or further directives on lockdown for COVID-19 pandemic. Anything short of this, there may be resistance to law and order for blocked opportunities, hence poverty, hunger and starvation which have apparently caused citizens civil unrest and thuggery in many communities from around the world under lockdown for COVID-19 pandemic.

Sociology of Covid-19: Social Demography, Research and Social Statistics

Sociology of COVID-19 is interested in examining the implication of Corona virus pandemic on micro-demography; small scale population such as; families, communities, ethnic or religious groups and the structural changes experienced as a result of COVID-19 pandemic and it’s consequential effects on members. It is rather obvious that smaller groups have lost their formidability for COVID-19 with enormous change in purposeful goals for which such groups were ab-initio established. COVID-19 has left group members in doubt and somewhat, pessimistic for recovery of lost value systems that had hitherto sustained members for achieving purposeful life engagement, survival and sustenance of cultural beliefs and value systems.

The social distancing has huge demographic implications on social groups and gathering such as; clubs, beach, bars and Gardens are no longer tenable for COVID-19 pandemic distancing as one of the mitigating measures. It is also the same for ethnic, tribal or community meetings and gathering during wedding, funeral, naming ceremonies, etc have been put on hold and religions gathering; churches and mosques are either closed down or assigned specific number of persons to observe prayers while observing social/physical distancing measures to avoid transmission of corona virus.

COVID-19 is a new way of life and it is obvious that it has taken away group purposeful life engagement and members coming together are still yet to be decided. Also, COVID-19 has negatively impacted the macro-demographic settings of diverse human grouping as the size and structures of larger population such as the USA, Italy and Brazil has changed so significantly and the death toll in the USA as at May, 2020 is to the tune of 80,000 and by longitudinal projection, come August 2020, the death rate could be 137,000 due to first phase ease of lockdown as enabled by social mobility amongst huge population coupled with human traffic connection to increase death rate as the model, demographic longitudinal study suggests.

There are problems around population explosion with huge change in density, for example, China has recorded (80,738) confirm cases as at May, 2020 while, the death toll was (312). Italy was in the range of (733) confirmed cases and (366) dead. Spain recorded (674) and (17) dead, Iran (6,566) confirmed cases and (194) dead. France (1,209) confirmed cases of COVID-19 and (19) dead with greater consequential effect on macro-demographic transition, shift and tension that can only be corrected through demographic formal (statistics) and use of valid and reliable empirical data and statistical measures as guide for policy formulations to better the social wellbeing of their population for better future.

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Sociology of COVID-19 makes enquiry about demographic gaps caused by COVID-19 and the lives lost and change in population transition and it's consequential effects on families; social life, domestic co-workers, violence; socialisation of children; economic life, etc and society in general.

COVID-19 has caused shift in demographic fundamentals and had generated high demographic tension or speed up or slowed down cases of birth rate as meeting between spouse during lockdown may provoke persistent meeting and pregnancy issues or slow down and it is believed to be on the increase with higher death rate during the lockdown due to hunger and palpable deficit in palliative humanitarian gesture to cushion the hardship experienced by the members of the communities, especially the down trodden masses and domestic violence between spouse are said to be on the increase all of these have greater implications on socialization of children and increase in aggressive behaviour through imitation.

It is obvious that these changes have enormous negative impact than the positive, especially in change demographic characteristics of their citizens with enormous change in income as businesses are closed down, age as COVID-19 affects the aged and religion on morality and group social solidarity. Also, it affects education of children for the long stay at-home for the pandemic, sex the females are safer than the men with excessive power of having their men around and at all times.

Similarity, there are issues of discrepancies in reporting the case of COVID-19 as the female population is not separated from its male counterpart in relations to confirmed cases and dead to suggest demographic normal (statistics) to inform planning rather lumped of demographic characteristics and that has created gap in better understanding of what gender or aged group are more affect than other characteristics for clearer variability in relations to COVID-19 cases in the reporting.

However, at the moment, the situations are being examined by experts, scientists and the Mac-world for solution and COVID-19 is ravaging and has altered the general population with greater implications for some time to come. Also, Sociology of Covid-19 examines the relationship among people due to corona virus pandemic and the effect on demographic social mobility; as members of the society are now under lockdown and there is no interstate movement while the ease in the first phase lockdown is rather calibrating and speeding up the scale of the virus in terms of transmission than solving the problem as many countries whose lockdown were eased apparently experience sky rocketing of the curve than flattening it altogether.

COVID-19 has demographic implications on national and population planning as countries that are into population control programmes may experience significant reduction in population and those of Africa whose belief is influenced by cultural forces, may have population increase due to lockdown and meeting with their spouses more frequently with less family planning.

Corona virus spreads faster among diverse populations due to movement of persons around the world and that was the more reason why people get infected of the virus and social distancing a nightmare, especially in African societies. However, segments of a particular population may have moved to infect another population cn Also, migration affects population that moves for the fear of COVID-19 pandemic and the change in the population of new settlements and the implications of interstate lockdown on population growth.

It's obvious that, Covid-19 has changed the global population patterns and structures with 'demographic normal' and that has enormous implication on global population size and density for change. Sociology of Covid-19 also tells us that the population demographic gap experienced for covid-19 pandemic may never be the same largely due to population transition and migration. For example, the USA has recorded 80,239 deaths and 1,345,307 confirmed index cases as at 11th of May, 2020. To rescue the population from COVID-19 epidemic and for better understanding of population change and management for key policy decision.

COVID-19 is becoming so alarming and disturbing, a situation that can best be described as Tom Wicker knocking on the doors. Wicker was very popular for his Book entitled 'a Time to Die' just as COVID-19 is driven by social PEN energy of (+n), it’s invisible and human as carrier of the invisible virus (of death) for its transmission. Social distancing as solution, which emphasizes the imperative of sociology of COVID-19 is to discourage its transmission to ensure change as global solution against covid-19 pandemic.

There are demographic issues around Corona virus and Sociology of COVID-19 has implication on economic, biological and social fundamentals of human existence as interdisciplinary approach to population issues in social demography and population density and change. Sociology of COVID-19 is telling us to check for changes in micro demographics for corona virus that has happened during the pandemic to individuals, small groups and neighborhoods and how COVID-19 change their behaviour and global thinking, size, health practice and migration of individual family was limited by the lockdown and as well discourage social mobility of members of the macro demography.

COVID-19 has caused a generational shift in family structures, population density, maternity and morbidity rates and social mobility or immobility gaps and that is evident looking at the index cases versus state's death from the pandemic.

People of diverse societies are suffering and their demographic characteristics should be understood from the view point of sociology of COVID-19 via individual status, culture, identity, rich or poor, but it kills and people are dying all over and everywhere around the world. That concerns sociology of COVID-19 and demography in general in understanding the dynamic structures of the population and change.

For instance, the negative consequential effects of Corona virus on diverse population of human around the globe is presented in the month of March, 2020 and the conservative estimate made available by John Hopkins multiple report tells us that the fatality rate for the epidemic called Corona virus varies and therefore, it is relative from one country to another.

The demographic characteristics and strength of the virus is influenced by the very social and physical environment, weather, geography, etc. The socializing nature of the population on face-to-face basis is neglecting the socio-physical distancing principle as mitigating measures for its spread among people.

However, drugs and vaccine productions are still undergoing Atomic PEN structural synthesis and are yet to be discovered, but the good news is that, of the total worldwide confirmed cases of Corona virus in the months of March, 2020 disclosed 40% of those affected are ill and on admission in various hospitals across the
world, 56.6% have recovered from the sickness; while 3.4% have
gone to rest in peace due to the dreaded Corona virus killer
pandemic ravaging the world.
Sociology of COVID-19 therefore, presents social demographic
fundamentals caused by COVID-19 on population and changes
that happen overtime as a result of the pandemic and the shift
among diverse population defined by their very characteristics.
However, corona virus reduces the electronene E- drained human
among a given population dominated by the PEN forces (+-n) of
Corona virus in the society, especially those whose health
conditions are bad owing to the fact that, they can hardly compete
in a diverse population and highly competitive post COVID-19
environment created by corona virus.
Post COVID-19 society is assumed to be a highly IT driven and
capital intensive society of human, so to speak. Corollary to that
assumption behind Sociology of COVID-19 is that, if the
hypothetical statement holds, then it goes to say that the remedy
for COVID-19 lockdown may be handled with ease and as short
term solution, there should be conscious deployment of P+ and E-
elements of the social PEN theory to demarcate, sieve or (if you
like filter) the population with a view to isolating the class with
higher index cases and contact tracing among the general
population.
Afterwards, the class with higher cases can be grouped and their
frequency distribution of the individual members of the society
with Corona cases to tally with the sick and aged who are E-
drained from the active and potential electromony E-powerful
productive young men in the population and then establishes aged
institutions for referral and confinement of the old and to render
professional services of helping them with a view to enhancing the
capacity of their social function and to provide them with all the
necessary health-related facilities that would go a long way in
providing a conducive and favourable atmosphere for them as
short term solution and humanitarian measures pending vaccine
production, drugs and other orthodox measures and scientific
approaches of handling Corona virus related cases devastating the
world.
Sociology of COVID-19: Social Distancing a Sociological
Perspective, the First Phase East of Lockdown and the
Dynamics of Reopening
The dynamics of the reopening during the first phase‘ ease of
lockdown’ doesn’t speak well of the attitude towards COVID-19
with insignificant degree of observing the social distancing
measures. The problem of associating and socializing on the basis
of group and inability of individual members of the society to
maintain social distancing at business places, community level and
market places, is rather a nightmare. By and large, simply put,
'social distancing' as perceived feelings of social separation or
distance between or among groups which of course, includes
separation of two or more groups in practical application of the
term dealing with covid-19 pandemic.
The first phase of the ease of lockdown in some jurisdictions
witnessed a mass and densely congested people in most strategic
business places such as banks and market places, falling short of
stapeme, with glaring push and pull, body-to-body and shoulder-
to-shoulder while trying to have access to premises of most banks
to get cash. (O.H. Opeyemi; 2020y) (Laster F. W. 1968);( Thomas
Dealing with Covid-19 and its mitigating measures such as social
group segregation/social distancing, principle and guidelines,
including the lockdown or site at-home, are completely a new
way of life and socialization on 'Bogardus scale' and as an onerous
tasks leading us to a newer world of Covid-19 world completely,
a schema defined by 'sociological determinism' and it is to the
credit of 'Darwinism' and by implications 'Malthusian theory on
Population’ as consequential for COVID-19 pandemic.
Sociology of COVID-19: the Sociological Definition of the
Term 'Social Distancing'
Social distancing: Simply moving away from social group
activites to be safer and taking responsibility to ensure a safer
society. It's purely 'social' and the definition of 'social distancing'
has been supported by established sociological literature in the
work of (Hogan Sociology', 2006, Pg: 331) while the space of 6ft
between individuals (if you like) man-to-man or social dispersion
from group or isolated social molecular groups to avoid
contraction or being infected of Corona Virus. There is paradigm
governing 'social distancing', and so it has a philosophy and
epistemology governing the guidelines policy on COVID-19,
transmission from human to human through social interaction.
Therefore, to avoid being infected, members of the society need to
be socially distance from one another and safeguard themselves
with face masks and as well adhere to the high powered authorities
at the level of the UN and CDC guidelines and principles on
'social distancing' .
Corollary, to the above, there is an ongoing debate among scholars
that, physical distancing should be the most appropriate term to
use other than social distancing as one of the mitigating measures
against COVID-19 pandemic. The left wing conservatives
highlight their argument on the simple ground that, the distance
is physical and social distancing allows conversation on phone so,
humans are therefore, still socially connected. They argue that, if
people are socially distanced then it means they cannot converse
on phone. Since people distance themselves from one another and
to also get opportune to converse on phone, it means they are not
socially distanced. This argument lacks substance, because there
is an existing literature to support social distancing as the most
appropriate term to be used and not physical distancing. The crux
of Sociology lies on empiricism, i.e. the sense perception reference
FGD, and interviewer-interviewee situation, verbal and non-
verbal responses and gestures constitute the core of the discipline
of Sociology for evaluation and gauging the social life of an
individual or individuals. The fact remains that, there is nothing
like physical distancing if we are to talk about distancing as
mitigating measures against Corona virus. 
Conversation on phone, as they argue, lacks perfect relations as
social but rather, the face-to-face interaction is considered as
social where emotions and sense perception are gauged. Talking
on the phone is communication and not social interaction and
therefore, social distancing is the most appropriate term and not
physical distancing as erroneously perceived by some scholars.
Although social distancing is a nightmare and that is why it is
difficult to be maintained and practice, hence violation of
guidelines and distancing principles. Social distancing has it's
weakness as human must relate for his own survival and as well for
their livelihood as members of the society largely need to
depend on congregation than group segregation.
(Hogan, 2006, Pg. 331) has provided a comprehensive sociological definition of social distancing as it has been the one applied to COVID-19 pandemic and as well as social telesis which shows the relations between physical and social world. What is social in conversation is the scenarios which unveils the face-to-face, the verbal and non verbal, the emotions, gesture and senses perception constitute empiricist imperatives and consideration in Sociology and social science in general.

Social Telesis is a term used by (Lester F. Ward) meaning as 'social Telesis’ an idea or a conscious and rational control of societal development in an intelligent and orderly manner for the attainment of 'social goals' in the 'physical world' for 'social ends' and the 'social world' for 'physical ends'. COVID-19, is ‘social fact’. Applied sociology of Covid-19, sees social facts as the bedrock upon which sociology as a discipline revolves.( Laster F. W. 1968);(Thomas K. 1962);(Elizabeth K. R. 1969).

This is so because; Covid-19 is a 'social facts' external to all members of the society and it has, to some extent, constrained individual’s action in the society. The fear of Covid-19 is highly coercive and it is an objective reality than subjective in its believe and by its definition, standard, power and practice. However, the term social distancing is contextual here and is utilized as one of the mitigating measures for ending Covid-19 pandemic that has taken the world by surprise, hence relative and contextual .(Hogan, 2006). (Laster F. W. 1968);(Thomas K. 1962);(Elizabeth K. R. 1969)

However, this notion is relative to social segregation, a viewpoint once reinforced by W.A. Ghazali, 1998 to mean as feature of a more organic society like postmodern society characterized by COVID-19 pandemic. The more society evolves, he noted, the higher the degree of sophistication and complexity and increasing individualism to permit distancing. And, the society he reaffirmed would have more capacity of increasingly higher sense of 'I than that of the 'we' and such a society, he went on, would have higher sophistication with high degree of division of labour and simplified ways of doing things, facilitated by technological advancement as Organic fundamental to enable all these to happen to affect man's life in the society, a caricature of the phased change in societal evolutionism typical into 'The New Normal'.

(W.A. Ghazali, 1998)

Most traditional concentric residential settlement around slums are made up of 'broken homes' so to speak, with little or zero level of 'tolerance for distancing as red zone' concentric for criminal hideouts and a hub for law breakers for COVID-19 pandemic. Covid-19 has expressly demonstrated power over all men, all societies from around the world as members of the society run away for it, lockdown for it, closed borders for it and commit colossal sum of proionateous (P+ capital funding) and electroneous (E-human resource capacity) for its containment and all seek for solutions overcoming Corona virus, a threshold and stepping stones for post-COVID-19 world of human as social fact. (Emile Durkheim, 1895).

Be that as it may, what is considered as sociological is the ability of men to mutually agree to come together and to disperse afterward better yet, interact in spite the distance communicate through a medium such as handheld (cellphone) provided by IT is enough a point to underscore the relevance of the concept 'social distancing' and the process through which one get to be infected of COVID-19 is more of sociological than any other means and therefore, the dominance of sociology in that regards cannot be underestimated.

Sociology of COVID-19: Ease of Lockdown, Stigmatization, Police Brutality and Blacks Uprising into 'The New Normal'

The first ease of lockdown has been characterised by horrible atmosphere especially for the black race in the USA were shocked and traumatized. Similarly, the Asians also, did not escape from the stigmatization that Corona virus blossom from Wuhan China and the Africans were abused and manhandled in some jurisdictions and more often than not not humiliated and frankly evicted from their homes, hotels and rented apartments, passports were allegedly confiscated and brutally stigmatized as carriers of Corona virus. The ease of lockdown has witness a hangover of COVID-19 crisis so to speak, a midst Corona virus pandemic as the situation has degenerated and evolves into a full blown blacks uprising and murmured crowds protest and blacks uprising for racism into 'The New Normal’ and beyond that is still evolving. However, the only remedies for that is global consensus building to allow for mutuality and coexistence and respect for dignity, the rights and privileges of human person and as well reciprocal respect to constituted authority and demonstration of obedience to law and order. Aside the social ills, COVID-19 cases in the USA have been on the increase, the same in Brazil, India and other jurisdictions as Texas and so on as potent hubs of the pandemic owing to social distancing being a nightmare in the absence of drugs and vaccines for the cure of COCID-19. The conservative statistics of the affected persons on global scale for COVID-19 is estimated at 4,165,752 confirmed cases and 285,307 deaths as at 11th, May 2020 compared to 10,168,657 confirmed cases and 502,387 deaths as at 29th June 2020. However United States alone recorded approximately 80,000 deaths and 1,345,307 confirmed cases for COVID-19 in May 2020 and 2,549,069 confirmed cases and 125, 803 deaths as at 29th, June 2020.

COVID-19 is an invisible virus and as well indivisible as to it's existence as real which has ravaged the universe of diverse human race. Corollary to that, COVID-19 pandemic is ravaging and changing the world albeit, gradual and that change must happen in phases reminiscent of social evolution of C. Darwin, W.W. Rousseau phases of development, Maslonian hierarchy of human needs or Comtean theoretical phases of human progress of scientific stage and so ' The New Normal' is not an exception to such gradualism in its evolution as a transition towards comtean positive stage of the society.( Maslow, A. H. 1970; Darwin, A. Comte; WW Rousseau; John Hopkins, 2020). (A.K, Jihomberykwa, 2020).

Again, there was wrangling between the police and the public culminating to blacks uprising and struggle for redemption of blacks civil rights for equitable justice. The blacks staged protests against alleged murder of fellow black and that also has aggravated and sustained real and perceived injustice and discrimination that is systemic created scenario synonymous to 'Blacks Versus White' pandemic in the west and 'hunger Versus Corona' pandemic in the most fragile and vulnerable societies around the world.

A mammoth crowd took to the streets while protesting and it was all over the world seemingly preponderated struggles in the street of the USA and the UK for perceived police brutality and alleged manhandling and murder of George Floyd who was stranguulated in Minneapolis in the USA by a police officer while kneeling down
on his artery around the neck obstructing blood flow around his veins. This ugly trend led to protest and eventually, culminated once again, to the shooting of Mr. Rayshard Brooks during the struggle for blacks’ redemption in the USA and similar protest was staged in the streets of the UK and elsewhere.

A number of commentators perceived such scenario as the hangover of sustained cognitive dissonance, stress and burnouts for COVID-19 aggravated systemic and sustained discrimination and lack of justice for the Black's as many of such ugly trends had happened in the past without justice for such manhandling by the powerful against the powerless in the USA and elsewhere around the world, 'Iron law of Oligarchy'. Post COVID-19 society atmosphere will degenerate and if not carefully managed it may escalate into another crisis.

'The New Normal' as post COVID-19 society is characterized by stress boredom and psycho and physiological consequences due to uncertainty, hence oblique for many who ask; What next? The ease of lockdown and COVID situation which has threatened many, especially those in a capitalist society as USA and UK require psychosocial support for the panics and cognitive overload and burnout during work from home and being in the front lines while volunteering. However, COVID-19 might have been the causative agents for distress and anxiety as many were seen during the protest looting, shoplifting and pilfering public items in the name of fighting for right and justice..

Social evolution is waxing stronger. This viewpoint is supported by Khaldum and Darwin (1968 [1859]) in one of the most actively cited theories of evolution which was supported by Durkheim (1965 [1912]). Society is never static but a dynamic social system now and beyond, COVID-19 pandemic with protest and wrangling for justice and power balancing. This view point is reminiscent of Harber Spencer’s proposition and further supported by several works that human society changes due to happening a conflict which ensures change and eventually ensures an enforcement as an institutions of government and subsequently hence change the working of the police for better and that by directions in an attempt to address the ills of the society and thereby induce change that are immediate for long term gains, hence change the working of the police for better and that by implications would change the structural arrangement of law enforcement as an institutions of government and subsequently change is achieved as the USA’s reformation measures and parliamentarian are also debating on issues of national importance and bill as it relates to racism and justice system. (S. Probst; N. Carrington; A.A. Howat; 2020).

However, Robert K. Marton propounded on the ‘American dream’ which depict social justice, equal rights, opportunities and privileges but member of the society are constrained and as well restrain by the role of the institutions from achieving those goals. Robert K. Marton therefore introduced 4 modes of adaptation thus; Conformity, Innovation; Ritualism; Rewrites and rebellion. This mode of adaptation has perfect frameworks to describe the behaviour of the crowd during such protest against racism and agitation for redress around justice issues. Robert (K. Marton,1952); (Talcott Parsons, 1945)

The USA was under fire as protesters took to the street and the rebellious, disobedient individuals are also taking the laws into their hands by destroying the Confederates; artifacts Statues and non-artifacts material aspect of man’s historical monuments. COVID-19 pandemic has sandwiched a huge mammoth crowds of protesters coupled with Corona Virus pandemic at the other end of the spectrum.

However, here come a voice from Sociology of COVID-19 and as a black race, I share the grief with you guys as folk and the sad moment of global crisis characterized by confusion and we are concerned and well affected by the melancholy. My prayer for your struggle is for peace and social justice to reign supreme.
There is no point for racism or racial discrimination in a highly rated civilized society as the USA. Even countries in transition would have no better place to undermine social freedom, liberty, rights and social justice in postmodern world like ours. Discrimination should be seen and viewed with disdain as archaic, antisocial behaviour in a globalized world and it has negative sociological implications around thwarting societal progress, peace and unity among diverse and multicultural complex human grouping as the USA.

The blacks struggle against racism henceforth, requires tremendous sense of organization around group behaviour and the struggle should also combine with an outlined areas of dress to channel through the most appropriate legal means than to allow the protest to escalate and furthermore, to deteriorate to stage two or three for the hoodlum to take the garbs of the protest as many shoplifting, looting and pillaging were seen taking place in the streets and major road. Agitation and demands for justice requires systematic step-by-step approach dealing with situation in a round table and dialogue while eschewing differences through mutual consensus than taking all to the street at the expense of peace makers.

Unorganized group behaviour as protests in an organized society like the USA in postmodern times, may be 'a waste of time' and perceived as anarchy, act of terror and challenging constituted authority is rather altogether a zero sum game but there is benefit in maintaining peace and exploring opportunities of dialogue and compromise.


The sociology of COVID-19 presents critical issues that are historically located, politically potent and economically relevant and of course, socially significant derived from the voice of the individual members of the society from around the world while findings are presented herewith. However, those views and conceptions may be true, biased with inclination to prejudice while some may be altogether false. Therefore, what is to be presented under this sub-theme may be subject for further interpretation and reexamination for their factual nature and disposition. They are not my saying or views but examination and analysis of data. High or low data speak volume and are therefore not sacrosanct. Data analyzed under this sub-theme are mainly, primary; through verbal face-to-face and telephone conversation, transcription of video clips and secondary written text as data and composed short stories as expressed views of the commentators about COVID-19 pandemic. Also, write-ups were utilized as sources and frame for this line of thoughts. There were haunches around the following questions: Why COVID-19 pandemic? Who should be held accountable for COVID-19 pandemic? Where was the genesis of the pandemic? Where is COVID-19 pandemic leading us to?

However, the belief of the majority is that there are number of indices and some also were of the belief that, COVID-19 is rather from God as Corona virus was sent by God as punishment for the sins individual members of the society had committed on the surface of the planet earth and therefore, held the believed that, COVID-19 is an act of God as punishment.

Some respondents and sources may be sentimental with political undertones and the stance of their views and conception for COVID-19 may be questionable in terms of its reliability and validity criteria and therefore, may or may not be ascertained and some may be true, exact or near exact and others are mere fishing expedition as COVID-19 is so slippery to be concluded upon. Yet, the individuals are entitled to their opinion as empowered by Freedom of Information Act.

Perhaps, such views may provoke consciousness and potent enough to create pathways for rethink as pedestal to ponder upon a little more of COVID-19 pandemic and its implications on society and for our existence as human. It is also the belief of others, especially political sociologists and demographers who are very much keen in demographic characteristic of the population who had suffered for COVID-19 pandemic and population density and its control, power relations, change and the effects of COVID-19.

The general public has array of perspectives on Corona virus pandemic. They have presented different views and conceptions and this views are aggregated to explain their feelings and majority have stronger believe in the existence of the virus and have since put in place the social distancing principle as a new world order of sit-at-home or is it stay-at-home and/or clampdown for quarantine and improve hygiene. People are keen in avoiding handshake, washing hands regularly, using surgical marks and encourage elbow greeting. It is obvious that government, through its appropriate agencies, is going round to discourage public gathering in some instances, forcing public not to have clubbing around and so on.

While there are perspectives contrary to the 'meta-narratives' built around social distance as radical departure from the general believe, some members of the public go about their business and have since resigned to fate that Corona virus is not their portion and God is in control. Churches, mosques around observe their prayers and hold community services and meetings as usual. The world is changing and very fast for that matter.

There were insinuations around technology as the main cause of the pandemic. Some people claimed that, 4G network is somewhat, not effective to provide the kind of speed needed for efficient use of digital identification and therefore, 5G network is required for its efficiency at short distance. The wrangling trade deal between the USA and China that was signed on 15th of December, 2020 had created a lot of suspicion around COVID-19 pandemic and who should be held accountable.

A source also claimed that, six weeks after the trade deal was signed, the trade truce was further signed again as phase two of the deal. The source also, claimed that, "the Chinese had made a very clever out clause that, they made sure was not in there which said, "if there was any kind of an act of God, Pandemic" then within days they announced the first 'Corona Virus'.

The compelling question is that "did the Chinese know that Corona Virus was running around the world for six weeks before they shut down Wuhan?" The answer provided by the source was "Yes! Another question raised, did such actions amount to crime and criminality? The source further said in affirmative!" "Does this deserve to go in front of the world tribunal? The source answered Yes it does!. The source further added that "the unfettered travels that made the virus a global phenomenon impossible to contain and claimed that, China knew it almost 6 weeks of its escalations and wanted that out clause and still underreported what happened in Wuhan.

Therefore, China should be held accountable for not providing valid and reliable data of the damages caused by COVID-19 in
Wuhan". "For, if that has been done earlier, the rest of the world would have been prepared for fewer people to die". The source felt that, "COVID-19 was equivalent to an act of war on the part of China" and, added that "COVID-19 was first reported as flu and within 24 hours of the South Korean’s first case was reported, the USA case also been reported and reiterated that, someone should be held accountable".

There was further argument that, "Of all these happening, for almost six weeks of enlightenment among Americans that, it's just a flu while South Korea was testing her citizens for COVID-19 and shutting the country down". Therefore, the source argued that, "there were many responsible bodies that had taken the world to the point of where we are right now". "They may be inside the country or in China and they need to be held responsible".

While responding to a question, the source said, "there is no point to ask whether or not it was a manufactured virus and set upon the world". She further held the belief that, "you don't even have to go that far, "If that was known by China for six weeks before saying anything at the global stage just to get the trade deal signed, so, somebody needs to look into that because countless lives have been lost and people are still losing their family members as a result of that". And "the scenario is capable of bringing about suicide, economic hardship, and all of that would have been mitigated if China had been honest of the virus..." (Withheld, an electronic source, 2020).

In some quarters, some were of the opinion that COVID-19 is an attempt for global siege to control human being. COVID-19 enables control of members of the society, same as we control our devices by sending signals to the brain. Some of the claims make reference to movies such as 'Divergent from 2014, a new world order,' that COVID-19 is an attempt to control the world via vaccination containing microchips digital ID-2020 alliance manifestos, highly innovative as public private partnership (PPP) committed to improve life through digital identifications, so that, human beings can be manipulated and controlled for global domination and change.

Nonetheless, for some, Corona virus epidemic is interchangeable with transition to another world of IT for global capitalism and its expansion among 19 COVID (or is it 20 COVID) countries to take over the markets of the smaller nations. The world ruled by information technology, monitors everything. Movement would be monitored, transaction would be monitored.

The entire world is left at the mercy of the most dominant-19-White-Winged-COVID, corona in the world. There are great beasts of burden on individuals, families and communities who are perhaps, innocent and not ready for such biological warfare from around the world. There would be severity around social responsibility and commitment of individual members of the society if the Corona virus is not contained by observing the mitigating measures as precautionary, and immediately so.

In post COVID-19 world, there would be significant change around moral values. Social life would be automated for COVID-19 and relationships are further reinvigorated on wire than physical face to face. There would be significant change in structure, social economic and political life. There would be excessive regulations and capital reintegration to define the brand new phase of human life. Our relations to IT facilities would be improved with enormous cost and there would be clampdown on sites and applications would be paid and to the credit of COVID-19, same as we purchase token for electricity.

There would be uniformity in social relations with pattern and individual action and life would be changed tremendously, a pathway to what (Hogan, 2006), called 'mathematical sociology' with exact formulas to define activities of human by eliminating the qualitative aspect of life such as face to face relationship.

Travels for businesses, leisure and tourism will reduce and there would be more official travels and engagements in the post Covid-19 human society. There would be high precipitation of social dynamic density in the society. More structures would be converted to warehouses, humanitarian institutions and hospitals. The rate of charity and humanitarian assistance will increase, only to exist for a short period of time.

Social distancing may be seen to have provided a safety net in curbing the spread of corona virus but it has pushed the downtrodden masses or the most fragile segment of the population to high risk zones, leaving them in situations best described as jumping from “frying pan to fire” as no provision was made for their sustenance. The imposed lockdown, being a necessary aspect of social distancing and the new world order in postmodernism, has proved to be more of a nightmare for the ordinary citizens Downplaying and declining on genuine statistics, Corona virus and its implications have enormous existential threat to social life as gatherings and meetings are forced to extinction, businesses are closed down and members of the society are forced to avoid social demographic meetings of over a hundred (100) persons because of the virus. Consequential multiplier effects on socio-economic and political fundamentals are as highly communicable as the virus because the acceleration of its transmission among human is faster and calamitous.

More so, if the so-called killer pandemic is not properly handled and urgently checked, it may exponentially and profoundly increase in its intensity and open up to a range of bio-holocaust of very high magnitude around the world and only strong countries with a credible workforce, health system and capacity would survive the momentum. Stringent measures must be taken to improve on the health system and the WHO guidelines on quarantine for safety, prevention and control must be totally complied with, if we must overcome the ills associated with Corona virus.

**Sociology of Covid-19: Anthropology African Society's Belief System and Religion**

Sociology of COVID-19 examines the pandemic from comparative Anthropological study of human race, the goals humans set for themselves and how they could attain to such goals especially, with the changes experienced as a result of COVID-19 pandemic. This dimension of Anthropology is oftentimes, referred to as an 'Action Anthropology'. African's belief system and comparative cases of diverse religions and its implications on man's social life, while taking into accounts the African societies, their cultural activities such as belief system, norms, values, cultural rite and religious practices and the influence of COVID-19 pandemic on those structures.

The Anthropological analysis of issues in relations to COVID-19 pandemics take into accounts the emergence of new culture.
associated with COVID-19 which has changed the attitude of community members and direction of their life and social relationship within their social milieu.

Religion, cultural practices and some of the scientific approaches that had been employed in phased reopening of lockdown and its implications on human race across the globe is enormous. COVID-19 has contained in it social forces of redefining the entire race and their existence as human with consequential effects on man and by extension the entire society due to the consequences associated with the pandemic.

The emergence of the new culture, interrelationships of cultural traits, geographic, environment and historical context which also includes social structural changes is rather due to COVID-19 pandemic and that can be understood from diverse dimension thus: Socio-cultural, Physical, Archeological, Linguistics and Ethnographic and Action Anthropological perspectives in relation to scientific study of human race, cultural evolution and how human races differ in their life style and cultural identity, (Hogan, M. O. 2006).

Sociology of COVID-19 also examines the influence of the pandemic on human race and development and the capacity of COVID-19 when it was at its peak banned congregations, no naming ceremonies and gathering and it has entrenched new value system characterized by social distancing washing of hands, no handshake are the orders of the day. All of these new changes have transformed and altered man’s skills and knowledge in search of traditional cure or medicine against COVID-19, orthodox and non-orthodox peculiar to his tradition as solution against COVID-19 pandemic.

However, COVID-19 has changed perception of diverse people due to the forces associated with it and the emergence of new culture and socialization has introduced shift in many cultures and that has the potential of changing or transforming attitudes and behaviour of members of the community, especially with social distancing guidelines and their relationship with other humans and population change.

This incisive line of thought is reminiscent of Anthropological thoughts and classification of human race by Processor, Musa. Abdullahi (1998) in our undergraduate study referred to as "Mongoloid, Caucasians or Negroid". COVID-19 has higher intensity of curtailing social relationship and to encourage social distancing especially, for those who must hump around to get their livelihood. Corona virus has enormous capacity/potential for slimming down the hope for better tomorrow. However, for those who deliberately roam about the street during COVID-19 pandemic and since their behaviour is not sanctioned by the government and leveled roaming around during pandemic as deviation from the set standard as norms, then the society needs to deploy ‘guilt’ and/or ‘shame’ culture against the erring individual’s abnormal behaviour. (M. Abdullahi, 1998)

Shame or guilt culture in Anthropological sense is a form of ‘social control mechanism’ in which society members would collectively make deliberate actions of curtailing a person's behaviour in order to transform his attitude and to align to context and general expectations of the entire society. Although, ‘guilt’ and ‘shame’ culture in Anthropology is an approach of transforming individual behaviour to align with context and it may be effective in rural societies where you have homogeneous population willing to partake in such social control mechanism than in the urban settlement that is complex and heterogeneous and that is relative to other cultures as witchcraft and manhunts.

Similarly, Sociology of COVID-19 is telling us that, there is an emergence of new culture. The culture that has substituted our previous forms or ways of life for COVID-19 and that has challenged not only religion but also social, economic, political, family values and education and to reverse those trends requires sufficient time for the discovery and production of drugs and vaccine to suggest the next line of action and perhaps, the reversal of some of the changes may not be feasible, but the decision on the phased change plan as guide will suggest a newer tradition for COVID-19, especially the new life in post COVID-19 world. This is to the credits of Tariq Ali, illuminates on the 'Clash of Fundamentalism, Crusade, Jihad and Modernity'. (T, ALI; 2002 ); (Y. Trofimov; 2005).

Although, the North Toronto police were of the opinion that, those acts were campaign of calumny against religious practices, as a few Eastern Asians had put-in some calls to the police that, they were targeted with hate and nasty racial comments. There were cases of high profile property damage at several Buddhist Temples were sledge hammer and statutes that guards their gods and holy temple were destroyed and the police perceived such nasty attitude of the deviants as crime of hates as COVID-19 has transformed individual attitude and behaviour in their relations with fellow human from around the world. The statues are seen by the practitioners as religious and holy symbols as far as they are concern. This is resounding the thoughts of Tariq Ali, in his Book entitled 'The Clash of Fundamentalism Crusade Jihad and Modernity'. (T, ALI; 2002 ); (Y. Trofimov, 2005).

There is the debates among 19th century philosophers; Durkheim, Montesquieu and August Comte on the nature of society moving from simple homogenous to a more complex one heterogeneous and globalizing and COVID-19 world is normalizing. A World well configured on the tripod of the social PEN fundamentals of P+ prokeneous capital reintegration and E- electoneous human resource capacity for change around IT in the phases of normalization, a post COVID-19 world of men built upon E-electroneous IT capacity for change and P+ prokeneous capital as vehicle for change and progress of mankind.

Evolutionism is also to the credit of many more scholars such as C. Jeremy, R.Y., posits that development is a progression from primary to the secondary group; Spencer viewed the movement as one from homogeneous to heterogeneous units; George, C. Hommans, pointed out that E. Durkheim, viewed change or development as evolving from mechanical to organic solidarity. Furthermore, Tonnies expressed change to mean some sort of evolution from Gemeinschaft to Gesellschaft which also means transition from community to society and COVID-19 is forcefully, ravaging and changing the world to a more IT driven world of men. (W.A. Gazali);(George, C. Hommans, 1950);(C. Jeremy, R.Y.1959);(E. Durkheim, 1912)
Corollary to the above, many perceive COVID-19 from the view point of having bio-effects that may kill or rather eliminate human instantaneously (or is it gradually). Congregation in mosques on Friday is banned; churches are sealed by the government until it is safe to reopen. COVID-19 has entrenched danger on public health. The general belief around the faithful suggests it is rather more peaceful to suspend prayers in congregation for COVID-19 has higher velocity in its transmission, hence the social life of the faithful is never encouraging and members may end up being infected as processions, handshakes, and contacts shoulders to shoulder may increase vulnerability at prayer points and the advises to suspend and to reopen when the pandemic calms down is a welcome idea for some faithful, (Dr. A.U Tilde; 2020).

However, compared to the market places, some argue, it likely takes approximately 10-15 minutes to solemnized on prayers and held the belief that if market places would be open for a whole day or good number of hours and then equally the authorities concern should have allowed faithful to go on their routine prayers which altogether may not be more than matter of few hours put together the whole day prayers. There are country opening to that, especially from the elderly who are more or less vulnerable than the youths are exposed to risk and the vulnerability is even higher among those who go to the mosque early, in Muslim dominated communities considering the attitude and behaviour of the worshipers and how close they sit and how proximate the row are and siding shoulder-to-shoulder as compulsory or prophetic traditions has been taken over by the COVID-19 social distancing as mitigating measures against the pandemic. (Dr. A.U Tilde; 2020).

Often times, some fellow worshippers cough while in some cases others sneeze and as well breath around as they bend and raise up and exchange pleasantry by shaking bare hands with no glove as traditions demands and are not wearing face masks with higher degree of vulnerability of transmission of the viral infection called COVID-19. In prayer grounds, many may have flu with droplets and the populations all in one hall densely populated, so stuffy and worshipers sweating even under Air conditioner and fan for the hot weather and attendance as hub for COVID-19 infection and such a situation is risky and it is so bad. COVID-19 has already changed the world, if not completely, but to certain degrees. It has influenced a number of structures, beliefs, attitude as well as our behaviour. Qualitative data suggest that, in some societies, members removed, destroyed and/or demolished their (gods) and temples on the simple ground that, those gods lack the power of saving them from harms as COVID-19 despite they worship them periodically and some community members see no reason to retain those statutes again for worship. (Dr. A.U Tilde; 2020).

For example; at the heights of the pandemic, there were cases of high profile property damage at several Buddhist Temples where sledge hammer and statutes that guard their gods and holy temple were destroyed and the police perceived such nasty attitude of the deviants as crime of hates as COVID-19 has transformed individual attitude and behaviour in their relations with fellow human from around the world. Most Temples and symbols of religious practices in some communities were demolished or destroyed on the simple ground that those symbols worshiped as gods could no longer rescue humanity from calamitous situations as COVID-19, hence rendered those Artifacts useless in the eyes of their practitioners, especially the Artifacts (material) and as well the non-Artifacts (non-material) aspects of man’s culture and religious beliefs and practices were rendered useless by COVID-19 and turned those objects into mere symbols of anthropological analysis, forming narratives about man and his relation to those symbols as gods at a point in time of man’s existence in planet earth. (Financial Times, Yoval Noah; 2020).

The power behind COVID-19 is enormous and it is changing the world. Marx Weber, viewed the change in social organization as evolving from traditional authority to legal-rational authority. Furthermore, August Comte, propounded the stages of development as: theological, metaphysical and to scientific stages in human evolution. E. Durkheim, talked about mechanical and organic solidarity which was later expanded by F. Tonnie, to describe how phenomenon changes from one stage to another and coined what he referred to as the Gemeinschaft and Gesellschaft. (Marx Weber; 1947); (Spencer H. 1971);(Auguste Comte; 1986).

Again, the Archaeologists as Anthropologist would also make one to believe that, for example; those that had existed in the past 700,000 years had practiced religion distinct from what is obtainable today. They would also proof by excavations that they had different looks from us and our way of live. And then give an account for inevitability of human evolution and change in human existence and they prove those changes scientifically with evidence and data to established facts and social reality for their claims. Today COVID-19 is here ravaging and changing our way of life. What next?

If COVID-19 is changing the world it is not a new thing but, normal way of life. What the evolutionary theorists such as Herbert Spencer and Durkeheim et al referred to as ‘complexity’ can be understood from the viewpoint of Boko Haram becoming complex, defensive and offensive in what (Mao, Tse-tung, 1972) alluded to in his study of the Strategic Defensive and the Strategic Offensive in Guerrilla Warfare. He described the fluidity, something similar to the ravaging nature of the COVID-19 pandemic of today.

There are socio-cultural beliefs in some African communities that, death is a normal thing and for some others believe one dies when it is his time to go. Death can come at anytime and it is God who sent the Angel to end one’s life either by accident, kidney failure with systemic deterioration, heart attack, stroke, HIV or any medical related condition as terminal sickness leading to death. This is reminiscent of the social thoughts of Elizabeth Qubler Rose stages of ‘death and dying’ and it depicts the last stage of hopelessness and giving up for death.

COVID-19, they say is not an exception when the time comes. Once it’s your time you must die and some also, believe that God has sent angels to land on the surface of the planet earth to be taking lives same as some died of insurgency, terrorism, famine, earthquake, plane crash, flood disaster and other harms and monumental consequences and therefore, they argue COVID-19 is nothing other than a curse, if truly it can kill and when it is time and as ordained by God; no one can escape death.

Religion is so powerful to be undermined, but the forces of COVID-19 have ridiculed its practices at a point in time of our history in human existence in the year 2020. The significance of religion as moral revitalizer is rightly observed by (Emile Durkheim,1912) in his book ‘the Elementary Forms of Religious Life’ as religion has some functions to perform in the society,
especially that social solidarity and social cohesion, but being ridiculed by the forces of COVID-19.

Some believe that, the forces of globalization have greater influence on not only religious, but of course, all the institutions of human society thus: social life, economic fundamentals, religion, education, family and the polity are all shaped for the attainment of globalization which coincides with postmodernism intertwined with the forces acting and reacting around COVID-19 pandemic that has changed most things in our everyday life.

Similarly, on precautionary measures, for some cultures, face masks as one of the mitigating measures against COVID-19 may be seen as taboo due to our differentials in cultural orientation. So, due to these complexities, some societies around the world may not survive the momentum and sharpness of COVID-19 pandemic unless, mass mobilisation and enlightenment campaigns are mounted and citizens are informed through various media of communication to appreciate and as well embrace those precautionary measures for dealing with COVID-19 pandemic for the overall bio-safety of humanity.

For example, in some African traditional societies, covering mouth and nose is rather a thing that should be done and fit for animals than for human. A term known to be ‘Nzambu’ is a name synonymous with a (face mask) in Kanuri dialect. 'Nzambu' are more frequently used for covering the nose and mouth of either a lion or hyena to avert bites, especially when wild life's are taken down to community levels for cultural display to scare away children in order to mould them get stronger, rugged and used to a wild life as they grow up to be strong men in the society. In such Africa societies, the use of face mask may either be undermined or seen as a funny thing to be hanged on the face. Different societies see face masks differently and their attitudes and behaviour are greatly influenced by their culture and traditions to observe wearing masks as mitigating measures. After all, it is costly considering the economic base of some communities around the continent of Africa for apparent low income.

Again, for some culture and tradition, the use of face masks may altogether be seen as a taboo. For example, in India castes system, it may be difficult for the king to wear face masks and for the poor caste member of the same community to also wear one as that may also be perceived as taboo.

So, there are cultural forces that may influence and increase vulnerability thereby increase transmission of COVID-19. Therefore, understanding the general principles, knowledge, attitude, value systems and some of the traditional fundamentals which sustain human are crucial factors that have to be considered dealing with COVID-19 pandemic and its precautionary measures and guidelines is important, if not necessary ingredients for good result while dealing with COVID-19 pandemic, especially in African countries.

The African society belief system and culture are under severe attack from COVID-19. Corona virus has ridiculed not only the continent of African but the world at large. However, today, Corona Virus has entrenched existential threat on both the capitalist and the mixed economic countries around the world; the rich and the poor are vulnerable and at the mercy of credible health system and rapid health response facilities available to contain it irrespective of human race. Covid-19 pandemic has thrown many families, businesses, social events, communities, cultures and traditions into severe pain and with high frequency of transmission and social upheavals on health of young and old, women and children, strong and fragile; a society characterized by widows and orphans. When we are yet to settle the displaced populations, we are managing another round of holocaust of global magnitude. What will be the fate of the IDPs? May Allah, with his infinite mercy and wisdom protect us all, Amen!

Corona virus is huge threat to social solidarity and moral revitalization in our mosques, churches and other social gathering that may enhance social cohesion for social progress. Corona virus is threat to morality as children who should be in schools to learn morale values are today locked down and at the mercy of their parents. However, it is for the common good of all to deal with the pandemic as conscious effort to nip it in the bud. Covid-19 pandemic has the capacity/potential of monumental structural changes which cut across social, economic and political life, a caricature depicting periodic transition to moral crisis as Emile Durkheim reminded us in his thesis 'Elementary forms of Religious Life' as a new lease of life in our existence as human on the surface of the planet earth.

What we experience today is a kind of early warning signal and periodic transition to moral crisis as family members are no longer attending mosques, churches as places of worship have been closed down for the first time in the history of religious practice in the world as religious rights had been practiced even during face to face wars, but for Corona members of the society abandoned religion for COVID-19 at its peak. Is that not a test of faith? Countries’ borders are closed down, economies of nations around the world are rather galloping with severe structural negative (-) impact on family social life and political structures and decisions of our leaders and as individuals members of the society.

Sociology of COVID-19: Postmodernism as Philosophy which Drives the Dynamics of 'The New Normal' and Beyond

Postmodernism was first coined by Jean- Francois Lyotard in the 50’s. Unlike Comtean and Durkheimian who are modernist and believe that social reality such as COVID-19 can be established through scientific method of positivism. Lyotard, the proponent of postmodernism argues that building narratives around a phenomenon such as COVID-19 pandemic with authentication and credibility of the person theorizing is enough evidence to establish facts and that can be taken for granted in postmodernism to enable generalization and inference to discover realities such as social distancing of 6 feet to discourage velocity of Corona virus and further infection. (Lyotard Francois, L 1884), (Anthony Glidden, 1990).

The mitigating measure is being friendly and constant use of face mask to curtail rate of transmission within the physical environment during social interactions and this assertion is to the credit of (ecological theory of Burgess and Parks, further expanded by Shaw and Mckay to say more of man’ natural adaptation to his environment during interaction and adaption is to the credit of Talcot Parson acronym (A) which depict (AGIL and /P). (Robert K. Merton; 1968) ( Spence H. 1971).

Frequent and periodic hand wash/use of alcohol based sanitizer is to discourage transmission of Corona virus as handshake and touching face, eyes and nose may enable the virus to easily get into biosystems, hence infect those that are vulnerable and employing all of these mitigating measures seems a nightmare for significant number of population and safety dealing with COVID-19 around the world and major threat to distancing guidelines and principles.
The earlier thinkers, (the modernism) Comte, Mauss, Sine Simon, Durkheim, R. K. Merton, T. Person, Kaufmann David Hums and the likes of Neo-modernist theorist, such as Robert D. Putnam's and Anthony Giddens etal insist that it will rather be difficult to either do away with such normative standards of measurement and it’s orientation or compromise on same because they are the major source and foundation to ensure falsifiability as one of the attributes of a coherent theory, testing and validation as Karl Popper wants us to believe, employing deductive method for scientific examination of a phenomenon as COVID-19 pandemic. The theory of postmodernism rests upon the concepts of ‘miniaturization’, reducing the broad nature of society to a manageable size. The emphasis on social and physical distancing for COVID-19 pandemic that has been emphasized by the philosophy of postmodernism and commercialization of machines emphasizes the importance of computer technology as principal force of mass production depicting post COVID-19 world of human.

Simply put, postmodernism is the philosophy behind ‘The New Normal’ and postmodernism is a triumph over adversity while ensuring the position of science and technological advancement with flexibility of a hitherto, rigid and tough modernism, which was perceived as throwback. The dynamics and complexes of postmodernism determine the evolution of ‘The New Normal’ after the pandemic and the role and relevance of postmodernism institutions in driving ‘The New Normal’ cannot be overemphasized. Postmodernism is a process and not an automatic but has automated systems as post modernities to determine production, supply and value chain for justification sustainability. Post-COVID-19 world is characterized by highly simplified post modernities with tremendous result that should improve humanity now, and in the future it’s fast, flexible, instantaneous and sustainable. (Lytard Francois, L 1884), (Anthony Glidden, 1990).

Alluding to the intellectual thoughts of Professor, Olu Ogunika who forecasted a world as COVID-19 and this scenario is synonymous to ‘Ogunika social thought’. He was utterly coherent in his prediction fall back in the year 1998 as rightly observed in his lecture series that, ‘very soon a time would come, a time defined by the world of technology in which one big paradigm as COVID-19 would emerge to swallow everything and in the end all conflicting paradigms would cease to exist and give way to that one big paradigm’. Perhaps, the erudite Professor alluded and predicted about a kind of society redefined by the momentum and sharpness of COVID-19 pandemic as ‘The New Normal’. (Anthony Giddens; 1973), (Olu Ogunika; 1998).

Postmodernism is a threshold for ushering in COVID-19 world of human and globalization is to ensure an irresistible expansion of social, economic and political systems, including social structures for the common good of good governance and government (the action system) and by inclusion for more the benefits of the world population as (the target system) for greatness and social progress in the evolution of the society in the next phase. COVID-19 World is firmly supported by philosophy of the postmodernism as a transition from analog way of life (modernism) to a more vibrant, virile, efficient, and cost effective digitalized ways of achieving socio-economic and political goals (Postmodernism).

Be that as it may, many believe that what is called Corona virus has come with an option of either to be rich and strong and formidable with electronous (E-) human resource capacity to drive the bandwagon of Postmodernism. Again, in post COVID-19 World, there will be more and more professionalized jobs, but Social PEN electronous (E-) human resource capacity is required and everything will be done through IT facilities unlike the archaic fashion regarded as throwback in the times of modernism. The more we distance ourselves from one another for COVID-19 pandemic, the closer we become and so proximate to COVID-19 World; ‘The New Normal’ built on the very foundation of information technology, a world of social dispersion and more cities were empty and traffic jam reduced to the barest minimum and life would never be the same at the peak of Corona virus. COVID-19 World; ‘The New Normal’ would have values as normative cultural standard, principles and dictates and it allows labour migration, but for a short while to allow humans to settle to attain normalcy for the business of the new world. Jobs can be done remotely and there would be rush in residential and serene environment to allow an uninterrupted and smooth delivery on job assignment.

The complexes of COVID-19 World; ‘The New Normal’ will make humanity to face social change of unimaginable magnitude and the post corona virus society redefine social life, events and the mode of doing things. In post COVID-19 World, content development, production and co-production of knowledge would be marketable. Society would be defined only in terms of electronous (E-) human resource capacity and protoeuneous (P+) capital for further development and ‘The New Normal’ as society must support the (P+ and E-) reintegration as neutroneous value for successful calibration of systems to context and relative equilibrium to ensure structural change that are sustainable in man's life and for the benefit of the generation yet unborn.

These proposition is not different from what Max Weber told us in his thesis “ Protestant Ethics and Spirit of Capitalism” and global capitalist expansion and reintegration and the survival of the fittest. COVID-19 is the spirit which defines the ethics of Protestantism, a hand over of social, economic, and political, perhaps, cultural practices for virus in Marxian sense of analytical examination of happening and events leading to COVID-19 World; ‘The New Normal’.

In COVID-19 World, ‘The New Normal’ individual members of the society would place less emphasis on culture, ethnic identity and primordial sentiments will perish. There will be burst on rationality, a transition synonymous to what Professor, W.A. Gazali, 1998, in his lecture series far back in 1998 referred to as low intensity of ‘we’ and higher sense of ‘I’ with tremendous sophistication around specialty, occupation, production and co-production of industrial goods and services and all of these changes lead to ‘The New Normal’. It happens gradually in phases and it can never be sudden and the N element of the PEN need to calibrate the P+ and E- to attain relative equilibrium for structural change to happen in social economic, political, cultural and institutional fundamentals to affect all spheres of man's life for a positively balanced change to happen. (Professor, W.A. Gazali, 1998)

Alas! To Jean Francois Lyotard who described postmodernism and the forces associated with the ills of COVID-19 World shapes global consciousness, socio-economic and political structures while on the impact and momentum of globalisation, Professor, A. G. Shettima, 1998 in his lecture series on globalisation, far back
in 1998, reinforced the viewpoint that, globalisation can be seen as a 'brakeless train' and Corona virus is a nightmare with gigantic fear that has already loosed many societies to fluids, pushed business into shambles. Human activities are halted to some degree and responsibilities are shrinking, individual members of the society are lacking in their personal and communal commitments and it will be so severe in COVID-19 World. (A. G. Shettima,1998).

And, social inclusion would be enhanced. Women would have more power. There would be significant change around moral values. Social life would be automated as post modernities to reflect the needs and expectations of the COVID-19 World. 'The New Normal'. Relationship among individual members of the society would further be reinvigorated on wire and physical face-to-face interaction would reduce.

'The New Normal' would come with significant change in structure. Social, economic and political life will change. There will be excessive regulations and capital reintegration to further redefine the brand new phase of human life for its normalization. Our relation to IT facilities would be improved with enormous cost and there would be clampdown on sites and new applications would be introduced with innovative increase and everything would be paid, to the credit of COVID-19 World, same as we purchase token for electricity and other similar bills in our normal life.

There would be uniformity in social relations with pattern and individual action and life would be changed tremendously, a pathway to what Hogan, 2006, called mathematical sociology with exact formulas to define activities of human by eliminating qualitative aspect of life such as face-to-face social interaction and relationship. The rate of travel by air and road for leisure, tourism and businesses would drop. G. Emefiele, 2020 noted that global Airline has lost about USD 252 billion in revenue in 2nd quarter 2020. COVID-19 World, the new normal may witness trips only embarked for official reasons and functions and sea transportation would be enhanced. There would be high precipitation of social dynamic density in COVID-19 World as normal way of life.(G. Emefiele, 2020); (Hogan, 2006).

More structures would be converted to warehouse, humanitarian institutions and hospitals and cottage industries. Reminiscent of the thought of T. R. Fehrenbach in his Book entitled 'Korean History' reflected the work of General Walton H. Jonny Walker thesis on 'perimeter' as he illuminated on 'the need to learn to ride hard, march hard, and live light and to co-operate in what he referred to as the 'isolated column'.

Postmodernism also, argues that, control over knowledge is increasingly becoming more marketable as the major source of power. Knowledge, they added, is no longer an end in itself, but something to be bought and sold, perhaps, even fought over and therefore, advocated for a new vista of understanding society as a response to logical positivism and quantitative analysis to inform theorizing COVID-19 world.

The postmodernist argues that, discovery of COVID-19 as a social reality characterized by social distancing principle and lockdown lie significantly on who has the primary source of such claims with the privilege of the claim passed on to wide variety of demography and that is what is called in postmodernist as (self-legitimation).

Jean Francois Lyotard argues that science is unable to get rid of itself of chains of narrative and knowledge. The application of scientific method to the study of social phenomenon, to Lyotard, is a deliberate attempt by the Positivist School to distance science from social convention, i.e. to ( keep sociology separate from the social life) so that, it can remain objective to the members of same scientific community, with same orientation background and belief system and therefore, advocates a postmodernist approach as a philosophy of discovery with the power of erasing borders in instantaneous manner.

Postmodernism, as a philosophy, says more of the social life in the most developed nations with enormous power and influence to control power as it's the case for COVID-19 era as a philosophy as well as a development strategy to drive globalization through institutions for change synonymous to post COVID-19 society; 'The New Normal'. He further argued that, the theory does not require procedural and tedious processing of scientific tools and its application but simply by 'language game' and credibility around it to ensure positive change with tremendous opportunity and mass production.

According to the postmodernist theorist, application of such rules by logical positivists are somewhat, outdated, hence they clamour for an alternative way of establishing social reality to bring about in the society. Postmodernism believes that comprehensive analysis of social facts, and discovery to give better description about the ‘why’ and ‘how’ of a social phenomenon such as COVID-19 is possible with the utilization of dominant institutions, literate society from the whims and caprice of tradition and culture to a more simplified, dynamic and tough society in which knowledge is seen as commodity typical of COVID-19 world of the new normal.

**Sociology of COVID-19: 'The New Normal' and the Nexus Between Marxian and Weberian Notion of Society**

The New Normal as the name implies is an 'Ideal Society' and this is to the credit of Max Weber who constructed an ideal type of rationale-legal bureaucratic organization with the following characteristics as activities required to achieve organizational goals are distributed in a fixed way as official duties. This feature of a rational legal bureaucracy has stressed the importance of Kinsley Davis and Wilbert E. More theorizing on stratification system for each official has a clearly defined area of responsibility for the attainment of organizational goals in a rational legal bureaucratic setting. Complex tasks are broken down into manageable parts with each official specializing in a particular area. Bureaucracy's complexes and dynamic structures of institutions are intertwine just like the thoughts of Max Weber and Karl Marx are inseparable because you cannot talk about economic system that is achieved via e-institutions without the electroneous E- social value of human resource capacity and as E-electroneous representing (human resource capacity, IT and otherwise) as advocates of social PEN theoretical components being prime source of decision making at all levels as COVID had engaged the E-component capacity for bureaucratic know-how dealing with the pandemic at the centre of decision making at the level of UN and policy formulation at level of various governmental levels as bureaucrats and/or administrators are working round the clock tirelessly briefing media to get out of COVID-19 quagmire. (Max Weber; 1947)(Karl Marx
The New ‘Normal’ is return to normalcy as post pandemic atmosphere, a leeway establishing a sort of society built on the very foundation of Weberian lines of thoughts of an enhanced rationalization of man's life from all ramifications, hence establishing the nexus between Max Weber’s notion of society and thoughtful beliefs around his theory of protestant ethics and spirit of Capitalism' and Karl Marx theory on society and production of surplus value accumulation through the role of e-institutions for the enhancement of e-capitalism as an economic system. The two theoretical positions are relevant not only because of COVID-19 but as gear which moves society forward since time immemorial and therefore, 'The New Normal' would not be an exception to societal fundamentals and the roles of institutions that has been in- termed in the recent history of man's existence. Corollary, to that, would investigate under this theme.

Some businesses are successful and some others are failure because an entrepreneurial activity has a social PEN structure to suggest the directions of business and investment fortunes. The social energy of (+n) provides powerful tool for causal analysis on how to rationally minimise cost and to maximise profit by rationalization akin to (Macdonaldization) of business enterprise in a manner rationally weighing cost and benefits of investment. Social PEN structural change of individual mind will be at work to enable objective, unbiased and rational decision in business, provided the manager is equipped with sufficient Protoneous P+ resource capital funding and Electroneous E- human resource for causal analysis of business trend and pattern to enable Atomic structural analysis of risks that are apparently invisible along demand and supply curves and fundamentals for appropriate utility.

Utility as social value is synonymous to the social philosophy and thoughts associated with J. Bentham and J.S. Mills (thoughts precursor such as T. Hobbes, J. Locke and D. Humme) that placed the satisfaction of the individual’s want (utility) at its core. Consequently, as the greatest good was defined simply as the greatest happiness of the greatest number of people with consequential effects on social action in which individual rationally pursue their own self-interest and it's conception of society as the aggregation of social Atomised individual united by self interest. Hence, understanding and reading the directions of social PEN structure for change ensures optimal utility and it enables chances in business and ability to employ the social PEN structural analysis influences one’s business over another to produce more Protoneous P+ value of capital funding in relations to structures of the business and more opportunities for investment over another. This is what social PEN structural theory of change is trying to give description of social life in business related venture for utility and investment.

There is no way one can talk about social investments within a newer or an innovated environment that has been altered due to the impacts and COVID-19 pandemic without asking fundamental questions on risks assessment, groups networking and some basic social and economic decisions. Thus, the Weberian theory of 'objectivity in sociology and by extension other disciplines in social sciences is to provide deeper understanding of the complexes and dynamic structures of how capitalist system and its e-institutions are ideal for 'The New Normal’ ‘work from home’.

This reduces burden of payment for office accommodation due to COVID-19 pandemic with a view to guarantee development as Weberian wants us to believe in what he referred to as 'Objectivity' in social science with particular emphasis on Sociology of Professor M. Abdullahi, (1998) shared similar feeling with Max Weber's perspective of Sociology. (Marx Weber; 1947), (Karl Marx (1978[1867]) (Robert K. Merton; 1968) (Spencer H. 1971).

I can vividly recall as he then said that “Sociology is the scientific study of human social actions and interactions. Sociological knowledge is objective and NOT subjective. It is scientific and theoretical owing to the discipline’s approaches and application of scientific methods in practice and analysis of society as a social system”. He further added that, “the objectivity of the discipline does not depend upon the attitude of a researcher, but public evaluation done by the researcher. This view point has reinvigorates Sociology as the mother of all sciences and geography provides the environment as enabler for practice”. Corollary to that, Prof. M. Abdullahi, like Max Weber, agreed that, Sociology enables the social thinkers and its practitioners to better understand and situate any global problem such as COVID-19 pandemic within the context of Weberian causal explanation and cultural interpretation of diverse human race from around the world who suffered COVID-19 pandemic and the way forward to avert the social impat and rejuvenation of structural failures, fractured and resuscitation of the failing ones or those that had faced elimination, comatose or extinction. This is only possible when the social PEN elements play simultaneous roles and perfect PEN configuration, ensuring protoneous P+, electroneous E- and N for calibrations of all structures that had suffered for COVID-19 pandemic to attain social, economic and political context. The relative equilibrium and the approach has, to some extent, a Verstehen approach combining (both Aktulles and Aklarandes) to achieve reconstruction of society in Post COVID-19 pandemic for change and good of all and sundry. (Marx Weber; 1947); (Musa Abdullahi, 1998).

Vestehen approach is a way of dealing with social issues in the society as a whole looking at the social action of the phenomenon under investigation by explanation and understanding and that can be achieved by asking fundamental questions around: What instrument do we use to measure the benefits associated with post COVID-19 pandemic as 'The New Normal'? What are the comparative cases to be drawn in prior Corona society in terms of factor of production for development to ensure comparative advantage for utilization and success, moving into 'The New Normal’ and beyond? What are the necessary services and deliverables needed for systemic overhaul for overall benefit and development as we usher in 'The New Normal'? What are the states of the institutions prior to COVID-19 and e-practice in 'The New Normal'? How much resources are invested and Protoneous P+ capital integrated to ensure and guarantee value for protoneous P+ capital and return on investment? What competitions do 'The New Normal' provides environment and electroneous E- human resource potentials and capacity for improved production in large scale comparatively for an enhance import/export substitutions to increase Gross Domestic Product (GDP)? Also, how do we woo and/or attract foreign direct investment (FDI) into 'The New Normal' with integrity, trust and credibility and assurance for

Though these questions may sound more of economics than sociological, this is what I refer to as the point of convergence and divergence of Durkheimian sociology and Weberian theory of objectivity and perspectival nature of knowledge and relativity in sociology. When Durkheim wanted to isolate and differentiate sociology from other disciplines, Marx Weber debunked and argued on the contrary and showed the link and interconnectedness of sociology to other disciplines, necessitating the aforementioned questions.

For instance, how do we employ Weberian theory of social action and explanatory interpretations (vestehen) and causal explanations to improve on policies of government, especially in post COVID-19 pandemic 'The New Normal' with a view to better the lives of the individual members of the society? If Marx Weber's causal analysis is a preliminary to inquiry into cultural significance of social phenomena; then we can ask questions around new policy in 'The New Normal' and beyond as: Is the policy people-centered? Whether or not the new policy conforms to people’s needs and expectations cum 'The New Normal' standard operational procedures as prerequisite and as well as post modernities achieving newer cultural inclination?

What policies do we intend to establish in Post COVID-19 society or improve upon the existing ones as e-practice? What are the options to the new policies to come soon and what are the backup plans? What provisions for substitution and what are the obstructions or inconveniences to such new policies in 'The New Normal'? What is the relationship between the new policy in 'The New Normal’ and the existing ones as hangover of Corona virus ridden societies? How is the new policy different from similar policies for Example say in Nigeria and elsewhere? Is the new policy evidence based? How do we benchmark it to global best practice? What is the degree of sustainability of the envisaged policy in post COVID-19 society 'The New Normal'? According to Max Weber's preliminary inquiries, objectivity and causality also allow to ask questions such as: What economic benefits should it bring to the doorsteps? What is the level of commitments on the side of both government and citizens as individual members of the society? How is it a support for national ambition as always reaffirm by David Kiegele and as he uses to champion? As far as Sociology is concerned, Max Weber was the first analyst of bureaucracy and he sees it as an ingredient for the expansion of capitalism and provided an ideal portrait of bureaucracy with norms and values system as 'The New Normal'. Weberian and Marxian sociology like other theoretical considerations are interdependent and interconnected and so are other theories in sociology.

No one theory is independent of others, but they are all intertwined. No capitalist development will take place without the social configuring of the PEN component of Protoneous P+ capital integration, electronic E- human resource capacity; talent knowhow and the power of IT, industries and Neutroneous N calibration of structures to attain context and relative equilibrium. No industry survives without taking major economic decisions of what to produce; how to produce and for whom to produce? These decisions are taken by the electronic E- human resource capacity as bureaucrats for subsequent change in 'The New Normal’ and beyond enhanced return on investment and that would have consequential effects on productivity and effective service delivery in 'The New Normal' as a milestone for overall development in the history of mankind.

Marx Weber was of the believe that, for such a development to happen in any organized set up, we need a charismatic leader to champion the crusade that should allow successful outcome and such a leader should possess qualities of a 'Supra-Mundane Personal Master like' sort of personality; a highly charismatic personality to influence the course of organizational goals in 'The New Normal' and beyond. Max Weber has also provided three discrete but interconnected realms of sociological concepts such as Class; Status; Party and the corresponding variables as Economics; Politics and Culture respectively, as inevitable social situation to define bureaucracy, people, leadership and good governance especially, in 'The New Normal' and beyond postmodernism society. (Marx Weber; 1947), (Karl Marx (1978[1867]) Robert K. Merton; 1968) (Spencer H. 1971)

There is also, a chain of command and responsibility and the operations of bureaucracy are governed by a consistent system of abstract rules which limit the power of those in the position of authority and hence, establishing Durkheimian notion of the 'Division of labor' which Karl Marx in his radical posture and contrary opinion referred to as 'Alienation' to mean, what you have generated by your own actions and talent is favorably competing with you and to some extent limits your behaviour in an organized setting.

Independent of bureaucracy and its fundamentals is the role of e-institutions and activities of man as a driver for change and life improvement engagements. Classical example is Weberian rationale action and McDonaldization, according to Marx Weber used to optimize business by cutting cost and maximizing profits. 'The New Normal' as post COVID-19 society has embraced newer cultures such as 'work from home' which has tremendously reduced and cut off pay for renting spaces and office accommodation for maximizing profit with COVID-19 and transition to 'The New Normal' as a new lease of life, everything would be on internet, fragile business are to gear up in their enterprises conforming to the newer culture entrenched by COVID-19 and beyond it's standard operational procedure as prerequisite. This is positive stage in man's and societal development as envisaged by Auguste Comte as scientific stage of societal development such as 'internet of things' (IoTM2M). Macdonald is a merchant who operates continental business by applying Weberian rationalization of cutting cost and maximizing profit as the newer business environment into 'The New Normal' may stand to portray.

Sociology of Covid-19: Political Sociology, Imperialism And Development Strategies

Sociology of COVID-19 tells us the perception of the people from around the world in relation to COVID-19 pandemic, social groups political attitude, behaviour and knowledge of power relations and change, including social relationship among countries and how influential is the power behind COVID-19 to change the behaviour of individuals and groups at the community level and by extension the society as a whole. Under this sub-theme, Sociology of COVID-19 intensifies efforts to gather as well as analyse public views and conceptions about COVID-19 and challenge man's social and poetical milieu while applying
cross-sectional approach to interrogate the general feelings of the members of the society about COVID-19 pandemic with a view to marking a longitudinal projections of the causes and the changes as well as highlights the sociological effects of COVID-19 pandemic on individuals, groups and community members with a view to understanding the negative effects as social problem faced by community members as a result of COVID-19 and then proffer solutions – short, medium and long-term as available data would suggest remedies and solution around humanitarian gesture as palliative to cushion the hardship being faced by individuals in diverse societies.

The expansion of corporation and enabling business environment for meeting local demands has made it possible for the need to have more raw materials and the impact of globalization has made many countries around the world richer than what they were at the expense of the poorer countries. A nation's development should be understood from the point of view of its relations to the political power, a rightful business environment, means of productions and distribution and activities of countries and relations to those with enormous political power determines the power relations amongst or within countries. Since the political structure and power of a nation state is the reflections of, and determines her political behaviour and by extension the changes that may take place within the physical environment.

The dynamics which define monetary and fiscal policies of smaller countries are also determined by their political arrangement and inclination with the superpowers and political structures of their respective host countries and their zeal to succeed ensuring change and development of a given nation state. Although, modernization paradigm emerged as a response to dependency paradigm and later postmodernism for globalization of social, economic, political and religious, to some lesser extent, and the power of technology has been dominant to achieve the Millennium Development Goals (MDGs). However, all of these are possible only with Social PEN reinvigoration and role equivalent of P+ and E-. The P+ here means the protoneous capital integration for liquidity of economic system and E- value of human resource capacity of the citizen in IT and building their hands for constructive innovation and invention that would create competition within the global economy and host country's revamping of all ailing industries and for the creations of new one in tandem with global needs and expectations for the stabilization of 'The New Normal' however, in essence, that's what the social PEN theory of structural change stands to explain and discover as a new vista making inference to social life from Atomic properties Dr. Mustapha Bintube (2020); 'The Social Atomic PEN Structural Theory of Change' International Journal of Scientific and Research Publication Doi: http://dx.Doi.org/10.29322/IJSRP.

Similarly, since time immemorial, the history of man has been characterized by monumental events and happening which determine the survival and wellbeing of humanity and that has also, defined man's relations to the forces of production, distribution and economic decisions of what to produce, how to produce, for whom to produce and the urges for those questions were (and still are ) correlated with monumental historical events as Slave-trade (slavery), colonialism and neo-colonialism, dependency and to modernization and that chain trickled down to postmodernism as threshold for ushering in COVID-19 world of men with USA and China at the centre while the peripherals are gradually collapsing getting into a state of recession and dissolution to give change for globalisation and the idea behind globalisation is 'One World'. Social distancing is the power which precipitates the human and Corona virus is ravaging and killing citizen of the peripheral nations and the super powers are not exception from the ravaging nature of the phenomenal COVID-19 pandemic.

The notion of development in modern capitalist society and the dynamics around development vis-à-vis imperialism is to the credit of Vladimir Lenin, in his book, "Imperialism is the highest stage of Capitalism', 1917"; Max Weber’s book on the "Protestants ethics and the spirit of capitalism”. Capitalist economic and political domination are not new things. There was push and pull around credibility and responsibility of whether or not one of the two countries; USA and China would be responsible for the COVID-19 pandemic. USA is blaming China and China is turning 'donkey ears'. USA President was asked by a journalist at the White House press conference that COVID-19 is a catastrophe of global magnitude and why is it so? The USA President in response felt that question was so nasty and retorted, "Ask China". USA and China are in face-off using threat words at each 'bloc', suspicious of each other while COVID-19 is ravaging humanity around the world.(D. Triumph, 2020);( Lenin V. C 1971);( Marx Weber; 1947).

Similarly, the recent scenario around global economic and political scene, especially the USA and China trade deal of December 2019 has generated major socio-economic and political issues. Beyond that, it has the potential of impactful political life of the world population in so many different ways. The fact that human society evolves from one phase to another cannot be downplayed as the doctrine of Darwinism. This is more of a fact than an assumption or a Mirage and this viewpoint has been corroborated by the very tenets of (evolutionary theory of Charles Darwin) which suggests that human society progresses in phases and each phase has its own characteristics peculiar but similar to the previous kind of society from which the new society emerged and each phase is characterized by struggle and survival of the fittest. Those passing away for COVID-19 pandemic may be an account for the tenets of Darwinism survival of the fittest. (Durkheim and Mauss, M, 1703);( Darwin, C. 1859);(Spencer H. 1971);(Lenin V. C 1971).

The sick and those with terminal illness are locked down at the very first phase of change. Again, this is reminiscent of the debates among 19th Century philosophers such as Durkheim, Montesquieu and August Comte on the nature of society moving from simple homogeneous to a more complex one, heterogeneous and globalizing and COVID-19 world is normalizing. A World well configured with social PEN fundamentals of P+ protoneous capital reintegration and E- electoneous human resource capacity for change in phases of normalization, a post COVID-19 world of men built upon E- electoneous IT capacity for change and progress of mankind.(Durkheim and Mauss, M, 1703) Karl Marx (1964, [1840]).

However, Sociology of COVID-19 is telling us those developmental strategies, agenda, frameworks, marshal plans for reconstruction of the societies around the world somewhat, have political interest and the dominance of the imperialist has on so many occasions influenced the development or underdevelopment of many countries. In addition to the economy, it also includes

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social life with the power of institutions and COVID-19 pandemic is seen by many as global siege achieved by lockdown and compulsory quarantine necessitated by Corona virus. The present precarious social, economic and political situations and the threat posed by COVID-19 pandemic such as shutting boarders and lockdown has crippled the economy of most countries and economic recovery in post COVID-19 would be a herculean task for many countries around the world due to global power wrangling and competition and the palpable power struggle between USA and China and the COVID-19 dangling situation. The power of China in the world economy is enormous and that has accelerated the dominance of Chinese corporations in the west, China is said to have taken about 17% of the world GDP going into the production of cheap goods with sufficient electroneous E-(human and material resource capacity) and P+ capital for the purchase of raw materials and large productions in postmodern society. The availability of markets and large consumption of her products within, China and everywhere around the world has given China economic leverage with enormous power (David Kiehe,2020).

The momentum of this power wrangling for economic and political pursuit has not only undermined and trapped the economies of the smaller nations, but has equally quarantined them and as well locked them down in their houses with the power of COVID-19 pandemic for the next decision on global scale to determine man’s life in phases still for development interest and gains of the eastern and western blocs at the expense of the rest of the world a business to be determine by Macworld and Rockefeller foundation determination of phase reopening and guide to the world as observed by William Bulum, only the super powers. To say that the USA is powerful is a fact. On the imperialist political and economic power, William Blum, in his Book "The Rogue State" said, throughout the history of mankind, man’s social, economic and political development is controlled by developmental forces acting and reacting upon the society and its institutional arrangement. These forces are changing and shaping the fortunes and destinies of political, social, cultural and religious forces and are crucial for the understanding of the developmental setting of nation state.

Again, each of these epochal events came with its peculiar characteristics and forces which define the history and existence of man and his relations to the forces of production and distribution for change that are beneficial and such benefits are in the interest of one nation over another with consequential effects on man's history and social progress which encompasses; social, economic, political, religious and cultural spheres of man’s life and is today changing by the forces of COVID-19 pandemic. Those events say much about individual country's development or her underdevelopment reminiscent of U.A.Tar, 1998, in his lecture series on imperialism and development strategies in 1998, has this to say, to paraphrase his lines of thoughts on dependency paradigm. He concurred that, the whole idea of development, underdevelopment, marginality and spatial-imbalance between developed and underdeveloped countries of the world, is more or less a vicious circle of international division of labour. He affirmed that the surplus values produced by the peripheral countries were extracted for the use of the metropolitan economy, ‘the centre satellite’ relations. This kind of economic relation, he affirmed, is what most Asian, Latin American and African scholars referred to as; disarticulated economy. In line with the above, the viewpoint of the dependency paradigm has been echoed by scholars such as Andrew Gunder Frank, Samir Amin, Paul Barons, Osvaldo Sunken, Theothonoous dos Santo’s, Emzo Palatal, Puranedo Henrys Kadoso, John Kaltun, Walter Rodney, Ralph Raplksky and to some degree of perceived exploitation Emmanuel Wallenstein. In the words of Claude Ake, those countries at the periphery always have disarticulated economies due to lop-sided power relations. Samir Amin calls it disconnected economy and Ibrahim Ayage often refers to it as trapped economy. (U.A.Tar, 1998).

The power struggle and wrangling between USA and China and the emergence of Corona virus is more than just a coincidence. It's seemingly affecting the population the entire world and not only the people but the economies of many nations have gone into comatose. Smaller businesses, infant cottage industries, informal, semi-formal, indigenous/local techniques are gradually facing extinction for COVID-19 syndrome. The smaller countries’ relations with the superpowers has always been at the expense of the developing nations and their independence as nations has always been undermined, economies jeopardized, shortchanged and exploited. Countries with least political power are always subjugated, segregated or even lockdown and sealed as we can witness so glaring at the time of COVID-19 pandemic.

Similarly, Blum, quoted President Bill Clinton, 1996, in his Book "The Rouge State” while, reiterating the determination of the United States as..."When I came into office, I was determined that our country would go into the 21st century still the World's greatest forces for peace and freedom, for democracy and security and prosperity". (Bill Clinton, 1996) quoted in "The Rogue State” by William Blum.

The notion behind the escalation of COVID-19, to some people, comes with some political interest which is somewhat core as the handball and COVID-19 was perceived by many around the world as it is intertwined with certain degree of interest around MDGs and agenda with entrenched interest and power relation for change in global socio-economic and political fundamentals and that is to be achieved through technological advancement.

Consequent upon that, an x-ray of the Corona Virus pandemic reminds us of tremendous sense that are sociologically inclined and political sociology is there to tell us more about global politics around social grouping, re-grouping and social dispersion for power and change to champion a cause in postmodern societies of men. Corona Virus depicts the ills of postmodern society driven by global capitalism for expansion of social, economic and political system for surplus profit accumulation which looks exploitative, hence antagonistic in nature; a view antithetical to fragile society, which Karl Marx described as a ‘sack of potatoes typical of fragility’. (Karl Marx (1964, [1840]):( Karl Marx and Engels, F. (1950[1808]).

Capitalist economic domination is not a new thing and history has it that in1883 the entire economy of the USA was taken over by financial moguls, the likes of John D. Rockefeller, Andrew Carnegie, JP Morgan, E.H. Harriman and Henry Ford. The global politics for power relation and change around Corona virus is enormous, that has been echoed by Yakubu Mukhtar, 1998, in his
Sociology of COVID-19 is telling us that, COVID-19 can only be transmitted from person to person through human interaction as the core and the crux of the subject matter; the science and discipline of sociology.

There were (and still are) a number of insinuations and feeling about COVID-19 for global change agenda and the scenario around it has completely changed the attitude as well as thinking and behaviour of some people in the society with enormous fear of the pandemic. That has huge implications with differential narratives at global, regional, national as well as the community levels in respect of what COVID-19 really means.

The USA, China economic war and politics around 5G, some respondents claim is the main reason for COVID-19 pandemic. China, they argue, was so fast to roll out 5G networks, sometimes in July, 2019, in the city of Wuhan and that follows USA, UK, France, Italy, Iran and other countries around the world to follow suit and installed same network in some of their major cities.

Primarily the intension was NOT to kill; rather it is inevitable for technological advancement for change and development. (VERDICT with TED CRUZ; 2020)(Mrs. Abdullahi; 2020)(S.M. Innocent; 2020).

Although, the 5G network was known to have been harmful to human, but no one knows the degree of danger it carries and China was the first to roll it out and as the source claimed, they deliberately did so in the city of Wuhan where people eat live animals to justify the fact that, the deaths due to emissions from 5G to virus from those animals that can easily be transmitted to human and source claimed that it was the main reasons why Wuhan was used for the test of the technological innovation. (Mrs. Abdullahi; 2020)(S.M. Innocent; 2020).

However, the effects of the radiation from the 5G, the source claimed would take nothing less than 5-6 months to evidently manifest as science made us to believe that. The source also, believes that the casualty/dead bodies due to radiation are used as samples for experiment to carryout research with a view to understanding the effects and damages to human cell and to quickly write a code that can quickly prevent damages that should have taken place within the bio-system. Those that are dying from COVID-19 now are collateral damage that must take place before vaccine and drugs are discovered to calm down the situation,(VERDICT with TED CRUZ; 2020)(Mrs. Abdullahi; 2020)(S.M. Innocent; 2020).

Nonetheless, sociology of development is there to tell us the motive and intent behind COVID-19 as Emilie Durkheim illuminated ‘capitalism as ills of the society’ characterized by social disorganisation as human are today disembedded from the context of social relations via social distancing, albeit for the protection and common good of humanity to get rid of Corona Virus and it's okay. Some were of the believed that, COVID-19 quagmire is aided by a world driven global politics and it is antithetical to bio-system (human); (Durkheim and Mauss, M, 1703); ( Karl Marx (1964, [1840]).

A turning point in global history and corona virus is paving way for the emergence of a new world of information technology (IT) and the role of sociology in this regard is enormous to rescue society from the social ills of corona virus, the most common of it all is suicide, depressions and cognitive dissonance and burnout from work overload.

We require social psychology to add more to the understanding of individual’s feeling, cognitive thought processing and behavioural disposition of individuals in the society for attitudinal change while encouraging social distancing, elbow greeting so as to handle and contain the so-called filthy Corona Virus epidemic for an overall protection, prevention and control which is perhaps, the base line for analytical examination by the medical sociologist.


Sociology of COVID-19 is telling us that a lot of families and groups attached to smaller businesses, especially in informal and semi formal sectors in the society would face the consequence of COVID-19 as we usher in ‘The New Normal’. Employer/employees relationship would be in sour and labour crisis, disputes, litigation and arbitration would be high in post COVID-19 society and there would be increase in consensus building for solution in the short term to handle the situation. The impact of COVID-19 has pulled down informal and semi-formal business and that has affected the employers from getting value and return on investment and the employees’ job too is facing threat or risk of losing their employment and that assertion has been supported by finding of several researches including that of the ILO.

Similarly, Out of the 389 million global demographic strength of workers in the informal and semi formal workers, 232 million of them engaged in wholesale and retail trade and the sectors account for 30% of the GDP and represents 70% of global employment in retail, 60% in the accommodation and food services sector and that is a reflection of the severity and vulnerability posed by COVID-19 which requires immediate fiscal policies as shock observer with huge stimulus package on the short and medium term. (ILO, April,2020).

Workers whose earnings are below 50% of the Median earning in the population are worse hit. As at April, 2020 it was projected that about 45% of the workers whose income are below 43% of the median earning, especially in informal businesses would face poverty and 21% in poorer countries globally.

Employer and employees of lower middle income earner countries are affected as their businesses are characterized by informality with limited fiscal policy to quickly respond to the needs and expectations of enterprise and informal businesses with high risks of insolvency. COVID-19 lock down has crippled smaller business’s with ease of lockdown, a lot of businesses would face challenges and therefore, need to struggle to get back on their feet and such recovery would be slow and that requires calibration around fiscal and monetary policies and that of the business environment need to be safe and secure injection of protoneous P+ capital and electronic E- human resource capacity of the social PEN theory to change business structures is necessary for
business adjust and as well put in place a mechanism to reflect the change and realities of IT environment and it has cost implications. The N element of the social PEN theory as Neutroneous business norms and systems to enable resuscitation of the global supply chains that has already been disrupted by COVID-19 pandemic and revival of the forward and backward chains of global supplies as COVID-19 has affected business activities all over the world and reduction in economic activities are rather galloping with slow phase and that, requires boost in the physical and monetary policies to enable some calibration of the P+ and E- as booster for businesses to get back to context and relative profit margin and that has to be gradual to reach equilibrium. However, for those businesses to come to normal there may be new policy and requirements that may come with the reopening of business as another challenge that constrain business.

Sociology of Covid-19: Summary of Major and Minor Findings

Qualitative data obtained from the sample frames in relation to the narratives about the genesis of Corona Virus severity and the social and economic impact of COVID-19 on socio-economic structures and the possibility of post pandemic changes to shift paradigms are eminent. The survey also probes into consequential effects associated with COVID-19 pandemic and narratives build around it and proffered the way forward. The survey also interrogates the study population on difficulties achieving effective and all-round compliance to distancing guidelines, especially in designated high risks and vulnerable societies cannot be achieve due to human factors such as feeling, emotions, habitations and the need for 'sociation' has greatly hindered social distancing measures.

The terms "social distancing", "physical distancing" and "Social Telesis" were first coined and operationalized by Hogan in 2006 pg. 331 and pg. 332 respectively. The most appropriate term to describe human social grouping vis-à-vis distancing from groups is the term 'Social distancing' and NOT 'physical distancing'. However, as corroboration to Hogan’s definitions, this research discovered that, social distancing is more appropriate terms to be utilized and therefore, there is nothing like physical distancing when talking about social interactions as enabler for the transmission of COVID-19.

Members of the society can be physically distanced yet, socially connected. Therefore, physical distancing is more of providing the physical description of the space in relation to inanimate objects in terms of measurement. Human may be distanced from one another, yet socially connected and the space in between human is referred to as social distancing between animates human as opposed to inanimate objects. So, social distancing is the most appropriate term because it doesn’t take away the social aspects by distancing. COVID-19 can only be contracted or one get infected through social interactions and the inverse is social distancing as mitigating measures to get rid of COVID-19 or Corona Virus.

There are empirical evidences to support the fact that, the rate of criminality at community levels was high, especially at the time of the lockdown and height of the pandemic. Recent happenings suggest and finding from respondents confirms that youth’s unrest, looting, organized protest, gangster and other criminal activities were slightly higher than prior to the pandemic due to job losses and panic around unknown. Qualitative data suggest that, vices such as stealing, armed robbery, burglary, theft, pilfering, shoplifting, harassment of law enforcement official during lockdown for COVID-19 pandemic was rather glaring. The finding also shows that COVID-19 has carted away jobs; hence the disobedient individuals in the society were left with no options than to revolt resounding thoughts of (Tom wicker) typical of American prison revolt. Conversely, on COVID-19 pandemic, the research establishes that, more than 426 million smaller businesses, informal and semi formal are faced with severe disruption and 1.6 million of informal economy workers accounting for 76% of informal employment globally were seriously impacted.

Similarly, Airline has lost about USD 252 billion in revenue in 2nd quarter 2020 and this is a huge threat which has curtailed the social electronic (E-) social value of rendering human resource capacity that should improve labour and enhance services and evolution of structures for the benefits of mankind. Some of the findings suggest that the USA has taken a proactive measure by longitudinal survey while looking into the future with the aim of arresting any evolving conditions related to COVID-19 pandemic while forecasting dead to increase from 80,239 in April to rise approximately, 137,000 come August, 2020 due to increase in human traffic connection and social mobility of both macro and micro population during the first phase ease of lockdown. Qualitative data obtained has supported the fact that, the USA is among the worst hit countries by the pandemic and to reinforce the significance of the measures taken by the USA to project the implications of the pandemic.

Sizeable respondents have agreed that, the dead and the impact of COVID-19 pandemic has inverse implications on the electronic (E-) human resource capacity of the United States of America (USA) and that of the world at large as the consecutive estimate and statistical strength of affected persons for COVID-19 across the globe as at 11th, May, 2020 stood at 4,165,752 confirmed cases and 285,307 death on global scale. Again, literature and empirical findings suggest that the pandemic has overwhelmed the electronic (E-) human resource capacity of not only the USA but many other developed nations. The health care systems ranging from hitherto, testing capacity to healthcare workers of otherwise viable healthcare system with limited beds to admit COVID-19 patients were overwhelmed, talk less of ICU and ventilators as it was apparently the case in most developed nations of the world at the height of the pandemic.

There is strong qualitative evidence to support the finding that, COVID-19 has disrupted 436 million enterprises, 232 million are retailers and wholesalers globally and COVID-19 has risked and threatened 1.6 million informal workers across the world. The sociological implications is that, the family independent and relations of those directly affected by the pandemic, would have to experience major shift and by approximation about 500,000 household globally would need support around small and medium scale businesses and loans to cushion their hardship. The philanthropist, industrialist, diplomats, bureaucrats and technocrats, including good Samaritan to help contribute in their professionalism to volunteer in supporting the government in creating public health awareness, contribution of material and

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non-material items to support the fight against COVID-19 pandemic, ensuring healthier and COVID-19 free society. Community volunteering efforts among citizen must be recognised and respect the people they are dealing with for who they are and as well accept their value systems and to see them as those in need of help irrespective of their social class and status. The whole process of achieving voluntarism should be home supported and home enabled for quick and win-win successes against COVID-19 pandemics around the world.

The source also claims that the whole programmatic action plan behind COVID-19 boils down to two options of 'life and death'. Some believe that the objective behind COVID-19 is centered around three fundamental prerequisites of 'one world economy', 'one world government' and 'one World religion'.

Some hold the belief that 'COVID-19 is to cage humanity and take over power to be controlled by few individuals and big corporations utilising ‘artificial intelligence’ so that, human beings can be manipulated and controlled, same as machines for developmental, businesses and life essentials.

Some hold the belief that COVID-19 can be fought to the letter while others are pessimistic and doubtful of its control while looking at our setting as human and the building designs around may permit and promote more of transmission as 'must-hands-hake' and association for cultural group inclinations at community level.

For some, our attitude hardly allows people to observe social distancing guidelines and not to take anything serious to support government initiatives and to see it as crucial and that calls for an aggressive, unrelenting collectivisms of prompting social action guidelines and credible enforcement around compliance and respect to laws and order ending COVID-19 pandemic in our diverse communities.

Electronic sources and qualitative evidence have proved that patients could be seen lying on the bare floor at various hospitals and persistently coughing some symptomatic while others asymptomatic but the degree of their illness could not be measured as this research is more interested in narrative and social impact and effects of COVID-19 pandemic on social structures than the health aspect which is purely medical.

Therefore, some respondents were of the opinion that serious enlightenment campaign be mounted to discourage interpersonal contact, to stop or rather employ conscious effort to avoid it and block or reduce the chain of spread.

Small enterprises from around the world are the providers of jobs all over the world, especially in low and middle income earners countries. Corollary to that, a number of smaller businesses would perish due to lack of access to credits and loans with weak capital base and are more likely not to benefit from fiscal measures.

There is strong evidence for an increase stigmatization, only during COVID-19 pandemic. Vancouver police recorded 20 hate incidences in 5 month compare to 12 altogether in 2019 mostly directed on East Asian, and they were looked at with disdain for COVID-19 blossomed from China. The attitude of the public on Chinese people was disturbing and the level of stigmatization and hate was on the increase. Data reveals that an insulting statements directed at East Asian were recorded as ‘go back to your country, that is where it all started’.

The Chinese were seen with suspicion all over the world for the Wuhan escalation of the novel Corona Virus. There are hate-fuelled incidences and racism and there were agitation and bigotry in Canada and such scenario appeared to be strength for the Chinese and they lament of physical, mental and psychological imbalance for such accusations for just being citizens of China. Chinese all over the world are in great fear, anxiety and some are depressed for the unnecessary harassment. (Globe and Mail, May, 2020).

During the lockdown for COVID-19, many people have lost their jobs and in Ontario Canada alone, about 2.2 million people lost their jobs. In April 2020 alone, statistics reveal that about 689,200 people lost their jobs and unemployment rate rose to 11.3% in Ontario Canada.

The job loss of almost 87% during the lockdown, just within two month and the demographic characteristics of those affected were significantly women from the private sector. About 577,200 women lost their jobs compared to 514,800 men and are mostly from the industrial sector. The job loss has also affected wholesalers and retailers as 230,900 jobs were lost while accommodation and food services account for 215,800 job loss. At least one out of three jobs was affected by COVID-19. Similarly, many have appreciable level of agreement that it is no longer news that hospital beds and other health facilities - safety nets and protective devices and equipment are rather in short supply and the entire hospitals in most dominant nations across the globe have been overwhelmed for COVID-19 cases at the expense of the population who are in dire need of hospitalization.

COVID-19 is no respecter of anybody. Empirical evidence and reliable sources have confirmed that many healthcare workers at different hospitals and isolation centres have fallen victims and contracted the virus. The paramedics themselves are not safe of the infectious COVID-19. Sources also confirmed that, the Prime Minister of the UK had contracted COVID-19.

Equally, the Vice President of the USA and some few White House officials were not exempted from the dreadful, devastating nature of the novel corona virus and quagmirc momentum of COVID-19 which must be discouraged by social distancing measures of at least 6 feet distance as mitigation strategies against droplets or flu from infected person.

Conversely, on COVID-19 pandemic, the research establishes that more than 426 million smaller businesses, informal and semi formal are faced with severe disruption and 1.6 million of informal economy workers accounting for 76% of informal employment globally were seriously impacted. Similarly, Airline has lost about USD 252 billion in revenue in 2nd quarter 2020 and this is a huge threat which has curtailed the social electronicus (E-) social value while rendering human resource capacity that should improve labour and enhance services and evolution of structures for the benefits of mankind.

The enforcement guidelines and the law and order put in place to address excesses of human for the spread of COVID-19 mean

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different thing to different people of diverse population of Africa and beyond? To the poor, fragile and vulnerable it is probably a way of displacement and rejection. For the mentally retarded lunatics who roam the street during COVID-19 pandemic who were evacuated by the enforcement taskforce for safe keep and who at some instances and subsequently referred to either relevant institution or isolation centre, it means an improved livelihood for survival and a source of free food at the cost of government budgetary expenditure for the control of COVID-19 pandemic. Human society tends to evolves from time-to-time and some of the changes are positive (+) while others are negative (-) and it is enabled by social PEN energy of (+-n) to complete the circle. Again, some of these changes are socially visible while others are socially invisible, but it has to happen at their social indivisibility. Similarly, others have divergent opinion that COVID-19 came from live animals and attributed the virus to the Chinese who live in Wuhan and are used to eating live animals such as reptiles and seafood, frog, snake etc, hence they got infected of COVID-19 from those animals. On the 1st of January, 2020 COVID-19 was declared as the first patients in Wuhan started experiencing symptoms of the sickness on 1st of December, 2019. COVID-19 is sending humans to their graves, cemeteries are full and cued, yet there is negligence at community level, especially in most vulnerable ones where touching and kissing corpses suspected to have died of Corona virus due to traditional and cultural forces as goodbye blessings are rampant. While for some segment of the sampled population studied, Corona virus otherwise, 'SARS-COV-2' abbreviated as COVID-19, some critics have contrary opinion to connect COVID-19 to mean 'Certificate of Vaccine ID-19' (COVID-19) translates Corona virus to reflect a global economic domination through the power of 5-G network radiation which according to the source of the data may have positive relationship with microchips to be implanted through vaccine and crypto-currency bit coins to regulate the economy and as well determine online transactions as the 5-G is having higher emissions, more powerful, capable and faster than the 4G that has been in use. There are speculations in some quarters with some political commentators describing Corona virus as genetically manipulated, so powerful to shape humanity for structural change and its fundamentals; social, economic and political life and the forces of COVID-19 as pedestal and leeway to the threshold of a new world of human. Although, the 5G network was known to have been harmful to human, but no one knows the degree of danger it carries and China was first to roll it out and as the source claimed they deliberately did so in the city of Wuhan where people eat live animals to justify the fact that, the deaths due to emissions from 5G to virus from those animals that can easily be transmitted to human and source claimed that it was the main reasons why Wuhan was used for the test of the technological innovation. Social distancing is the most appropriate terms because there is an existing literature to support 'social distancing'. There is nothing like physical distancing as insinuated by some scholars. The term isolation has underscored social distancing. When someone is isolated, means he/she is off the human scales of social actions and interactions situation. So, social distancing is social segregation or social dispersion from social groups. Members of the society can be physically distanced to maintain the space but still socially connected. In an interview situation you can be physically distanced due to space, but socially connected as you gauge responses of the interviewer and it’s called social scientific interview situation and NOT physical space interview. When you talk on phone with someone in strict sense of social, it doesn’t mean that you are socially connected and therefore, the most appropriate definition of the term social appreciates social networking in practical terms and ability to connect sense perception verbal and non verbal responses. The finding of this research has confirmed that, there are early warning signals around suicide due to depression, acute anxiety and mental imbalance for the devastating nature of COVID-19 and a further excessive regulation of the society and deregulation, emerging inflation, hunger and starvation are on the increase, especially at the height of the pandemic before it gets to normalcy (post-COVID-19). After all, the society is already tensed-up and tough dealing with socio-economic issues. Sociology of COVID-19 examines the social ills and conflict situation associated with COVID-19 pandemic. The enforcement guidelines and the law and order put in place to address excesses of human for the spread of COVID-19 and its enforcement too may altogether be value laden, i.e. a different thing to different people as COVID-19 law and order and/or enforcement guidelines are established to curtail the spread of COVID-19 and what does it means to the people of diverse population of Africa and beyond? The COVID-19 enforcement guidelines mean something different for the poor, fragile and vulnerable and probably a way of displacement and rejection for them. As for the mentally retarded lunatics who roam the street during COVID-19 pandemic who were evacuated by the enforcement taskforce for safe keep and who at some instances and subsequently deferrals to either relevant institution or isolation centre, it means an improved livelihood for survival and a source of free food at the cost of government budgetary expenditure for the control of COVID-19 pandemic. There are speculations in some quarters by some political commentators describing Corona virus as genetically manipulated, so powerful to shape humanity for structural change and its fundamentals; social, economic and political life and the forces of COVID-19 as pedestal and leeway to the threshold of a new world. Although, the 5G network was known to have been harmful to human, no one knows the degree of danger it carries and China was first to roll it out and as the source claimed they deliberately did so in the city of Wuhan where people eat live animals to justify the fact that, the deaths due to emissions from 5G to virus from those animals that can easily be transmitted to human and source claimed that it was the main reasons why Wuhan was used for the test of the technological innovation. However, the effects of the radiant from the 5G, the source claimed would take nothing less than 5-6 months to evidently manifest as scientifically. The source also, believed that the casualty/dead bodies due to radiation are used as samples for experiment to carryout research with a view to understanding the effects and damages to human cell and to quickly write a code that can quickly prevent damages that should have taken place within.
the bio-system. Those that are dying for COVID-19 now are
guinea pig or sacrificial lamb before vaccine and drugs are
discovered to calm down the situation.
A community may record death of a prominent person that could
lead to condolences and handshakes with some other members of
the same community. Many get infected in the process and all of
these happened because COVID-19 incubation period is time
bound and the symptoms are PEN invisible, hence people don't
care about it, mingling and humping around sick persons.
Something urgent needs to be done to curtail the rate of the spread.
Most people get into depression, distress boredom, anger and
aggression causing serious psychological imbalance, cognitive
overload and dissonance to inform escalation that may call for
hospitalization. In April, 2020, more than 102 export restrictions
were placed by 75 countries over 120 countries were subjected to
lockdown during the pandemic.
COVID-19 was perceived as paving a path for a post COVID-19
society, a world guided by the philosophy of postmodernism to
bring about mass production, create competitive environment
while delimiting space and time for enhanced business and capital
reintegration for competitiveness with higher intensive on
economy, a society of human driven by IT for better tomorrow.
Government hospitals are apparently lacking in the necessary
tools; test kits, PPE, etc. Hospitals that are functional operate
below optimal performance, grossly inadequate; medical
personnel are ill trained and ill equipped to handle special cases
related to the novel Corona virus and those who were tested and
found positive are referred to isolation centres.

Considering the devastating nature of the pandemic, the
government of the USA appropriated 113 million (One Hundred
and Thirteen Billion Dollars) to achieve testing and at least 1.9
million of her citizen have been tested in the second week of May,
2020 through hospital and community testing programmes.
The inter-states lockdown which has trapped individuals who, on
a normal routine, move out of their county to get orthodox
medicines and traditional herbs; integrated healing charms from
their traditional and personal physicians respectively are now
confused on what next to do due to Corona virus pandemic. Those
people are left at the mercy of their immediate community for
healing and many may eventually pass on due to the ailment
aggravated by hopelessness, especially the aged and those with
underlying health conditions who are more vulnerable to COVID-
19 pandemic.

In addition to the fear of the Corona virus and the consequential
rising cases of infected persons that is yet to witness decline, there
are hunger related cases associated with the pandemic apparently
due to incapacitation and inadequacies around palliative to
cushion the hardship caused by COVID-19 pandemic.
COVID-19 or Corona virus would perish over time, but the impact
would remain for a long time. It has caused major shift, some
reversible while others have come to stay and evolve furthermore
to advanced stage to change the world. Sociology as a discipline
is relevant at all times to provide analysis about society and the
relevance of the science of Sociology in providing analysis about
man and his environment cannot be discarded nor underestimated.
Sociology is everywhere to say everything about humanity
and change in all sphere of our existence as human in a scientific
manner.

Fight against COVID-19 pandemic, especially in volunteerism
requires tremendous sense of camaraderie demanding maximum
cooperation and therefore, the relationship between the law
enforcement and civil volunteers is necessary to enhance
compliance to guidelines and general security of the community
members and that also has to be supported by the government to
achieve success in the fight against COVID-19 pandemic.
Qualitative empirical data obtained from informant explores
challenges in most vulnerable, weak, fragile social groups in areas
where criminals are preponderated and those communities may
end up adding up to the existing crime statistics of the police
during lockdown for COVID-19 pandemic if volunteerism is not
enhanced to contain those excesses to free the society of crime
during COVID-19 pandemic.
Available studies and findings have suggested that Corona virus is
relative to geography, race weather, environment and climatic
changes. Therefore, the impact varies from country to country
and the USA are ten times times more likely to be infected and
four times (4) likely to die of COVID-19 pandemic.

XII. SOCIOLOGY OF COVID-19: CONCLUSION AND
RECOMMENDATIONS

The research has discovered strong empirical evidence supported
by theoretical grounds that in the absence of empiricist and
scientific discovery of drugs and vaccines for the cure of diseases,
not only COVID-19 but any other disease capable of bringing
upheavals to render humanity helpless poses existential threat to
mankind.
The delay around drugs and vaccine production to arrest COVID-
19 calls for immediate actions by all governments from around the
world to collaborate and nurse scientific maturity to speed up the
process and that includes laboratory science techniques to rescue
individual members of the society at the time of COVID-19
pandemic. There is consistent data to proof that humans can easily
be lured and deceived for anything as cure for COVID-19 and
other diseases without probing into the claim of the so called cure
claimants.
When faced with an emergency situation leading to death, human
attitude can be altered as many compromise science for non-
Orthodox approach solving biological disease and that also
includes the scientists themselves who believe in concoction for
cure without proscriptions, level, instruction and proportionate
scaling of dosage, hence individuals can easily be fooled around
in the name of cure with little effort to justify claims. COVID-19
has made so many individuals in the society to go on fishing
expedition for the cure of Corona, with trial and error everywhere
promoting the traditional, non-conventional herbal medicine and
its development as homegrown dealing with the pandemic.
There is strong empirical and theoretical evidence and data
profiled both primary and secondary suggesting that one fact is
imminent and it is universally unchallengeable that, COVID-19
is a phenomenon sugeneris as reality that, for the first time in the
history of mankind a phenomenon as COVID-19 came to
dominate man's life completely cutting across all facets of man's
institutions. COVID-19 has induced newer culture and fine-tuned
social group networking as well as changes the working of
institutions and man's relations to groups and socio-economic and
political structures in parts and whole as the emphasis of 'structural
functionalism' in Sociology.
Newer changes could take place in the society once structures are altered by any force not necessarily pandemic, but any other force as cause effect and systemic change is necessary as we witness job loss hence the need to support and upgrade the informal sector to attain the standard of business within ‘The new Normal’ business environment.

However, reversal of those changes and or adjustment is inform by the N component of the PEN structure to enables calibration of P- and E- structural elements of a system to ensure change at various institutional parts and levels through human activities and relationship in the society to bring about consolidation of ‘The New Normal’ to attain an indivisible society that is socially PEN as a wholesome society.

There is the need for collaborative effort and support to deal with COVID-19 pandemic as the behaviour of the curve has not been encouraging as it goes up on daily basis. There should be regulations around social mobility and mass human traffic connection and curtailed heterogeneous and unnecessary ceremonies that would allow hugging and dancing. The ease of lockdown in the first phase has been worrisome and individual in the society are not adhering to the social distancing guidelines and precautionary measures and the law enforcement is up and doing in the enforcement. Some countries have slim hope overcoming the virus and having second thoughts of another lock down and interstate restrictions of social mobility to ensure discouragement around human traffic agents for further transmission.

Cross sectional examination of the study population showed that, the level of preparedness of many government from across the world has been weak and that includes the most developed ones, hence the need to look into the future, for containment of any other emergency quagmire capable of undermining rationality of human beings and should similar pandemic like this one erupts, leaders of various nations are to place the most rightful infrastructures in place and around strategic geographical areas especially, the needs to improve on public health awareness and primary health care to ensure containment while placing emphasis on research and development and promotion of establishment and support for institutional research that should interrogate philosophical questions not only in the area of health but rather all facets of human endeavour and to connect those research institutions and their finding as content with other institutions, agencies and parastatals of government charged with the mandate of policy making and development fundamental improving lives of their citizens.

Dissemination of the content masterpiece and finding propelling from findings is also crucial to share with the elites, the political class and strategic managers of manufacturing firms in partnership other entrepreneurs alike for improved policy and enhanced and prepared environment that should nip any pandemic in the bud. Empirical finding has shown that precautionary measures are necessary tools to guard against and overcome the pandemic but the finding of this research suggest individual members of the society were financially weak and as worse hit by the pandemic hence in some jurisdiction could not even afford to purchase facemasks and hand sanitizer, especially members of the hard hit vulnerable society whose earnings relied on and from the non formal sector sources of the economy. Therefore, buying facemasks and hand sanitizers don’t form part of their scale of preference and choice to have one and most people’s economic decision, especially at the heights of the pandemic need more of food for their intake and survival not buying (PPEG) wasn’t part of their scale of preference or choices.

There were instances in which individual members of the society lend their peers facemasks to access formal premises as the guidelines around most formal setting are still adhered to and could only beat the guidelines and used another person’s facemasks whose COVID status were not known. The government officials are still on top of the enforcement measures and adhered to the guidelines and the PTF briefings is on top gear and CDC is still going on in many jurisdictions around the world as at 27th, June, 2020 at the time of writing this research thesis. This research has established the fact that the CDC, in conjunction with the PTF on COVID in most jurisdiction is assiduously working round the clock and tirelessly so with support from the mass media for coverage and subsequent dissemination. Also, there exists evidences that the lockdown has received 100% support and compliance of most citizens, especially between the months of January to May 2020 before the ease of lockdown and as all trunk A, B and C roads, community and neighbourhood were calm and indoors with full hope as they awaited palliatives from their respective governments to ameliorate their suffering under the lockdown.

However, qualitative data suggest that there was pilfering gender-based violence and community ransacked and attacked by group of hungry and angry youth and some unscrupulous elements took advantage of the lockdown to engage and perpetrate ills as the rate of crime and deviant behaviour were on the increase. The enforcement received the blessing of the officials and the mobile court and task force prosecuted, fined, and engaged many offenders on community services for the violation of the guidelines.

There were number of issues around urban centre and settlement, especially at the time of the pandemic and more were pinned down by the interstate lockdown, mostly the lower working class had suffered and felt the brunt with excesses around social immobility, reducing in urban, semi urban, suburb and country side. There was serious discouragement around social grouping and unnecessary outdoors relaxation during the first phase ‘ease of the lockdown’ with higher sense of risks around fragile and the most vulnerable settlements and communities. The ease of the first phase does not provide any solutions against the pandemic, but rather increased the rate of transmission as the dynamics of the X,Y Axis along the curve suggest increased while government in conjunction with philanthropists, volunteers and formal setting were still making conscious effort to discourage human traffic connection and congestion in public places while ensuring adherence to social distancing guidelines and other mitigating precautionary measures.

There were difficulties around maintaining social distancing which was nightmare in some settings, but it works perfectly in formal and government settlements that are enlightened, but almost zero at the local levels and communities that seem unorganized or rather broken slums. The first phase east of lockdown and the dynamics of reopening has increased the rate of transmission and many cities are afraid of second phase lockdown due to the increasing nature of the virus. The government, philanthropists and good Samaritans, non-governmental organizations, the faith based mosques and churches
had all extended hands of gesture and committed enormous resources such as food, material items and finance to cushion the effects of COVID-19 pandemic on the lives of the needy, destitute and down trodden masses and of course including the working class who were in dire need of assistance during the lockdown and are apparently facing hunger and starvation and the vulnerable who by all standard measurement and parameters could not afford three (3) square meals and the government had provided truck loads of foodstuff as palliative and had since distributed to the community members, but could not go round some respondent interviewed at some quotas observed.

Although, the ease of the lockdown has freed members of the society, but it has posed gigantic threats around transmission and to further monitor and control the pandemic researches and models were put in place as longitudinal projection of the USA case confirmed increase up to August 2020 and that, has challenged both macro and micro population and are expected to face some social demographic issues and population decrease is imminent. Similarly, the finding of the research also reveals that number of cases of COVID-19 would still skyrocket and USA alone is reading approximately more than 2 million confirmed cases only in July, 2020 with increasing and shooting curves in Texas. Brazil is now taken over by COVID-19 as centrepiece of the pandemic. The ease of the lockdown, especially in the USA was characterized by Police brutality and blacks uprisings into 'The New Normal'.

COVID-19 has dislocated and induced newer culture such as 'work from home' 'social distancing' and 'elbows greeting' amongst other newer ways of life and postmodernism as philosophy which drives the dynamics of 'The New Normal' while finding has provided nexus between Marxism, Comtian and Weberian notion of society in post pandemic characterizes by large scale instantaneous production of goods enables by positive and/or scientific fundamentals for an ideal society respectively. This research has uncovered the newer scientific innovations and the imperative around Weberian rationalization and Comtian scientific stage as socially PEN indivisible society antithetical to Marxian egalitarian society. The notion behind postmodernism is surplus profit accumulation and large scale production with values are seen as driven by the imperialist power and control of protineous P+ capital who more or less have control of the development institutions and strategies map out by E-electronically endowed citizens for an overall development.

Historically, according to Social PEN theory of structural change, society changes from 'loaned pathological as weaker' and fragile society for being lones to form and combine in human activities at all levels of interactions of groups to form PEN Molecular society as relatively stronger with more defining characteristics and features for projecting into another formidable system of PEN elementary with differential identity and similarity and orderliness for the attainment of PEN composite society as more heterogeneous society with complex behaviour and interdependence and independence that are indispensable for social progress to a more formidable PEN indivisibility society that can no longer form and combine but it maintains its stage and keep on consolidating with newer scientific improvement on the gains of the earlier stages until the Comtian scientific stage and Weberian ideal society built on the basis of rationalization of the postmodern society comes into play and the 'The New Normal' is a leeway for such a society.

Corollary to that, the social PEN theory, the actualization which depicts a wholesome indivisible society are achieved and driven by highly protoneous P+ capital integration and E-electronically human resources capacity; head, hands, mind, IT and Telecom skills and know how as a scientific stage and stabilization as envisaged by sociologist such as Auguste Comte, the positive and/or scientific stage in the history of mankind. The finding of this research has confirmed the fact that science and objectivity rule the world. This fact is indisputable and therefore, it is not debatable. COVID-19, has confirmed the scientific stage of societal development as abdicated by Auguste Comte. COVID-19 has posed challenged around institutions, experts, leaders and people, in fact every single structure was proved to be challenged by COVID-19 and the pandemic is still ravaging as at June, 2020, especially USA, Brazil and some selected major cities are experiencing shooting in the curves of COVID-19 and global economy is creeping or is it galloping with difficulties around recovery. It is therefore, necessary to expedite actions to speed up discovery and subsequent production of drugs and vaccines as solutions to rescue humanity from the dreaded monster called COVID-19. COVID-19 has thwarted humanity and thrown more into darkness.

Between February and March, 2020 people had chewed, swallowed or rob anything as it goes for cure without dosage. Many herbs and green foods were eaten as cure for Corona virus. And, that emphasise the need for scientific, orthodox approach that should completely stamp out COVID-19 pandemic. There is need to place all the traditional approaches for further test to ascertain their efficacy and encourage support for the ABU Zaria projects on ventilator for home utilization, income generation and over all interest of the country.

The global leadership response for the containment of COVID-19 was rather unparalleled, devoid of political waves. It was characterized by onerous tasks and all hands were on deck to contain the pandemic. The leadership response was prompt and instantaneous. Perhaps, that decision was a reflection of a decision at certain political pedestal and global. Therefore, whatever change that is to come in post COVID-19 pandemic is seen as again, a unanimous effort to amend the socio-economic and political structure to return to normalcy and there might be a marshal reconstruction of the damages caused by COVID-19 pandemic.

The emerging decision from the global leadership at the level of UN, World Bank and WHO with their counterpart subsidiaries, as the Bretton Woods institutions, perhaps may not fall short of the initial subscription to global decisions as unanimous to receive the magnificent magnumnity enhancing and improving the life of the individual members of the society for the betterment of humanity now and the future.

COVID-19 has demonstrated that science is still premature to rescue humanity and therefore, it is still evolving, until then, men are vulnerable and exposed to tremendous natural threats; hence stand a chance of being consumed by disaster. The newer scientific norms as innovations and discoveries would gradually emerge to differentiate into conventional norms, rules, guidelines, code of conduct to further direct the behaviour of the individuals members of the society as 'social determinism' to say more about...
man’s 'social existentialism' and through such process and man’s activities we witness change of the society.

Should another pandemic so deadly as COVID-19 emerged again or a biological disaster erupts in the future and the chance of this world to survive it through scientific principle is oblique. That is the experience and lessons learn from the current COVID-19 pandemic, hence man will be at the mercy of the natural laws; the natural selection, a pat on the back of Charles Darwin evolutionism, survival of the fittest.

The theme of this research is Covid-19: applied Sociology of the Pandemic and The dynamics beyond 'The New Normal' in the Context of Social PEN Theory of Structural Change and it recommends further study and improvement around key areas of COVID-19 challenges while taking into cognisance the needs and expectations of both macro and micro demographics population and with more policy around promoting scientific paradigm, feminism while catching the younger and utilization of their brains should be the number one target as the target action while government, relevant institutions and private sectors as system target are to make deliberate efforts of building the hands of the youth ensuring that, they are electroneously E-configured for future challenges. If trajectory are maintained this kind of process would continually increase the global populations and countries electroneously with E- human resource capacity for further change and development. 'The New Normal' is a way of life. It's an envisaged society which redefines human rationality and fundamentals in social, economic and political structural arrangement and power relations for change. It may also, mean to be a post COVID-19 world which can interchangeable be used as 'Postmodernism and beyond' in Anthony Glidden's classification of modern societies as PEN Indivisible society driven by science and the power of IT for simplification to enable large scale production for surplus profit accumulation.

Post COVID-19 environment would be driven base on science and technological requirements again, synonymous to establishment of Comtean connotation of society as positive stage driven by scientific fundamental and to its greater height which confirm Weberian ideal society built on rationalization and all are achieved through social evolutionism of Charles Darwin enabled by social PEN energy (+n) for moves of conglomerates of systems beneficial to define value chains around social, economic and political structures. This ignites further progress into motion as envisaged by Herbert Spencer’s 'social static and social dynamic' theorizing and all are possible through rationales activities of the members of the society and interplay of institutional social PEN energy to bring about positive developmental for change in socio-economic and political systems.

Consequently, 'The New Normal', is post pandemic society driven by scientific forces of social PEN energy of (+n) in man's relation to other societal fundamental and the role and dominance of institutional innovations enables by configuring of the P+, E- and to be supported by N to enable and ensure competitiveness of the 'The New Normal' social economic and political environment for more profit and gains 'only and only if' the society is able to promotes projects and programmes around youth's empowerment and configuring their electroneous E-component of human resource capacity, building and developing their hands and head while tasking them to engage in activities that would bring about change) through a rationalized systems along as echoed by Max Weber and the thoughts of the younger citizens to attain positive scientific requirements again, as unequivocally believed by Auguste Comte for change and development of onerous tasks to come into play.

Change and development of the society in post pandemic is only possible when the three integral components of the 'Social Atomic PEN Structural Theory of Change' which must work simultaneously and in harmony to inform structural change and that, must be supported by the N neutronic value for sufficient calibration of the P+ and E- to context and relative equilibrium. Social Protooneous (P+): positive social value as capital integration as funding support for liquidity of any system for change. Social Electroneous (E-): negative social value as human resource capacity both IT and Telecom Technological capacity, natural or acquired by man in the society through training to support change for development. Social neutronic (N): the societal norms and values systems to serve as calibre to support protooneous (P+) and electroneous (E-) to calibrate and further recalibrate any social structure or system to context and relative social equilibrium for change to happen (societal support). The New Normal': What is key to the stabilization of the society to attain 'The New Normal' are the newer scientific norms and the role of e-institutions and the emerging structural fundamentals would have influence on social, economic and political activities of societies to enable the change in phases in post COVID-19 society.

The human society is evolving and fast changing by the pandemic. This is is to the credit of Charles Darwin Evolutionism enable by social PEN energy (+n) for moves of static phenomenon to get into a dynamic state of affairs as exponentially, propounded by (Herbert Spemcer). New changes could take place in the society and within a system, which is only possible when the N component of the PEN structure aide calibration of P- and E- structural elements of a system to ensure change at various institutional parts and levels through human activities and relationship in the society to bring about consolidation of 'The New Normal' to attain scientific stage and stabilization as envisaged by sociologists. And, all of these could be achieved with the role of instantaneous telecommunications activities to enable change for example; the working of 'Internet of Thing' (IoTM2M) as some of the guides to the world of science of only the super powers.

News on cure of COVID-19 was like food during the pandemic and the political class, including the aged were so scared and very careful while avoiding group behaviour and social grouping as a run from the pandemic than the able bodied men. There is enough qualitative evidence to support that the rate of divorce has been on the increase just as domestic violence between spouses.

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others were trapped by the lockdown and were faced with trauma, anxiety and distress for missing their family. The rate of sudden death was high and self administered drugs leading to drug abuse at community level was also apparent for the fear of going to hospital only to be tested for COVID-19. There is the need for psychosocial support to calm the affected victims of Corona with timely advice, therapeutic and counseling to reposition the mental health of individual affected by COVID patient in the society, especially those in the front line who more or less had suffered and felt the brunt of COVID-19 for handling Corona patient, cadavers and are in panics, especially when the pandemic was at its peak. This research has discovered that from qualitative standpoint, the health workers, volunteers and members of the task force, mobile courts and field workers required specialized and skilled support and treatments in the case established in line with mental and medical health practice. Also, there is the need for an enhanced social welfare units at various hospitals and deployment of medicals sociologist to assist in providing case history, case study and to cover more on attitude, personality and case study about social life of the Corona patient as backup support information to enable medical practitioners perform their jobs effectively and efficiently with better grasp and in-depth knowledge about the sick person through studies that are evidential.

There is need to upgrade hospitals to meet world class standard and to support hospitals for improve health seeking behavior. The hospital database are to be connected to research centres, institutes and other health research facilities and universities for an all round and inclusiveness in research finding utilization and onerous data management, especially in African countries for future pandemic and upgrade those resource centres with technological equipment and IT facilities and that would go a long way in timely utilization of findings from research commissioned in specific areas of professionalism as support and that is sacrosanct and necessary to contain pandemics in the future. There is the need for commissioned research both medical and social impact which is necessary for better understanding of health seeking behaviour and the social effects of future pandemic and COVID-19 in particular as guide going forward to contain.

Indigenous researchers need to be supported to further their research in social health issues for the utilization of their results as home grown and home supported. The level of preparedness for unknown escalation of diseases like COVID-19 has been weak hence the need for plan B as always, safety nets and improved palliative should crisis like COVID-19 escalates in the future. Research institutes in both developed and countries in transition are to be connected to the university with research support grants to play supplementary and complementary roles for formidable finding and use of various health and social agencies for amelioration of human needs and subsequently, cushion the hardship of the affected persons especially, the lower working class citizens.

There is enough evidence that COVID-19 is causative agent and the world is evolving; as a result new changes are emerging not abruptly but gradually as natural selection characterised by the power of science and institutions. This finding has supported Comte’s positive (scientific stage) and reinforced by Darwinians (social evolutionism; the survival of the fittest). Paradigms are conflicting and shifting in their bearings and man is being dominated by IT in all spheres of existence ranging from; hospitals, market places, schools, work place, eatery to ATM dispenser and to all payments for purchases and other transactions are done electronically online with the use of value-MasterCard supported by IT as ‘Internet of Things’ (IoTM2M) as postmodernities, as a way of life opposing to life practiced in modernism.

The research has uncovered problems achieving social distancing, that adherence to social distancing guidelines is been affected by so many factors ranging from human feelings; emotions and uncontrollable reflex actions in addition to the natural social energy (+) for attraction which allows natural human traffic connection and forgetfulness, hence threat to implementation of the distancing guidelines to the fullest. It's therefore, recommended in the short term that, the high powered authority UN, CDC and PTF to encourage and support media activities both new and mass media to create awareness, sensitization and mass mobilization with the support of the government. The need from civil society groups encouragement and enhance motivation around law enforcement to work closely with (well guarded PPE volunteers) at the community level and those volunteering at the hospitals and community levels must be checked to ascertain their COVID-status, mental health and intentions both latent and manifest actions to ascertain that they are sound, credible and well motivated civil society groups. Volunteers and stakeholders’ participation in both formal and informal control mechanisms; government and community respectively to ensure social distancing measures are adhered to by members of the society.

The informal sector requires support and special grants and loan, especially small and medium scale as support for economic resuscitation as qualitative evidence has supported the finding that, COVID-19 has disrupted 436 million enterprises, 232 are retailers and whole sellers globally and COVID-19 has risks and threatened 1.6 million informal workers globally. The findings suggest that, normalcy would return, but the devastation of COVID-19 stays beyond the extinction of Corona virus. This is indisputable and therefore it's undeniable fact that, there would be a newer World, as post COVID-19 world driven by postmodernities and sophistication to facilitate the phased evolution of 'The New Normal' as postmodernity characterized by science and technological advancement in all its ramifications as the 'Comtean Positive society'.

Post COVID-19 world and the role of conscience commune, the rise of science, newer norms and tradition, customs, rationality of law, morality, civilization and information technology IT would take account of further change in human behaviour in post COVID-19 society and it has to be gradual to descent to 'The New Normal' and it has PEN energy (+n) effects to indicate the directions of change via technology. The social PEN effects have positive (+) social as well as negative (-) PEN consequential to suggest change and to indicate direction of any society undergoing change in structures. (Emile Durkheim, 1938), (Durkheim and Mauss, M, 1703), (August Comte, 1986). Considering the casualties, index cases discharge and deaths for COVID-19, is rather so alarming and disturbing, a situation that can best be described as Tom Wicker knocking on the doors.

Wicker, so popular as he was for his Book entitled 'A Time to Die' and Covid-19 pandemic is an invisible Virus driven by human and facilitated by social PEN energy of (+-n) and individuals members.
of the society as carriers. Again, it's transmission are also possible and enable only through social interactions while social distancing as one of the mitigating measures to avert the pandemic supported by human social actions through networking and distancing from groups and social gathering. COVID-19 has tremendous consequential effects on institutions, structures and social relationships in the society, especially during lockdown and for social distancing of individuals members of the society from social gathering as lone with enormous pathological implications. Corollary to the above, COVID-19 World; 'The New Normal' dictates and redefines relationship and monitor human activities to curtail excesses which hitherto held some countries to lag behind, and offices are no longer necessities but rather an exception with numerous options of discharging official functions and routines at home or anywhere convenient for its flexible and connectivity supported by IT facilities. This viewpoint is reminiscences of the study conducted by (M.S.E. Shahrentani, 2015).

"A smart home application based on the management of thing internet platform" he argued that, society would evolve to attain a milestone in IT to further simplify the society. The dominance of IT to control heterogeneous appliances and managing them from a distance, he argues, is enabled by 'Internet of Thing' management, platform to bring connectivity to every physical object around us, a two tier model which enables communication between things to things with minimal human intervention to drive industrial needs and supply value chain. He echoed that, in no distant time society would largely depend on 'Internet of Things' and automation becomes more increasingly integrated into 'Internet of Thing'.

The role of crucial institutions would be dominant in ushering in 'The New Normal' post COVID-19 society. Some jobs will perish and the down trodden masses would have more trouble to face around knowledge delivery and dynamics of systemic change with cause and effect on man's socio-economic and political life. The result of this research has confirmed that the society is tilting towards the apex of society in Comtean notion of society as positive and/or scientific stage of social evolution enabled by social PEN energy (+n) for change. For the first time in the history of mankind a phenomenon as COVID-19 came to dominate man's social life with newer culture for adaptation with tremendous shift in the working of institutions and man's relations to socio-economic and political structures was completely overhauled by COVID-19 pandemic.

For example; there seems to be newer culture as; 'work from home' which has changed organizational structure and this is a huge concern for organizational study and organization as an institution may experience change as this is maintain in 'The New Normal'. Social distancing is also another norm which defines COVID-19 era with effects on heterogeneous human grouping. This view point is reminiscent of structural functionalism in sociology which sees the roles of parts for the maintenance of the whole. The fact that science and objectivity rule the world is indisputable and therefore, it is not debatable while in social domain is to the credit of Auguste Comte. When science is mentioned in social sciences for management of fundamentals to ensure change and development, again it's to the credit of Auguste Comte the founder of Sociology and master of logical positivism who reinvigorated his philosophy on the pedestal of science with emphasise and relevance on sense perception.

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How Democratic Was the Roman Republic and Empire?

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Abstract- The history of Rome has always been an interesting topic for discussion among the scholars since the past centuries. Starting just as a city of Latium region, the Rome expanded its empire and dominance throughout a huge region including the many parts of modern Europe, Northern Africa and Western Asia. Rome witnessed monarchical rule till 510 BCE; but after the expel of Etruscan monarchy, Republican government was established which testified democratic institutions and elements. These democratic elements and processes often became a model for the later democratic world, although Roman never followed proper democracy alike modern times. Even after the establishment of Principate rule by Augustus Caesar in 27 BCE, the democratic and republican institutions sustained without having any real power. Therefore, it raises a very interesting question how democratic was the Roman Republic and Empire, which has been discussed in my paper. Besides of showing the democratic elements and its limitations and changes throughout the consequent ages, I have also spoken about the symbiotic relationship between the institutions of democracy and aristocracy.

Index Terms- Rome, Democracy, Aristocrat, Republic, Election, Senate.

I. INTRODUCTION

Famous historian of Hellenistic period, Polybius mentioned in his book, The Histories, that the Roman Republican Constitution was the mixture of three elements of Government, among which Democracy was represented by the instruments of popular sovereignty i.e. popular assemblies, tribunes of concilium plebis and popular participation in voting process and electing officials. Since most of the past centuries, historians have a general view that Roman Constitution is theoretically quite democratic, but practically undemocratic, dominated by a socially and economically privileged group of wealthy aristocrats; which is challenged by many scholars after the triumph of Western democracy in the international battlefield.

The idea of Democracy meaning “Government of the people, by the people, for the people” as stated by American President Abraham Lincoln, was first-born in Greece, but has been changed and refined throughout the ages. Polybius argued that “where reverence to the gods, succor of parents, respect to elders, and obedience to laws are traditional and habitual… in such communities, if the will of the majority prevail, we may speak of the… government as a democracy.”1 The global proliferation of democratic regimes in 20th century, especially the idea of Representative Democracy, has the root in Ancient Rome; even while arguing for the ratification of the United States Constitution, Alexander Hamilton claimed that the Roman Republic had “attained to the utmost height of human greatness.”2 Even the notion of the rule of law and the idea of constitutionalism were first originated in Roman times.3 Since the Roman Constitution had profound impact on the democratic world, scholars find special interest in analysing the nature of Roman Democracy.

II. MATERIALS AND METHODS

This research work mainly focuses on determining the nature of Roman Democracy during the Republican period and consequent ages. For such analysis, I have mainly focused on the literary sources. As the paper approaches towards theoretical explanations, I have not focused in the field-works and or other works like that. The sources and the journals which have been used as authoritative are mainly secondary in nature. I have used as many as twenty-five books and articles in total many of whose authors made researches based on primary sources. I have used the writings of Fergus Millar, P. A. Brunt, Brian S. Roper, L. D. Blois and R. J. Van Der Spek, Mary Beard and others as the fundamental sources. The details of all books and journals have been mentioned in the ‘References’ section.

III. ANALYSIS OF FINDINGS

Roman antiquities narrate that after the suicide of virtuous Roman matron Lucretia due to the rape by the son of last Etruscan monarch (Tarquin the Proud), the outraged Romans outcast the Etruscans and elected a Senate, which in turn elected two annual consuls and other officials to conduct the new republic’s government and army.4 Thus the establishment of republic was occurred by aristocrats, but with popular support. However, republican tendencies were always part of the Roman political machinery, even during monarchy.5 But the republican structure went through various changes during the five centuries (510 BCE – 27 BCE).

1. Political structure during republican period

Roman political structure was mainly represented by the Senate, senior and junior level magistrates and Assemblies. The oligarchical council i.e. Senate controlled the political, military and economic matters of the state, supervised public opinions and conveyed decree (senatus consultum) to magistrates. The senatorial class was initially an exclusive patrician order based upon birth, but their membership depended upon wealth.6 The ‘honorary offices’ (L. de Blois and R. J. van der Spek, 2019: 214) of the magistrates started with quaestorship, thenaedilisitor tribune of the plebs, then praetor and finally consul. Besides, there were...
censors, dictator, apparitores. The unpaid officials were elected by popular vote and the voting was done by group procedure.7 The third element of Roman republic within which democracy was resided according to Polybius, was assemblies being three in number during republican period, namely comitia centuriatia, concilium plebis and comitia tributa. Comitia centuriata being referred as comitiatus maximus in Twelve Tablets used to elect consuls from a time well before the middle of the fifth century.8 This assembly of arms-bearing men where 193 centuries (later 473) voted in bloc in five units, rarely vote on legislation or declaration on war, but elect magistrates which, according to P. A. Brunt, was very important for giving successful candidates lasting prestige in the counsels of the Senate.9 Due to the growing discontentment of the plebeians and the following conflict of orders, there was created concilium plebis and comitia tributa. The former discussed plebeian issues and organised voting through a vote system based on the residence of the citizens to elect tribunes. The later including all male citizens of 35 tribes is a guardian of liberty, as Cicero viewed, protecting popular interests and sustaining senatorial legitimacy.10 In the last years of the Republic, it was frequently seen that the decision of comitia tributa was against of comitia centuriata.

2. Democratic elements of Roman Republic

Ancient writers had not the idea of democracy alike the modern sense which is present in India or USA. Demokratia of Hellenistic age “no longer necessarily connoted a system of direct popular control like that of Periclean Athens, but had come in practice to be applicable to any government which was not openly monarchical.”11 Romans thinkers gave importance to democratic control, not because of any “definitional connection with liberty but from the fact that it is a means of furthering liberty.”12 Roman people enjoyed three fundamental constitutional rights – right of direct voting on legislation including declarations of war or making of peace, electing officials and judging in popular courts. Lily Ross Taylor mentioned that voting was a major occupation of the Roman citizens and there was hardly any season while Rome was free from voting in assemblies and voting campaigns.13 Even, voting was so important that the candidates often tried to influence over the voters, which is also seen in today’s democratic elections. Though Roman group voting system collected unit votes contributing a single result, every citizen i.e. every adult male citizen including ex-slaves had the right to vote within a subunit. There was no trace of property qualification or the requirement of citizen-birth for voting.14 Even, in late republic the comitia tributa passed the overwhelming mass of legislation without formal “timocracy.” That is why Fergus Millar argues that it was the crowd within Forum, more than the Senate, whose “voting power… had effects that were felt from Britain to the Euphrates.”15 He added that the political life of the Roman republic should be seen as a form of open, mass politics, with speeches being addressed to the crowds who gathered in Forum and voted individually, originally by voice and later by ballot.16 Millar’s argument has been supported by other scholars who focus on the fact that the prospective candidates often gave importance in persuasion, promises, canvassing and bribery to gain popular support before the elections, which is also seen in modern democracy.17 Even, Mouritsen mentions about certain cases where bills had been withdrawn due to the public reluctance along with the threat of a ‘tribunician veto’. Like the failure of the bill rogation Servilia occurred due to its unpopularity among the plebs and this claim was based on the testimony of Cicero.18 E. S. Staveley argues that if the fasti of the early fifth century contains the name of plebeian consuls for several years, despite of shorter period, the choice of consuls in each year depended at least to some extent upon the whims of the popular assembly.19

The actions of the magistrates and the commanders during wars were investigated by Senate and need to be approved by the people’s votes. Even the consuls hardly could go against the popular support, as we had seen in 196 AD when the emissaries from Flamininus proposed for peace with Philip. The newly elected consul M. Claudius Marcellus wanted to fight in Greece and spoke against peace before people who were against of war. The Senate testifying popular opinion did not support the consul and sent ten emissaries to approve peace thereby reflecting the power of popular support.20 Even the Senate had to be wary, as the tribune plebis could bring halt any public business, including senatorial meetings, with their veto, and could propose legislation to the plebs.21 Besides, the people enjoyed the important powers of jurisdiction, as they could appeal to the centuriate assembly against capital sentence imposed by a magistrate.22 Even during late Republican period, despite the murder of Tiberius Gracchus and Gaius Gracchus, their reforms i.e. the distribution of public land to landless and the arrangement of state subsidies to purchase grain for commoners respectively retained by Senate to prevent the popular revolts.23 Thus the view that Rome was totally controlled by hereditary oligarchy who kept the political and economic structure in favour of themselves is nothing but “frozen waste” theory (John North, 1990: 278) to those scholars who finds democratic elements in Roman political structure.

3. Limitations of Democratic elements

Despite the presence of democratic elements, Rome was never fully democratic concealing the popular sovereignty; and after the decline of Roman republic, democratic elements lost vitality. By the foundation of the Republic, Roman offices were monopolised by ‘senatorial aristocracy’ who was not a classic hereditary aristocracy in the sense of a closed and legally defined group privileged by right of birth and descent.24 Ste Croix argued that after the result of the ‘conflict of orders,’ patrician oligarchy was replaced by ‘patricio-plebian oligarchy’ having little difference in outlook and behaviour.25

The nobiles always dominated and influenced popular assemblies through their clients, personal relations with members, successful command in wars and deep-routed traditional authority. Brunt mentioned that ruling class often used bribery to influence the poor urban plebs during the elections, and the consuls rarely defer to the will of the Senate, as they always aimed to get elected in Senate after the end of their offices.26 Keith Roberts mentioned that wealthy aristocrats often sought clients for their power and influence, and clients sought patrons for economic assistance. As it was impossible for clients to violate the patron’s advice (especially in voting procedures), this symbiosis favoured the patrons during their elections.27 Moreover, as the poor persons had not the access to stand for elections, the assemblies were only allowed to ‘take their pick’ of candidates coming from the privileged classes.28 Even, in comitia centuriata, the centuries were divided into five classes based on property qualification, and the patricians and wealthy plebeians were placed in first three
classes who could easily be manipulated by aristocrats. Roman assemblies had many limitations, like – it did not allow the people to come together regularly or debate on current issues, it could not emerge popular initiatives or proposals by self, it was directly regulated by presiding official who decided the time - space - issue of voting, and after all it could not vote freely as the presiding officials could refuse any vote. Besides the attendance of the people in the assembly was very low because the majority of the population who had neither adequate time nor money, were engaged in daily battle for economic survival. The old Comitium in the north-western corner of the Forum Romanum that was used as the meeting-place of assemblies could hold about 3800 voters. At next, the assembly was transferred to the Forum which holds about 10,000 voters; and then it was at the Saepa on the Campus Martius holding about 25000 voters, where citizen population total exceeded a million in late republic. It indicates that neither people were interested in voting process nor the ruling class was interested to include people thereby indicating the lack of democracy during republic. Theoretically people are deliberate on the question of peace and war, but practically it is the Senate and consuls, not assemblies which can do that. Even before the Second Macedonian War against King Philip V, when comitia centuriata rejected war with Macedon, the consul proclaimed “let Macedonia rather than Italy be the seat of war, let it be the enemy’s cities and fields that are devastated with fire and sword… go to the poll and confirm the decision of the Senate.” This signifies the limited power of assemblies. Even Scullard argued that most of the legislations which were introduced in the assembly by the tribunes were shaped previously in the Senate, and the tribunes became only an ‘instrument of the senatorial oligarchy.’ That is why Cicero claimed that the Senate must respect the freedom and interests of the commons, but they are allotted no more than a passive role. Even during late republic some legislations being favourable to the popular interests was passed and the reforms of the Gracchus brothers retained only for a group of aristocrats of the Senate namely populares.

4. The Late Republican period

North is right to say that the popular will of the Roman people is expressed only in the context of divisions within aristocracy, and democratic politics was a function of the degree and type of competition in progress between aristocratic families, groups or individuals. As a result, when the symbiosis broke down and conflicts arose among the aristocrats and military commanders who gained authority and prestige for giving leadership in the wars, democratic elements lost their power resulting civil wars and the arrival of dictatorship in the last years of republic. Thus Sulla, after defeating Marians, proclaimed himself as the dictator in 82 BCE and began a reign of terror where he liquidated about a hundred senators and sixteen hundred knights. In this way military power became more important than elective power to gain political control in Rome, and the commanders tried to become dictator with the help of troops who were more loyal to them than to Senate. In this political turmoil, Julius Caesar broke the First Triumvirate from Pompey and Crassus, and appointed himself the dictator for ten years in 47 BCE and then for life in 44 BCE. During his dictatorship, he used to nominate candidates for election and control other elections behind the scenes. He tightened the control of provincial governors, limited the number of recipients of wheat in Rome, and settled about forty thousand veterans and tens of thousands of proletarians and freedmen from Rome in colonies thereby governing Roman Empire alike an absolute monarch. But this destroyed the interests of optimates of the Senate and resulted his assassination by Brutus and Cassius who wanted to bring republican government back. Even they struck a coin with the words “Ideas of March” and a liberty cap between two daggers indicating that they had liberated the fatherland by their murder of Caesar. But soon they were defeated by the Second Triumvirate in the battle of Philippi (42 BCE) which marked the end of democracy or liberty in the senatorial sense. Later Caesar’s nephew Octavian, with his military power, captured the Roman throne by defeating Lepidus and Antony, and became the sole ruler of the Roman Empire. To legitimize his reign, he returned his power to the Senate, and Senate in turn handed back to him this power thereby offering the title Augustus who established Principate rule in Rome.

5. Augustus and his successors

Augustus Caesar, inspite of establishing autocracy, balanced between Senate and military. He declared himself ‘commander-in-chief’ and made Senate just an ‘arm of administration’ (Mary Beard, 2015: chap. 9). He established the Consilium Principis i.e. council of his trusted advisors which influenced the Emperor more than the Senate. Popular assemblies declined substantially and people hardly attempted anymore. His successor Tiberius transferred the power of electing magistrate from assemblies to Senate. Thus Augustus sustained some republican institutions, but gave them no real power thereby resulting the decline of democratic power. However, he had been praised by contemporary writers and orators for consolidating the huge empire and bringing peace (Pax Romana) throughout the empire through military conquests. Chester G. Starr mentioned this reign as ‘the perfect democracy’ as it offered liberty, economic and social justice, and gave to each class what it deserved.

After Augustus, democratic elements totally demolished. Senate thereafter consisted only of emperor’s friends, advisors, confidants, dinner guests, drinking partners and family members. Though Tiberius wanted to return open ballot voting system, Senate opposed. One Senator sharply asked, “Could you tell me in what order you will cast your vote, Caesar… If you go first I shall have something to follow. If you go last of all, I fear I might find myself inadvertently on the wrong side.” Thus autocracy is so pervaded in Roman political institution that it became impossible to bring the previous system back. The emperor himself became the ‘super-patron’ (L. de Blois and R. J. van der Spek, 2019: 292) of the people. Moreover, wars and rebellions broke out throughout the empire, and it was the Roman army who solved this problem. Thus the military commanders became more powerful and became a huge claimant for getting into Roman throne through military power. Besides Senate often got involved into the conspiracies thereby leading to the assassinations of the emperors which became very common in the history of Roman Empire. That is why after Augustus, twenty-five emperors reigned in 220 years. As the emperors had come to throne by military power, they had very little respect for Senate, like – Commodus had been depicted to threaten “the Senators in the front-row seats of the Colosseum by waving the head of a decapitated ostrich at them.” Besides due to the extension of citizenship rights to all free inhabitants of the...
empire, non-Romans also became claimant for being emperor, as we saw in the case of Septimius Severus who had origin in North Africa. With the death of Severus Alexander, the Principate rule was ended marking the official end of aristocracy’s power; and during the third century crisis (235 – 284 CE), the previous system totally broke down and the principle of election by the soldiers was established. Thus Maximinus having origin in Thrace and pursuing a purely military career supplanted Alexander by his troops. Third Century Crisis witnessed huge political chaos, civil war and violent death of more than twenty emperors in fifty years. In 284 CE, Diocletian wished to reorganise the Roman Empire to solve the crisis and took the new title dominus denoting him a slave-owner thereby completely wiping out the republican institutions. During his time, Senate was nothing but a ‘town council’ which had no power in important administrative matters and no access to high military offices. Thereafter Constantine shifted the seat of the emperor to Constantinople in the eastern part, and Rome as well as the Senate lost its political significance. After the division of the empire into two halves in 395 BCE, the eastern empire flourished, but the western empire was declined after several tribal invasions.

IV. CONCLUSION

Therefore, after such a brief discussion, it is still very hard to decipher how democratic was the Roman Empire. The dominant view about the Roman Republic which has been popularised by nineteenth-century German historian Theodor Mommsen, was that it was an oligarchy. But after the triumph of Western democracies in World War I, there has been change in the historiography to find out the democratic elements in the Roman political system; and still now huge debates has been pervaded among the scholars about the nature of the Roman democracy. It is my opinion that democracy and aristocracy had a symbiotic relationship in Roman Republic and were depended on each other in directing the governance. That is why we see that aristocrats always came into power through democratic processes and democracy manifested through the aristocratic prominences. As a result, when the aristocrats got involved into conflicts to grasp power, democratic elements also collapsed during the late republic period and can never be revived later. So instead of arguing whether it was democracy or aristocracy, we should focus on the relationship between the elements of democracy and aristocracy which affected the Roman political system. Even after the decline of the republic, democratic and republican institutions also sustained within the dominance of autocratic and military power, though no real power was accorded to them. Officially it was the Senate who legitimised the emperor’s reign, although the scene was just opposite in practice. However, after the end of the Principate rule, that legitimization of the Senate was not seen anymore. Therefore, Roman democracy should be seen as a ‘very particular form’ (John North, 1990: 286) which never flourished in a full-fledged way, but has a huge impact in the governing system of today’s democratic world.

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Social Causes of Juvenile Delinquency: The Case of Axum Correctional and Rehabilitation Center, Northern Ethiopia.

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Abstract- The purpose of this study was to explore the Social Cause of Juvenile Delinquency at Axum Correctional and Rehabilitation Center, Northern Ethiopia. It was to investigate the demographic and the socio-economic statuses of juveniles. It also investigated the type of different offenses committed by juveniles. To this end, the study was carried out using mixed research method. Structured questionnaires and key informant interviews used as tools of data collection. The study involved 80 inmates selected by systematic random sampling technique from a total list of 155 inmates. The study found that 96.25% of respondents belong to the age between 13 and 17 years old. About 86.25 % of the respondents were males; and 68.75% of the juvenile delinquents were from rural areas and poor family backgrounds. The study sample was also characterized by a low level of education. The results of the study are congruent with what exists in literatures indicating economic problems or poverty is the major cause for many juvenile’s involvements in crimes. It was also found that 26.25% of the juveniles were institutionalized out of peer influences. Besides, other social factors including dysfunctional families, large family size, rural urban migration, and quality in family relationships, lack of parental control and the availability of alcohol and, drugs in the neighborhood influenced these young into crime and delinquency. About the type of crime committed by the juveniles, the study revealed that theft and related crimes were mostly committed by a juvenile than any other offense.

Index Terms- Axum correction center, Juvenile Delinquency, Social causes

I. INTRODUCTION

1.1. Background

Juvenile delinquency is a complex social problem that significantly impacts all members of society and processes of a social structure. Delinquency refers to a set of behaviors that are not in line with the collective practices and/or ethics of the dominant social group. Essentially, these behaviors deviate from societal norms and more specifically they violate established criminal codes and laws (Georges, 2009:56).

Globally, crime patterns are changing. Offenders are increasing in number, the youngsters are getting involved and violent crimes are becoming more common. Also, our life, our views of the world and our ways of knowing about crime have undergone considerable change with the changing patterns of crime (Edwin, 2006). The roots of such violence may not be clearly understood but declining income and work opportunities, and the consequent frustration, particularly for youth are important factors (Azeh, 2009). Violence, crimes and anti-social behaviors were consequences of social inequality, social exclusion and lack of institutional and social protection (Sisay, 2015).

The most important causes and conditions for juvenile delinquency are described from economic and social factors. Socio-economic instability is often linked to persistent unemployment and low incomes among the young, which can increase the likelihood of their involvement in criminal activity. In terms of social factors, delinquent behavior often occurs in social settings in which the norms for acceptable behavior have broken down (MesafintAdal, 2009).

On the other hand, an important aspect of the socialization process and a cause of delinquency is the quality and process of interaction between parent and child. If communication breaks down at any point, it could lead to delinquent behavior. In addition to that, the absence of family as a unit could affect childhood and how children socialized. Where the family fails, other socializing agencies will take on an increasing role in a child’s life (Wickliffe & Joseph A, 2013). The significant factor of juvenile crime is also the increasing number of dysfunctional families. Juvenile-delinquency rates are twice as high for youngsters from single-parent homes as for those in normally functioning families. Children in single-parent families are taken less care of and thus have feelings of being neglected, discriminated and isolated. The lack of parental love makes them hostile and cynical towards society (Benekos & Merlo, 2010).

In Asian countries, juvenile crime and delinquency are largely urban phenomena. As it is true elsewhere, young people constitute the most criminally active segment of the population. The financial crisis that hit some countries in East and Southeast Asia created economic stagnation and contraction, leading to large-scale youth unemployment and drug traffickers frequently recruit adolescents to serve in this industry, and many become
addicted to drugs while involved in this criminal activity (Jarjoura, et al., 2012). Hunte (2014) notes that long-term unemployed youths are at high risk of social exclusion, feel socially isolated and economically excluded. Unemployment threatens the overall integration of the youth into a society that may lead to the criminal offence. Russell, et al., (2009) observe that crime among the youth is associated with the current level of youth unemployment and the annual changes in the rate of youth unemployment.

In Latin America, the young have been the hardest hit by the economic problems linked to the extremely high unemployment rates prevailing within this group. Juvenile delinquency is particularly acute and is often associated with the problem of homelessness among children and adolescents create environments that are conducive to crime and delinquency (Ignacio, 2013).

In the Middle East, there is less indication that serious problems with juvenile delinquency exist. However, affluent nations such as Saudi Arabia and the United Arab Emirates have more problems with juvenile offenders than do other nations in the Middle East (Ramiro, M., & Matthew, 2012). In these countries, delinquency occur in connection with migrants seeking employment and it linked to factors such as continued urbanization, rapid changes in the economy, and the increasing heterogeneity of the population. The conflict between traditional Arab-Islamic values and modern views imported from other areas of the world seems to be a common problem for countries in this area of the world (Siegel, et al., 2011). In Eastern European countries such as Russia, families are becoming more dysfunctional. Indeed, the number of parents who are deprived of their childrearing rights is increasing annually (Wood, et al., 2009). Parents are often alcoholics, drug addicts, and they have criminal backgrounds (Sandstrom, 2012). Factors such as unemployment and low family income are the main contributors to juvenile delinquency in many parts of this region. There are few, if any, social services in these countries, which creates a dismal picture for youth (Simoes, 2015).

Throughout the African continent, delinquency tends to be attributed primarily to poverty, malnutrition, and unemployment. These factors are the result of marginalization of juveniles in the already severely disadvantaged segments of society (Warr, 2011). Rapid population growth has been experienced in Africa, and the population seems to be getting correspondingly younger over time. This is coupled with the fact that few new jobs are developed in Africa, which has resulted in half of all families living in poverty and juvenile delinquency is on the rise, with the primary offenses being theft, robbery, smuggling, the abuse of narcotic substances, and drug trafficking among young offenders (Ojo, 2012).

According to Andergachew (2004) Ethiopia is one of the developing countries where the majority of the people live below the poverty line. Young people constitute the majority of the poor. Together with the rapid urbanization and the observation capacities of Ethiopian cities being very limited a large number of unemployed people roammed around city streets. Central Statistical Agency Survey (C.S.A, 2015) showed that the total unemployment rate for the youth (percentage of total labor force aged 15-24) is estimated to be 25 percent. It is inevitable for such people to be fertile ground for deviancy activities such as theft, robbery, burglary, and other similar crimes. This condition’s is illustrated by the 2013 study of 90 prisoners which revealed that 57 of them were committed to prison pity theft (Bimal, 2013).

Drought and famine, armed conflicts, destabalizations of family life have left billions of children in Ethiopia without care and protection. These and other related socio-cultural factors have led to the abuse, neglect and/or mal-treatment of children in Ethiopia (Andergachew, 2004). According to Bimal(2013), the problems of juvenile delinquency are connected with the results of poor background, dysfunctional family, and influence of peer groups and poverty, which is considered to be the roots of problems and issues in the country, may not be eradicated easily. When poverty prevails, there would still be juvenile delinquents prowling all over the study area. Axum. This study, therefore, aims at exploring the social causes of juvenile delinquency in Axum Correctional and Rehabilitation Center. Specifically, the family relation and dynamics (disfunctional families, quality in family relationships, lack of parental control, low family socio-economic status) and influence of external environment (Peer influence, school influence, rural–urban migration, the availability of alcohol, drugs in the neighborhood).

1.2 Justification of the Study

Now days, serious and violent crimes have been being committed by juveniles in an alarming rate in developing countries. In addition to their involvement in violent person and property crime, juveniles are committing increasing number of alcohol and narcotic or drug related offences (Paylor, 2010). Economic deterioration, poverty, uncontrolled and unplanned migration from rural to urban areas in search of better working condition exacerbated the problem of delinquency (Sisay, 2015). According to Federal Police Commission, of 182,169 total numbers of criminals reported in Ethiopia for 2012/13, 32,133 were of juveniles aged 9–17 years and of 211,302 criminals for 2013/14, 37,233 were juvenile delinquents aged 9-17. This reflects an overall increment both in number of juveniles and adults criminals in the year 2013/14 by 13.69% and 10.93% respectively as compared to 2012/13. The national crime statistics compiled by the Federal police commission in 2015 for the year 2016 has shown that 311,202 crimes were reported to police throughout the country, juveniles aged 9-17 accounted for 21 % of total crimes. In the same way, of 127,989 crimes were reported throughout the Tigayar region to the police for the years 2012/13, 2013/14, 2014/15 juveniles accounted for 15 percent of total offenses and in the same three years of 125, 115 criminals, 18,050 were juvenile offenders in the region (Tigray Police commission, 2014). Moreover, the national crime statistics report has indicated that the Tigray regional state accounts for 13% of the total crimes reported to the police in the entire country; and out of the Tigray region share 12.8% of all criminals in the country,3.2% were juvenile offenders in 2014/15. This indicates that the Tigray region is one of the crime prone regions in the country. Data compiled in 2016 by Axum Police office shows that there were a total of 3,500 offences from the year 2012/13, 2013/14, 2014/15 committed by child offenders. Among these offences 29.5% of the children were from age 15 to 17, whereas 3.8% total offence during the three years were committed by children of age 9-14 and 51.7% by the 18-30 age group.

For the first age-group (9-15), the total number of offenders has generally tended to rise through consecutive years. For
example, the number of offenders in 2012/13 and 2013/14 was 1155 and 1803 respectively with 38.96% increment. Comparison between 2012/13 and 2014/15 shows even a larger increment which was 53.7%. Based on the 2007 census report of Axum population size, the prevalence rate of offenders for this age group was 146 per 100,000 which indicate that out of every 100,000 people in this age category 146 are offenders. Whereas this age group shares about 12% of the total population of the city, its share in offenders’ population is only 1.7%. It indicates that compared to others, this age group is the least prone to criminal behavior if we assume that there is no recording bias by the police.

The number of offenders in the second age group (16–18) steadily increased in 2012/13 and 2013/14 and then declined in 2014/15. This age group comprises about 15% of the city population but its total share within criminal population is nearly 27%. Its criminal prevalence rate is 4343 per 100,000 which is nearly sixteen times of (9-15) age group. This age group is the most prone to criminal activities (Sisay, 2014). However, data regarding age is not reliable due to the absence of compulsory vital registration system. Nevertheless, juvenile delinquency is the root for more organized and sophisticated crimes that costs a very strong activity in order to tackle it. However, it is often overlooked in the study area. The problem is explained as not challenging enough in relation to the other economic or social difficulties people confront. Thus, the attention of the police is emphasized only in ordinary crime and the problem has never been given full attention. As a result, juvenile crime and delinquency are becoming social problem in Axum town. There are some previous researches carried out on the juvenile delinquency related topics. For instance, Selamawit (2014) studied the lived experience of delinquents and young offenders in the case of Addis Ababa police commission prisoners. It was a qualitative study and the result indicated that the causes of delinquency include mental illness, peer pressure, unemployment, and separation of family (divorce), financial problem and addiction. On the other hand, Habtamu Mamo (2007) also assessed the pattern and trends of crime against the women in prison. The study explains the case of delinquency in relation with genetic factor and socialization. However, the two studies, fail to indicate clear benchmark about the driving factors of offence.

Similarly, Bimal (2013) undertook a quantitative study to explain the case of delinquency in relation with each level of the social structure, such as social institutions, social groups and organizations, and interpersonal relations. In general, these limited studies are related with my research in many ways. The variables they used include family relation and dynamics (dysfunctional families, quality in family relationships, lack of parental control, low family socio-economic status) and influence of external environment (Peer influence, School influence, rural –urban migration, the availability of alcohol and, drugs in the neighborhood) were covered by the previous studies. But, all of the above mentioned literatures used either qualitative or quantitative study. In the case of this study, however, the investigator believes that the best result mostly comes from the careful and selective use of both methods and triangulating them as long as there are variables to be measured and explored.

Cognizant to the prevailing research gaps, this study aimed at investigating the social factors that contribute to juvenile delinquency in Axum Correctional and Rehabilitation Center.

1.3. Objective of the study
- To investigate demographic characteristics of juvenile delinquents
- To identify the social causes of juvenile delinquency in the study area
- To investigate the socio-economic statuses of juvenile delinquents
- To describe the type of different offenses committed by juveniles

II. MATERIALS AND METHODS

2.2. Study Area
Axum is situated in central administrative zone of Tigray in the high land of the Tigray regional national state in the northern tip of the Ethiopian Plateau at 14° 07’ North latitude and 38° 44’ East Longitude at an altitude of 2100m above sea level. Geographically Axum is located west of Adwa, East of Wukro Maray, North of EdagaSelus and south of Rama at 1041 Km distance from Addis Ababa. Regarding the climatic conduction, it is conducive for all activities which is “Weynadega” with mean annual temperature ranges’ between 9.3°C and 29.8°C whereas the mean annual rainfall ranges between 85.9 ML and 428.1ML (Metrological service agency Mekelle, 2014). Administratively the town is structured into four kebeles of Hawelti, Hayelom, Kindya and Maebel with a total population of 44,647 out of this number 21,778 and 25,108 are males and females respectively with the total house hold head of 13,790 out of this number of total house hold heads 6,405 and 7,385 are men and females respectively. The annual growth rate of the populations is 2.5% almost less than by 0.7% from the national average. The source of livelihood and backbone of Axum’s economy are agriculture, tourism and trade respectively. At present, there are a lot of socio-economic activities in Axum city like construction of international hotels & multi-story buildings by the private sector.

2.2. Research Design
A cross sectional study was conducted to collect the necessary information on the research problem. This study is an institutional based study that was carried out among inmates in Axum Correctional and Rehabilitation Center, where convicted juveniles undergo the process of rehabilitation and correction and it was employed a mixed approach. It can be argued that the reason for combining quantitative and qualitative methods is to capitalize on the strengths of the two approaches and to compensate for the weakness of each approach. Considering this point of view on the combination of the methods, combinations of quantitative and qualitative approaches were selected for the research upon which this thesis was based. Both primary and secondary data sources were used in the study. The primary data was collected from juvenile delinquents found at Axum Correctional and Rehabilitation Center, police investigators, judges from courts as well as selected parents of the juvenile delinquents using questionnaires and, key informant interviews.

Secondary sources: In addition to the primary data that was collected by the investigator from the study participants using different research methods, the secondary data was also collected from different sources, such as written documents, police reports and journals, books, published and unpublished materials. The

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total population was comprised of 155 juvenile delinquents. Out of this population, a sample size of 87 respondents was taken as a suitable sample size using the formula proposed by Kothari (2004) and the study used a systematic random sampling technique. The quantitative analyzing method was used to analyze the quantifiable data of socio-demographic characteristics, social factors that contribute to juvenile delinquency, socio-economic statuses of juveniles, and different offenses committed by juveniles. Quantitative data was analyzed using Statistical Package for Social Sciences (SPSS) and the result was presented in tables.

Qualitative data obtained through interviews were analyzed by using content analysis. It followed the following steps: identification of the main themes, assignment of codes to the main themes, and classification responses under the main themes. Finally, the information from key informants was categorized into themes that were used to cement the findings of the study.

### III. RESULT AND DISCUSSION

#### Table 1: Sex distribution of the Respondents

<table>
<thead>
<tr>
<th>Sex</th>
<th>Number of Respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>69</td>
<td>86.25</td>
</tr>
<tr>
<td>Female</td>
<td>11</td>
<td>13.75</td>
</tr>
<tr>
<td>Total</td>
<td>80</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Own Survey, 2017

As indicated in table 1, 69 (86.25 %) of the delinquents are males while the remaining a much smaller proportion of 11 (13.75 %) are females. The results imply that boys are involved in delinquency more often than girls. This resonates with findings by Weijters (2013) that males engage more in delinquent and criminal acts than females. even though adolescents, both male and female, are at great risk of becoming delinquents, the main perpetrators are male (Shaw, 2007:89). A study by Legal and Human Rights Centre (2012) revealed similar results of female crime rate being lower than that of males providing social and cultural reasons being the prima-facie reasons explaining their rate. This is clear from the following quotation from one key informant police inspector:

“…….girls are involved in delinquency less often than boys because tighter controls exist for females both in the family and in their public lives, for example, adolescent girls are likely to be allowed less freedom to go out of the house and stay out than are their male counterparts. This limits the opportunities girls have to become involved in delinquent behavior ....”

#### Table 2: Distribution of Respondents based on Age group, Religion, Original premises and educational level

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Item</th>
<th>Number of Respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Age of the delinquents when they join to the institution</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>9-12</td>
<td>3</td>
<td>3.75</td>
</tr>
<tr>
<td></td>
<td>13-17</td>
<td>66</td>
<td>77</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>69</td>
<td>11</td>
</tr>
<tr>
<td>5</td>
<td>Religious background</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Orthodox Christian</td>
<td>65</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Muslim</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Protestant</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Catholic</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>69</td>
<td>11</td>
</tr>
<tr>
<td>6</td>
<td>Original place or Premises</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rural</td>
<td>48</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Urban</td>
<td>19</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Semi Urban/Semi Rural</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>69</td>
<td>11</td>
</tr>
<tr>
<td>7</td>
<td>The educational level of respondents</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Illiterate</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>1st cycle (grade 1-4)</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>2nd cycle (grade 5-8)</td>
<td>46</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>High school (grade 9-10)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Certificate or diploma</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>69</td>
<td>11</td>
</tr>
</tbody>
</table>

Source: Own Survey, 2017

Table 2 indicates that the majority of the respondents were aged between 13-17 years (96.25%) while 3.75% were aged between 9-12 years. It indicates that most of the delinquents were in age 13-17 years as it is also supported by the standard definition of the American Psychological Association that a juvenile delinquent is a person who is under age (usually below 18 Years). This clearly shows that the early adolescent period is the time when youngsters are highly delinquents compared to other periods.
of adolescents. This resonates with findings by Elliott and his colleagues (1985) that the level of adolescent involvement in delinquent acts—whether violent or nonviolent, serious, or minor—generally peaks sometime between 15 and 17 years of age.

The juveniles who are the focus of this study needed parental care in terms of the provision of basic needs, strong bond and guidance. However, these findings implicate that socializing agent are inefficient in shaping and controlling youth behavior. Since juveniles are expected to be under the control and protection of their families and the wider social environment, such proneness to criminal behavior shows that their early socialization could have been negative and unsupportive.

Concerning religious background, 73 (91.25%) are followers of Orthodox Christianity religion, whereas 7 (8.75%) are Muslims. The majority (91.25%) of delinquency acts are committed by Orthodox Christianity believers. The result attained was similar to the previous study conducted by Bimal(2013) that the magnitude of juvenile delinquency is more from orthodox Christianity than Islam and another reason is that in this particular locality the percent of the population is more from orthodox Christianity than Islam.

The table also reveals that 55 (68.75%) of the respondent come from rural areas, whereas 22 (27.5%) from urban areas. The remaining 3 (3.75%) of the juveniles come from semi-urban/Semi-rural areas. The preponderance of most of the juveniles being from rural areas supports the classical theorists who opined that migrant youth are more delinquent than native-born adolescents. The results are supported by the existing empirical studies, Betelhem(2014) and Sisay (2015), who suggested that juveniles who come from rural areas are more likely to become involved in delinquency than their native-born counterparts.

The question of migrants was asked in order to know whether migrant youth are mostly involved in crimes than native-born adolescents, most of the key informants indicated that migrant youth are mostly involved in crimes.

The police inspector said,

“.....Axum’s population has increased drastically because of the migration process.....” people come in anticipation of a better life, which involves finding a job, but once life gets tough, they are forced into criminal activities.

Another key informant from especial representatives to juvenile delinquents at the correctional administration center noted that, migrants have had a higher rate of crime in the sense that jobless migrants turn to crime as a means of survival. Police inspector as a key informant has pointed out as follows

“.....The trend of migration has been on the increase ever since by a situation created where everyone is free to move and settle anywhere, people have been drawn to the town with high hopes of finding employment, when chances of getting jobs narrow, these juveniles might be tempted to commit a crime to survive......”

One judge elaborated:

“Since everyone has a right to move and settle anywhere, many young people have decided to live in cities due to impoverished living conditions in rural areas and this has resulted in many social problems, some of which are unemployment and of course engaged in crime.”

According to the above quotes, young people have come to Axum in search of better economic opportunities, but with few chances of meeting those expectations. Once they fail, those young turn to other ways of making a living and some of these ways such as theft have not been approved by society. Even though the general consistency in the aforementioned empirical results, further careful examination is needed due to the fact juveniles who have urban origin have better knowledge to escape from the site of the police. These results are consistent with those of Xi Chen & Hua Zhong (2013), who suppose that the probability of migrant youth being caught committing a crime was much higher than the urban-born.

About educational level, the results in table 2 show that 13 (16.25%) of the sampled young offenders were from the first cycle, whereas 52 (65%) were from the second cycle and the remaining 15(18.75%) of respondents had never been to school at all. The figure indicated that young people in lower education levels were more likely to get involved with delinquency than those higher levels as none of the respondents had reached high school.

This finding is supported by Weijters (2013) who argued that, adolescents in lower secondary commit more delinquent acts. Also, Aoki (2010) mentioned that higher school attainment reduced the number of crime among young people since they have the legal/moral knowledge about the cost of criminal behavior. Likewise, juveniles who have low academic achievement at the age of 10, 14 and 16 years old tend to commit criminal actions at the age of 18 years old (Herrenkohl, et. al., 2010). These statements indicate that having a good educational background reduces the risk of adolescents to be involved in any criminal activities. Bearing in mind that none of the respondents had reached high school, these findings implicate the extent to which they had lost their ground academically due to their delinquent behavior because it was expected that delinquent behavior would in most cases either delay or terminate school completion. The highest level of education attained by the respondents could indicate where they were in their academic ladder.

Information on the period of stay in the correctional center was also sought on grounds that how long a child was in the institution, table 3 presents a summary of this information:

The table shows the distribution duration of stay in the correctional and rehabilitation center by the juvenile. 81.25 % of them had been in the institution for less than 2 years. Further, 11.25 % of the juveniles had been at the center for between 2 years and 4 years. The remaining 7.5% of the respondents had been at the center for more than 4 years.
Table 3: Period of Stay in the Correctional and Rehabilitation Center

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Item</th>
<th>Number of Respondents</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Duration of Stay at the center</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Under 2 years</td>
<td></td>
<td>57</td>
<td>8</td>
<td>65</td>
<td>81.25</td>
</tr>
<tr>
<td>2</td>
<td>2 years to 4 years</td>
<td></td>
<td>7</td>
<td>2</td>
<td>9</td>
<td>11.25</td>
</tr>
<tr>
<td>3</td>
<td>4 years &amp; above</td>
<td></td>
<td>5</td>
<td>1</td>
<td>6</td>
<td>7.5</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>69</td>
<td>11</td>
<td>80</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Own Survey, 2017

In general, data on the juveniles’ demographic aspect reveal that certain demographic characteristics such as being in the age group 13 to 17, being male, being from followers of Orthodox Christianity religion, being from a rural area and having a lower education are more related with delinquency than others.

Social Causes of Juvenile Delinquency

The study sought to understand the social causes of juvenile delinquency. Data was collected on social factors related to family relations and dynamics and influence of the external environment (such as Peer influence, school influence, rural-urban migration, the availability of alcohol and, drugs in the neighborhood).

Family Relations and Dynamics

Information was collected on marital status, educational and occupational status, estimated monthly income of the delinquent parents and quality parent-child relationships, lack of parental control, family size, as socioeconomic status and family factors that attribute to delinquency.

Table 4: Marital, Educational and Occupational Status of the Delinquents Parents

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Item</th>
<th>Number of Respondents</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Marital Status of the Delinquents’ Parents</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Live together</td>
<td></td>
<td>25</td>
<td>3</td>
<td>28</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>Never married</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Mother deceased</td>
<td></td>
<td>4</td>
<td>2</td>
<td>6</td>
<td>7.5</td>
</tr>
<tr>
<td></td>
<td>Father deceased</td>
<td></td>
<td>5</td>
<td>3</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>both parents deceased</td>
<td></td>
<td>8</td>
<td>1</td>
<td>9</td>
<td>11.25</td>
</tr>
<tr>
<td></td>
<td>Divorced or separated (but both still alive)</td>
<td></td>
<td>27</td>
<td>2</td>
<td>29</td>
<td>36.25</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>69</td>
<td>11</td>
<td>80</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>Occupation of parents</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Government work</td>
<td></td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>3.75</td>
</tr>
<tr>
<td></td>
<td>Private sector</td>
<td></td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Daily labor</td>
<td></td>
<td>8</td>
<td>1</td>
<td>9</td>
<td>11.25</td>
</tr>
<tr>
<td></td>
<td>Agriculture</td>
<td></td>
<td>54</td>
<td>5</td>
<td>59</td>
<td>73.75</td>
</tr>
<tr>
<td></td>
<td>Commerce / own business</td>
<td></td>
<td>3</td>
<td>2</td>
<td>5</td>
<td>6.25</td>
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<tr>
<td></td>
<td>Other</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>69</td>
<td>11</td>
<td>80</td>
<td>100</td>
</tr>
<tr>
<td>3</td>
<td>Parental level of Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Illiterate</td>
<td></td>
<td>31</td>
<td>3</td>
<td>34</td>
<td>42.5</td>
</tr>
<tr>
<td></td>
<td>1-8 complete</td>
<td></td>
<td>19</td>
<td>3</td>
<td>22</td>
<td>27.5</td>
</tr>
<tr>
<td></td>
<td>9-12 complete</td>
<td></td>
<td>11</td>
<td>1</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Certificate</td>
<td></td>
<td>4</td>
<td>2</td>
<td>6</td>
<td>7.5</td>
</tr>
<tr>
<td></td>
<td>Diploma</td>
<td></td>
<td>3</td>
<td>2</td>
<td>5</td>
<td>6.25</td>
</tr>
</tbody>
</table>
As indicated in Table 4, out of a total of 80 delinquent children, 8 (10%) were from father deceased family, 6 (7.5%) formed mother deceased family, 9 (11.25%) formed both mother and father deceased family, 29 (36.25%) were from divorced or separated parents (but both still alive) and the rest 28 (35%) were from the living together with family (unbroken home). From this data, one can easily note that the majority of 52 (65%) of respondents came from homes whose parents had died, divorced, or separated parents (dysfunctional family). This confirms the statement of Price & Kunz (2013) that children who live in homes with only one parent or in which marital relationships have been disrupted by divorce or separation are more likely to display a range of behavioral problems including delinquency, than children who are from two-parent families. It is interesting to note that a total of 28 or 35% of the delinquent children came from an intact family. This could be indicating the existence of weak interpersonal relationships within the family and its social control. Police from investigators, judges, correctional and rehabilitation center staffs held similar views that inappropriate family environment, ineffective parenting and unstable families led to delinquent behavior.

With regards to occupation, 59 (73.75%) of the respondents’ parents rely on agriculture whereas 3 (3.75%) are government workers, 4 (5%) are employed in the private sector, 9 (11.25%) are daily laborers, and 5 (6.25%) engaged in their own business. This figure indicates that the majority of the respondents came from low-income families who involved mainly in agriculture. The finding is consistent with previous studies. Such as Sisay, (2014), Harris, (2006 & Mbuthia, 2013) who argued that children from the poor and working-class are much more likely to engage in delinquent behavior.

It was also found that their parents’/guardians’ responses on interviewing about their source of income where the majority of them (76.8%) expressed that they depended solely on subsistence agriculture. These results are in line with those of levels of education attained by parents and it proves that lack of education the respondents’ parents leaving them with no option but to engage themselves in agriculture and daily labor.

Concerning the educational level of the delinquent parents, the study revealed that 42.5% of respondents’ parents are illiterate and those who are in the range of 1-8 complete are accounted 22 (27.5%) followed by those who are 9-12 complete accounted 12 (15%). For those who have a certificate, diploma and degree and above cover 6 (7.5%), 5 (6.25%) and 1 (1.25%) respectively. It could be concluded that the juveniles with parents with a low educational level have more probability to become delinquent than those parents who have higher educational achievement. This is because parents with a low educational level may not be as involved as should in their children’s education. The result of this study affirms the opinion of Faraja (2014), who argued that the low education level of parents contributed to respondents being delinquents for the fact parents, did not know or experience the fruits of education thus failing to insist it to their children.

<table>
<thead>
<tr>
<th>S. No</th>
<th>Item</th>
<th>Number of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Male</td>
</tr>
<tr>
<td>1</td>
<td>How juveniles spent Most Time</td>
<td></td>
</tr>
<tr>
<td></td>
<td>playing with friends</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>watching movies</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>visiting friends</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>assisting in various household tasks</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>69</td>
</tr>
<tr>
<td>2</td>
<td>People with whom the juveniles spent Most Time</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mothers</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>Grandmothers</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Grandfathers</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Fathers</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Friends</td>
<td>14</td>
</tr>
</tbody>
</table>
To establish if the parents/guardians had a quality relationship with their children, the researcher sought to find out how they spent their time. The results implied that most juveniles spent their time mainly playing with friends (61.25%), watching movies (12.5%) and visiting friends (20%). Quite a small minority (6.25%) spent most time assisting in various household tasks (Table 5). This implies that they were away from home most of the time. Thus, they were hard with their parents/guardians. This echoes their parents'/guardians’ responses on whether they had adequate time with their children where the majority of them (92.8%) conceded to have had inadequate time. Lack of adequate time spent by parents/guardians with the child may have led to the loss of parental relationship and authority over adolescence. The influence may have been taken by the children's friends with whom they spent most of their time. If, for instance, these friends are deviants, then they are likely to adopt socially unacceptable behaviors.

This is consistent with findings by Steinberg (2012) that the influence of peers and their acceptance of delinquent behavior are significant, and this relationship is magnified when youth have little interaction with their parents. During the interview with informants also confirmed this. One delinquent parent would say:

“…….I insisted that he stays at home, he would not hear of it. He was always away with his friends. I think he has copied the father because he too leaves in the morning and comes late in the night. So I have not had adequate time with him……..”

Another parent had this to say:

“……..Though my child was not going to school, she was barely at home. I tried keeping her home with various chores but she always had her way to be away. She had a group of friends with whom she would spend her day…….”

It is clear from the quotes above that the parents/guardians did not have adequate time to be with their children and failure by parents to guide, monitor and advice the desired behavior to their children at the family level may be suggestive that the juveniles succumbed to their peers’ pressure. Only one parent said that she had adequate time for his child:

“…….I was at home most of the time and I think we had spent adequate time together. I would have him work with me most of the time so that I could have a chance to guide him but still he adopted unacceptable behaviors…….”

Parents/guardians did not have adequate time to be with their children and it implies less intimate relationships which creates suitable ground for a juvenile to commit delinquent acts. Demuth &Wright (2012) also founded that lack of parental control and lack of quality relationships between parents and children resulted in adolescent substance abuse and delinquent behavior. Still, this is confirmed by what juveniles reported in the questionnaire that 91% of the participants said that they did not receive enough follow up from their parents/guardians.

A look at the information contained in table 5 demonstrates that the juveniles spent most of their time with their female parent/guardian; the majority of them spent time with their mothers 43.75% and 17.5 % with their grandmothers. Only 11.25% and 8.75% spent their time with their grandfathers and fathers correspondingly. A significant number (18.75%) also spent most of their time with their friends. The average percentage of 61.25% (mothers, 43.75% and 17.5% grandmothers) of the juveniles who spent most of their time with female guardians/parents. This suggests that female parents/guardians were more available for the juveniles than the male parents/guardians. The findings also suggest that either the number of female-single headed families or the extent of the level of un-involvement in parenting by fathers in the study area is high. This is consistent with findings by Kimani and Kombo (2010) that fathers in contemporary society have left their parenting roles to mothers.

<table>
<thead>
<tr>
<th>S. No</th>
<th>Item</th>
<th>Number of Respondents</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Monthly Income of Parents of the Respondents</strong></td>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Total</td>
</tr>
<tr>
<td>1</td>
<td>less than 1000 Birr</td>
<td>59</td>
<td>3</td>
<td>62</td>
<td>77.5</td>
</tr>
<tr>
<td></td>
<td>1001-5000 Birr</td>
<td>5</td>
<td>4</td>
<td>9</td>
<td>11.25</td>
</tr>
<tr>
<td></td>
<td>5001 -10000 Birr</td>
<td>3</td>
<td>3</td>
<td>6</td>
<td>7.5</td>
</tr>
<tr>
<td></td>
<td>Greater than 10000 Birr per month</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>3.75</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>69</strong></td>
<td><strong>11</strong></td>
<td><strong>80</strong></td>
<td><strong>100</strong></td>
</tr>
<tr>
<td>2</td>
<td>Family size</td>
<td>6</td>
<td>2</td>
<td>8</td>
<td>10</td>
</tr>
</tbody>
</table>

Table 6: Estimated Monthly Income and Family Size of Parents of the Respondents
Table 6 showed that the majority, 62 (77.5%) parents of the respondents earned less than 1000 Birr per month. It further revealed that 9 (11.25%) parents of the respondents were having monthly income of 1001 to 5000 Birr, 6 (7.5%) earned between 5001 to 10,000 Birr per month and the rest 3 (2.5%) parents of the juveniles earned greater than 10000 Birr per month. Here we see that the majority family’s income is less than 1000 Birr per month. Therefore, it could be understood that juveniles who come from low family income are more likely to participate in delinquent behavior. This is consistent with findings by Wahab (2015) that youngsters from communities with lower income were more at the highest risk of juvenile crime than those from upper-class communities. The lower the economic capability of an individual, family, or society contemplated the more risk chances of crime involvement.

Concerning the family size the survey results show that 10% of respondents had a family size ranging from 1-3, 31.25% of them had family members 4-6, and the remaining 58.75% of them had more than 6 family members (Table 6). Though the largest families had the highest number of delinquents from the data we cannot conclude that as family size increase the prone for delinquency also increase. This is because parents of larger families who have substantial economic resources may be better able to meet their children’s needs in a way that reduces the probability of delinquency. These results are similar to Prior’s (2010) argument that a more important variable is economic resources rather than family size.

**Influence of External Environment**

The external family environment encompasses peers, school and the community, which influence juvenile delinquency.

<table>
<thead>
<tr>
<th>S. No</th>
<th>Item</th>
<th>Number of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Male</td>
</tr>
<tr>
<td>1</td>
<td>Do you think Peer pressure leads you to withdraw from school?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>69</strong></td>
</tr>
<tr>
<td>2</td>
<td>Have you ever been engaged in any group of delinquents?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>49</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>69</strong></td>
</tr>
<tr>
<td>3</td>
<td>Do you think that the use of drugs or alcohol leads you to involve in Delinquent acts?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>56</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>69</strong></td>
</tr>
<tr>
<td>4</td>
<td>Do you think the availability of alcohol; drugs in the neighborhood influence you to utilize the drugs?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td></td>
</tr>
</tbody>
</table>

Source: Own Survey, 2017

**Peer Pressure**

This publication is licensed under Creative Commons Attribution CC BY. [http://dx.doi.org/10.29322/IJSRP.10.07.2020.p10356](http://dx.doi.org/10.29322/IJSRP.10.07.2020.p10356)
As far as the influence of deviant peers on school dropout is concerned, the results have shown that 63.75% of the respondents mentioned that they dropped out of school due to peer pressure and the rest 36.25% of them were not influenced by their peers (Table 7). One of the delinquents indicated how peer influence had led him to withdraw from school:

“..........My parent sends me to school, but instead, I go with my friends to the bush, and in the afternoon when the children come from school, I come home ... I struggled a bit at school and it started at the time I began to associate with those my friends, that’s when I started to perform poorly at school and eventually I dropped out of school........”

Peer influence was also given as a reason contributing to children dropped out of school by most of the parents. One of the parents had this to say:

“His friends with whom he associates are also school drop-outs, and all of them use Drugs ...”

Similar remarks were given by one of the guardians. One of the guardians remarked:

“They associate themselves with the wrong friends and there is peer pressure”

The above views of the juveniles and their parents or guardians indicated that association with deviant peers has led to them underperforming or temporally expelled at school, which then in return resulted that they permanently dropped out of school. The findings suggest that peers and the people that the juveniles interacted with influenced their behavior. These findings are consistent with Dizon-Luna’s (2013) argument that deviant peers cluster together and encourage one another to support the idea of dropping out of school. Therefore, absence from school is a fertile ground for delinquency.

Group Involvement

Most violent criminals belong to teenage peer-groups especially street gangs (Shaw, 2007:189). Clifford Shaw once uttered, “I never met a delinquent who acted alone”. Most young people work together as the fact that they are of similar characteristics enabling them to manage their activities as far as their age vulnerability is concerned. It was realized that, 66.25% of young offenders were involved in a group of delinquents whereas 33.75% were not involved. Respondents identified reasons for their involvement in a group of delinquents saying they needed a substitute of the family as far as their urban life is concerned. Others stated that they did not want to be alone because belonging to a group provide protection within the neighborhood. Still, others stated that they want to depend on their group for survival. 56% of them said they were influenced by others to join their groups. These results are similar to UN-Habitat’s (2004) argument that youth join gangs to get “a perceived” respect in a community, others band together for the purpose of finding community (street children) and work together.

Alcohol and Drug abuse and Delinquency

Kuo and Yang, (2002) argued that many delinquent acts appear to be committed while the perpetrator has been using drugs or alcohol. To confirm whether such a relationship existed in the context of this study, respondents were asked whether they had committed the offense for which they were institutionalized while under the influence of alcohol or drugs. About 17.5% of the respondents reported that they committed the offenses under the influence of drugs or alcohol (see Table 7). This reinforces report released by the national center on addiction and substance abuse (CASA) at Columbia University (2010), four of every five children and teen arrestees in state juvenile justice system are under the influence of alcohol or drugs while committing their crimes. Some of the key informants from special representatives to juvenile delinquents at the correctional administration center also held similar views that offenders could use illegal substances such as drugs or alcohol to be brave enough to commit crimes. However, some of the informants from judges did not agree with this position. This is inferred from the response given below from one of the judges:

“Use of the illegal substance or alcohol abuse was a factor but to a lesser extent as a crime such as a bank robbery requires some great deal of planning and concentration.”

From the above quotation, we can understand that the use of alcohol or illegal drugs has a causal link to delinquent acts. But this would depend mostly on what type of crime is to be committed.

Influence of Availability of Alcohol and Drugs in the Neighborhood

Respondents were asked whether they had utilized the alcohol or drugs out of the influence of their neighborhood. Out of 73.25 % of the respondents’ who are different drug users, the majority (54%) of the respondents reported that they utilized alcohol and drugs out of the influence of their neighborhood in which alcohol and drugs were easily accessible to them (Table7). From the above data, we can understand that an environment proliferated with anti-social behaviors that may have encouraged undesirable behaviors among the juveniles. This finding is supported by Mincey et al. (2008) which showed that children in environments where they are exposed to criminal activities have a likelihood of emulating the behaviors because they consider them acceptable. Additionally, when respondents asked in what ways did the availability of drugs or alcohol influence them to utilize, 42 % of respondents reported that with the uncontrolled expansion of venues serving addictive substances such as alcohol and khat in their neighborhood and they see people around enjoying it, make them want to try what it feels like to be drunk or, intoxicated. The findings are consistent with past studies by Plomin et al. (2006) which have shown that children who lived in social environments abounded with social evils are likely to emulate that behavior.

According to table 8, 59 (73.75%) of the delinquents used different types of drugs. The remaining 21 (26.25%) of the delinquents never used drugs.

Accordingly, cigarettes and khat are substances or drugs used at utmost among the delinquents 50 (62.5 %), 49 (61.25 %) respectively. Followed by alcohol 45(56.25%), hashish 26(32.5%), shisha 16 (20%) and the remaining 7 (8.75%) accounts for other substances. The above table also indicates that out of 80 samples size of juvenile, 50 (62.5%) were smokers, 49 (61.25%) were accustomed to the habit of chat chewing, 45(56.25%) drunker, 26(32.5%) were addicted to hashish and 16(20%) of them were addicted to shisha and the remaining 7 (8.75%) of them were addicted to other types of habits. The findings are similar to the past study by Sisay (2014) which has shown that out of 86 sample size of juvenile 44 (51.16%) of the delinquents used
different types of drugs. And 58 (67.44%) of the juvenile were addicted to chat and alcohol for each, 56(65.11%), 16 (18.60%) and 13 (15.11%) were addicted to cigarettes, hashish, and benzene respectively. 11 (12.80%) were addicted to shisha and the remaining 9(10.50%) covers other drugs.

Table 8: Distribution of Respondents Personal Habit

<table>
<thead>
<tr>
<th>S. No</th>
<th>Item</th>
<th>Number of Respondents</th>
<th></th>
<th></th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Total</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Have you ever used substances/drugs?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>52</td>
<td>7</td>
<td>59</td>
<td>73.75</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>17</td>
<td>4</td>
<td>21</td>
<td>26.25</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>69</td>
<td>11</td>
<td>80</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>Kind of Drugs they use</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Khat</td>
<td>42 *</td>
<td>7 *</td>
<td>49 *</td>
<td>61.25</td>
</tr>
<tr>
<td></td>
<td>Alcohol</td>
<td>39 *</td>
<td>6 *</td>
<td>45 *</td>
<td>56.25</td>
</tr>
<tr>
<td></td>
<td>Cigarettes</td>
<td>47 *</td>
<td>3 *</td>
<td>50 *</td>
<td>62.5</td>
</tr>
<tr>
<td></td>
<td>Hashish</td>
<td>24 *</td>
<td>2 *</td>
<td>26 *</td>
<td>32.5</td>
</tr>
<tr>
<td></td>
<td>Shisha</td>
<td>12 *</td>
<td>4 *</td>
<td>16 *</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>5 *</td>
<td>2 *</td>
<td>7</td>
<td>8.75</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Source: Own Survey, 2017
*refers to more than one responses of respondents

Typology of Crimes Committed by the Delinquents

The study revealed that theft and related crimes are the mostly committed by juveniles than any other offense. Theft is the leading crime with 36.25% of all the crimes committed by respondents, robbery was committed by 17.5% of the respondents, a burglary was 15%, a crime involving disorderly conduct or gambling was 10%. Serious crimes such as murder were committed by 5% of respondents, attempt to killing 3.75%, rape 8.75% and assault by 3.75% of respondents (Table 9). The fact that most of the respondents studied were institutionalized for economic-related crimes such as theft, robbery, burglary and gambling, as opposed to other offences is an indicator of the presence of poverty and social deprivation in the lives of these children. These results propose that many juveniles are in the struggle of having something for their basic need to sustain their life leading them to take peoples' belongings and property. Also, substance use acts as an attribute to stealing and theft for the sole aim of having money to buy drugs and relates substances. Information provided by key informants from judges indicated that theft crimes done by young offenders were to enable them to buy drugs.

Table 9: Types of Crimes Committed by Delinquents

<table>
<thead>
<tr>
<th>S. No</th>
<th>Item</th>
<th>Number of Respondents</th>
<th></th>
<th></th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Total</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Typology of Crimes Committed by the delinquents</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Theft</td>
<td>25</td>
<td>4</td>
<td>29</td>
<td>36.25</td>
</tr>
<tr>
<td></td>
<td>Robbery</td>
<td>11</td>
<td>3</td>
<td>14</td>
<td>17.5</td>
</tr>
<tr>
<td></td>
<td>Burglary</td>
<td>10</td>
<td>2</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Murder</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>attempt to killing</td>
<td>3</td>
<td>-</td>
<td>3</td>
<td>3.75</td>
</tr>
</tbody>
</table>
Factors for Criminal Behavior

Criminality is one of the alarming world problems in looking up the effects, prevention, and solutions knowing the causes is paramount important. The causes and conditions for juvenile crime are usually at each level of the social structure. The study explored social causes that pushed young offenders in a correctional and rehabilitation center to involve in crime.

Table 10: Social Causes for Committing Offenses

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Item</th>
<th>Number of Respondents</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
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<td></td>
<td>Social factors for committing offenses</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Economic problem /poverty</td>
<td>21</td>
<td>25</td>
<td>31.25</td>
</tr>
<tr>
<td></td>
<td>less intimate relationship with parents / integration</td>
<td>6</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Broken family (divorce, death of one parent or both, migration)</td>
<td>11</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Peers influence</td>
<td>19</td>
<td>21</td>
<td>26.25</td>
</tr>
<tr>
<td></td>
<td>use of alcohol, drugs</td>
<td>12</td>
<td>14</td>
<td>17.5</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>69</td>
<td>80</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Own Survey, 2017

The study results demonstrate that 31.25% of respondents involved in deviant acts due to economic problems or poverty, 26.25% became delinquents on their peer influences, 17.5% of the respondents in state of alcohol intoxication they end up in delinquent acts thus conflicting with the laws. The UN (2003) states that the use of alcohol and illegal drugs by young people is one of the delinquency as they involve in petty theft to acquire the cash for the purchase of substance use. Other social factors were broken family (divorce, death of one parent or both, migration) and less intimate relationship or integration with their parents (Table 9). The finding fact that the high proportion of minors involved in deviant acts lure for economic reasons is supported by Manh (2013) that if a family has unstable finances children may resort to adopting a socially defective approach to meet their needs. And this fact is implicated by the differential opportunity theory of Cloward and Ohlin (1960) which argues that poverty of the lower classes prevents them from using legitimate means, such as education, to acquire valued goods, thus giving them no alternative but to engage in illegitimate activities.

Additionally, on interviewing parents/guardians about social causes that led them to take their children for correctional and rehabilitation centers, most of them expressed their disappointment in their socio-economic status because making ends meet appears very difficult for them. The extracts below explain some of their views. For example, one of the delinquent parents expressed as follow:

“......Life has become hard. I cannot afford three meals a day for my children. A light breakfast and supper are all I can afford.” Another one said, “My children are only assured of tea in the morning and supper. Lunch is never guaranteed but we are used.”

From the above quotation we might understand that the juvenile’s parent/guardian did not provide the basic needs of their children failed to do so the juveniles could attract involvement in delinquent acts such as stealing related offenses that had led the majority of the juveniles to be placed in correctional and rehabilitation center.

Key informants interviewed on whether or not the economic problem was a factor influencing crime indicated the following. The police inspector said, “Poverty is really a main factor in crime commission as people are frustrated when their income doesn’t meet the basic needs of the family, they could commit crimes such as theft.”
To summarize data collected through key informant interviews, among the questions asked, questions related to who mostly involved in crimes between men and women juvenile, most of the informants responded that men mostly involved in crimes than women. Regarding the social causes for becoming delinquent, the majority of the respondents identified poverty or economic problem as the main cause for juveniles to involve in delinquency. The other reason raised by the majority of the respondents as the cause for juveniles to involve in delinquency was peer pressure. Other social causes identified by the key informants for juveniles to start involving in delinquent actions were dysfunctional families, lack of parental control and close relationships with their parents, rural-urban migration, and use of alcohol or drug abuse. Most of the respondents from the police investigators, judges, delinquent parents, and special representatives to juvenile delinquents at the correctional administration center agreed that theft was most committed by juveniles.

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Futurities of delinquents

Table 11: Do you believe you can abandon this delinquent behavior?
Source: Own Survey, 2017

<table>
<thead>
<tr>
<th>Item</th>
<th>Number of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
</tr>
<tr>
<td>Do you believe you can abandon this delinquent behavior?</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>65</td>
</tr>
<tr>
<td>No</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>69</td>
</tr>
</tbody>
</table>

Futurity means the chance of juveniles continuing their delinquent behavior or quit their delinquent action. When that asked the participants their futurity 91.25 % of respondents saying promised to abandon their delinquent behavior when they are out of the correctional center. They saying it has been one of the difficult and discouraging moments of their life. They aired out as they got lessons from their previous deeds and the rest 8.75% of respondents said they could not abandon their delinquent behavior because to them it is the means of their survival. The findings are in support of Betelehem (2014) who have shown that out of 41 sampled delinquents 36 (87.80%) of the respondents believe that they can abandon their current delinquent behaviors, while the rest 5 (12.2%) of the delinquents do not believe that they can abandon their involvement.

Table 11: Do you believe you can abandon this delinquent behavior?
Source: Own Survey, 2017

Future plan

The results imply that education provided by the correctional and rehabilitation has positive effects on the young offenders. At least some individuals are able to come up with plans on what will they be doing to earn for the living as one of the ways of ensuring they are not back in criminality. 45% of the respondents were to employ themselves in different activities using training skills gained while serving their sentence, 43.75% said they will avoid any person with bad influence and other temptations like alcohol or drug. However, 11.25% of respondents did not have any plan in their mind at the time of survey stating that they don’t know what awaits them after prison hence they will figure out when they are out (Table 12).

Table 12: Strategies to be used by the respondents to avoid crimes
Source: Own Survey, 2017

Respondents’ view on the correctional and rehabilitation center

Respondents were asked to say if the correctional and rehabilitation center was able to change their behavior to socially accepted behaviors and actions. In this regard, the study revealed that most of the respondents 68% were happy and satisfied by the training, vocational skills and counseling. About 30% of respondents said that the correctional and rehabilitation center efforts were not enough while 2% said they were not happy with whatever was done by the correctional and rehabilitation center. The correctional center’s efforts were not enough because

<table>
<thead>
<tr>
<th>Item</th>
<th>Number of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
</tr>
<tr>
<td>Plans to be used by the respondents to avoid crimes</td>
<td></td>
</tr>
<tr>
<td>Working to earn money</td>
<td>33</td>
</tr>
<tr>
<td>Avoid delinquent friends and other temptation</td>
<td>30</td>
</tr>
<tr>
<td>I don’t know</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>69</td>
</tr>
</tbody>
</table>
juveniles were not incarcerated based on their offence type, number of times incarcerated and age group. According to them, Because of this, they are learning different criminal techniques from their mates in the center. This is confirmed by the information provided by one of the special representatives of juvenile delinquents (counselor) in correctional and rehabilitation center through interview stated as follow: “………..They are locked in the same room, whether he/she is little or not. So, what do you expect? They will share each other’s different skills. If one knows only how to steal money from pocket, he/she will learn here how to rob from a house--- after that they will be released from the center learning more skills from senior criminals. To avoid this influence, they have to be placed in different rooms according to their age or offence type or whatever to reduce the influence. But to do this we do not have financial capacity………”

To summarize, male adolescents are more involved in most types of delinquent behavior than female adolescents. In the case of age the majority of the respondents were aged between 13-17 years. This indicates that involvement in delinquency changes with age during adolescence. The study generally has found that migrant juveniles are mostly involved in delinquent behaviors. The study also found that most of the juveniles in correctional and rehabilitation centers are from orthodox Christianity religious followers. Concerning the educational level of the delinquents, the study showed that majority of the juvenile offenders in Axum correctional and rehabilitation centers characterized by a low level of education. Finally, gender, religious background, place of origin and level of education are demographic characteristics linked to delinquency. Some of the family environment possible explanations for delinquency in this study were: Dysfunctional families, quality in family relationships and Lack of parental control, large family size and Low family socioeconomic status. All of these social causes forced the juveniles to commit delinquent acts. In addition, the study realized that most of the young offenders were involved in a group of delinquents and they were influenced by others to join their groups. The results further demonstrate that quite a good number of the respondents used drugs or alcohol out of the influence of their neighborhood. In turn, use of drugs or alcohol and addiction to different types of substances pushes the young to participate in delinquent behavior. Findings concerning the types of crimes committed by the delinquents, the study found that the majority of the delinquents were entering to correctional center by theft and stealing related crimes. This study revealed that the main cause that pushes the juveniles towards delinquency is poverty and association with delinquent peers. Generally, the study found that family relations and external environment as social causes drive the juveniles to delinquency.

IV. CONCLUSION

The first objective of this study was to investigate the demographic characteristics of juvenile delinquents such as their sex, religious background; age of the juveniles while they joined the correction center, their place of origin, their highest level of education. With regard to sex, the results of the study showed that most offenders who committed a crime in Axum were men. concerning age, the result of the study indicates that the delinquents belong to the age group of 13-17 years were more probable to commit crimes as compared to those with adolescents ages. With respect to religious background, the research result found that 91.25% of the respondents were followers of the Orthodox Christianity religion. The study also found that most of the offenders were juveniles who come from rural areas and who had poor family background is more like to commit a different offense in the adolescence period. The results of the study indicate that young people in lower education levels were more involved in criminal activities.

The second objective was to identify the social causes of juvenile delinquency in the study area. The study revealed that those who live in two-parent families were found less likely to involve in juvenile crimes as compared to those living in dysfunctional families. The study also found that a higher rate of delinquency among those youth who lack parental control and close relationships with their parents, compared to others. The study shows that juveniles who were from large-sized /or low-income families commit delinquent acts than smaller sized and higher-income families. The results further demonstrate that quite a good number of the respondents have at some point in time used drugs or alcohol out of the influence of their neighborhood. This signifies that easily accessibility of alcohol or drugs to juveniles and the use of drugs or alcohol, the higher the chances of engaging in delinquent behaviors. The study found out that most respondents were members of the delinquent groups and spend most of the time with their friends which result in dropping out of school which allows them to have criminal ways of thinking. The study indicates that economic problems or poverty are the main reason for many juvenile’s involvement in crimes. It can also be recalled that economic-related crimes such as theft, robbery, burglary, and gambling were the offices that had led the majority of the juveniles to be placed in correctional and rehabilitation centers. The findings of this study also show that a significant number of juveniles were institutionalized out of peer influences. In the research study two theories i.e. Cloward and Ohlin’s differential opportunity theory and Sutherland Differential Association Theory were found the most suited to explain the phenomena of juvenile delinquency. Differential opportunity theory argues that poverty of the lower classes prevents them from using legitimate means, such as education, to acquire valued goods, thus giving them no alternative but to engage in illegitimate activities. This theory has a close association with this research finding. The Differential Association Theory also deals with young people in a group context and looks at how peers influence and the existence of gangs could lead them into crime. The theory is very much in consonance with this research finding because the study found that peer group has a social influence on juveniles’ behavior, most of the respondents reported that they spend most of the time with their friends and also blamed them for their delinquent behavior. However, other social factors i.e. dysfunctional families, large family size, rural-urban migration, quality in family relationships, lack of parental control and use of drugs or took alcohol were social causes found that influence these young into crime and delinquency.

The final objective was to identify crimes committed by convicted juveniles. The study found that theft was the leading crime committed. Other crimes were robbery, burglary, gambling,
and rape. Assault, attempt to killing, and murder were also reported though not in high percentages.

On the basis of the findings and conclusions of the study the researchers are extending the following suggestions to decrease the increasing rate of juvenile delinquency in the study area.

V. RECOMMENDATIONS

- Increase the income of rural people. It was found during the research study that most of the respondents were compelled by poverty and financial problems to commit heinous crimes so the agricultural sector should be attractive enough that the incomes of rural people enable them to run their lives which include fulfilling their children material needs. Together with this, the government should provide adequate employment opportunities from non-agricultural activities such as small industry, co-operatives in rural areas to diversify their source of income. This will encourage young people to run their lives there thus lowering the intensity of rural-urban migration.

- Birth control education should be given to the public members as many parents fail to accommodate the needs of children due to the high number of children. Family populated by children and young people most of them being idle as parents cannot afford material needs, children drop out from school and spending most of their time with peer groups the juveniles have involved in antisocial behavior substance use, violence and crimes included.

- Dysfunctional families, weak control and loose bond of parents over their children and peer pressure are also found to be social factors for juveniles to become delinquents. Thus, parents should avoid divorce because it could lead them to engage in delinquent acts. Also, they must have a close relationship with their children and the parents should be aware of the activities that their children are engaged in and they should also know who are the friends of their children and what they do together to counter the evil impact of the peer pressure that influence these young into crime and delinquency.

- There is a need to have stringent measures in place against people who break the law prohibiting the selling of alcohol or drug to children and barring them from entering venues serving addictive substances. This might help reduce cases of the juvenile’s early exposure to alcohol or drug abuse.

- Both juvenile delinquents and adult criminals were institutionalized to the same correctional center but this situation may create opportunists for juvenile delinquents to learn other criminal activities and techniques from each other and adult criminals. Therefore, juveniles should institutionalize based on their types of criminal activities and age groups. Also, the government should have established remand home for juvenile delinquents at least at the regional level.

- The police investigators and judges should work hand-in-hand with the community as a whole in fighting juvenile delinquency and crime.

- The rehabilitation staff should create appropriate rehabilitation programs for juvenile offenders to redirect their minds and avoid the commission of any other offense.

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Investigating the Effectiveness of a Math Practice Paper in Teaching and Learning of Mathematics

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Abstract: Mathematics is the backbone of modern science, majorly used to solve world problems. Mathematical proficiency is thus very crucial. A math practice paper (MPP) can become a powerful tool for polishing student’s mathematical knowledge and reasoning skills. This paper explores the usefulness of a math practice paper in the teaching and learning of mathematics. It also examines effectiveness of various differentiated strategies of implementing the use of a math practice paper in a diverse classroom. A class of 30 high school students was involved in this study. Students were introduced to math practice papers using various strategies during a term of 14 weeks. Classroom tests and questionnaires were used as instruments for data collection. Results were analyzed and compared. A math practice paper done individually, and then discussed in mixed-ability groups under the teacher intervention was observed to contribute significantly to student achievement. Constant use of MPPs resulted to a positive math trajectory.

Key words: Math practice paper, Practice questions, Teacher intervention.

Introduction

Mathematics is almost becoming applicable everywhere in real life. Mathematicians who are able to apply mathematical knowledge and offer mathematical thinking ability are needed widely in many fields across the globe. The conceptualization and understanding of classroom mathematics is thus very crucial. However, majority of students across the world do not like mathematics [1]. The percentage of students who specialize in mathematical sciences in high school and colleges is quite low. One of the main reasons why students dislike mathematics is negative attitude [2]. Among other factors, negative attitude likely develops when a student consistently get low grades in math tests. Poor performance can seriously impact on a student’s perception about math. Apart from passing knowledge, the teacher has to ensure all students have the right attitude. Is that possible? Good performance in math tests is one of the strategies of boosting morale of students. Good grades make students appreciate and love mathematics. There are various instructional strategies that can be used to teach mathematics. However, studies are still carried out across the world to determine the most efficient method for mathematics education. This research investigates the use of a math practice paper as a strategy towards improving performance in a math class.

For many years teachers and students have often relied on textbooks to teach and learn mathematics. However, this has never been sufficient enough to prepare students for math tests. Textbooks have not been able to provide sufficient problems that are thought provoking, applicable in real life and challenging to all learners. The teacher thus, has to employ different instructional resources and practices that fill this gap. There are diverse teaching resources that can be used including teacher notes, past papers, work sheets, practice papers, games and teaching activities. Proper planning of the usage of these resources can contribute significant gains in student achievement. A well planned resource should pose a problem that generates an essence of curiosity that will make learner want to discover more [3]. Nonetheless, due to diverse abilities and talents among students, no single instructional resource has been proven to achieve math proficiency on its own. The choice of resources to use is a bit challenging as the teacher tries to gratify the aspiration of every student. It is thus reasonably important to use differentiated math instructions to suit distinct aptitudes [4]. Differentiated math instructions motivate students and promote their logical thinking and reasoning. It also promotes retention of desirable knowledge and development of positive attitude. The objective of this paper is to explore the effective use of
Math Practice Paper (MPP)

A math practice paper is a paper consisting of well-organized questions and answers that are applicable in real life. Questions in the practice paper are crafted in a systematic way, to start from simple to complex and made interesting and challenging to learners. Practice questions are mainly topical and exhaustive enough to cover all relevant concepts. This paper is supposed to be prepared by the teacher to cover concepts already taught in class. Apart from revision, the main objective of a math practice paper is to boost conceptual understanding of mathematics and enhance accuracy and speed. Some of the characteristics and importance of an effective math practice paper are outlined below.

Characteristic of a good Math Practice Paper.

Effectiveness of a practice paper depends on its quality. A good practice paper should be:
- Interesting to make learner want to reply.
- Relevant and applicable in real life.
- Systematically organized to start from simple to complex.
- Clear and understandable, with no vagueness.
- Able to generate the spirit of curiosity and wanting to discover more.
- Able to provoke learner’s reasoning and thinking.
- Able to suit learners’ ability and academic level of education.

Importance of a Math Practice Paper

A math practice paper can have many key implications depending on its quality and usage. The following are some of its importance.

- A math practice paper consists of questions from concepts already taught in class. Working out these questions enhances content mastery. It gives learners an opportunity to demonstrate their understanding of contents.
- A math practice paper enables learners identify concepts/topics they have not mastered well and this persuade them to pay more attention on those areas they experience difficulties. Also, the teacher gets a chance to gather feedback about topics that have been successfully learnt and those that need to be reviewed.
- Practice papers give learners an opportunity to revisit and practice arithmetic procedures taught in class. This stimulates revision hence promoting retention of prior knowledge.
- Practice questions stimulate students’ thinking and reasoning which develops their interest towards mathematics.
- A math practice paper encourages constant use of mathematical tools such as calculators, mathematical sets and mathematical tables. This makes students intensify on their accuracy, skills and speed, which help in reducing anxiety and phobia in math exams.
- Regular use of MPPs familiarizes learners with assessment standards for mathematics, which makes them appreciate, accept and believe that exams are fair.
- Constant exposure to practice papers leads to a positive trajectory in mathematics. This inculcates a desirable attitude towards mathematics.

Role of the Teacher

Effective teaching is not just determined by the quality of a resource but by the teacher success in using the resource. Thus, the following are the vital roles of the teacher intervention in the usage of MPP. Amid other responsibilities, teachers should;
- Plan and prepare relevant practice questions in advance.
- Set interesting and thought provoking questions that are applicable in real life.
- Prepare questions that suit the ability levels of learners.
- Set questions that create the desire to know more.
- Set questions in a way that will make learner want to reply.
- Ensure practice papers are availed to learners on time.
- Ensure all students attempt questions.
- Guide students where necessary.
Methodology

This research was carried out in one of the secondary schools in Kenya for duration of 14 weeks. A class of 30 students was involved. All students were female of average age 15 years. The academic level of students was above average. According to the culture of the school, a continuous assessment test is done fortnightly to assess student progress in mathematics. A test is done after every two weeks. In addition to the test, this study introduced weekly math practice papers that would help students prepare for the test. A math practice paper comprised of at least 20 questions with answers provided. These questions were sourced from concepts already covered by the teacher in class. Practice questions were made interesting and crafted well to start with simple to complex questions. Math practice papers were provided at least a week before the test. The following three strategies of administering practice papers were considered and feedback collected and compared. Every strategy was investigated within four weeks. Two tests were done within the four weeks and the average of the two recorded for analysis to determine the impacts of math practice papers on student achievement. Best performing and most improved students were rewarded. This research was carried out whilst students were studying topics on indices, logarithm and equations of a straight line, which are normally challenging and difficult to students. The teacher played a vital role of facilitating and ensuring an effective running of this study.

a) MPP without teacher intervention
In this strategy, math practice papers were introduced to students to help them revise for the tests. Students were left to work out practices questions on their own and mark for themselves. There was no teacher involvement apart from normal teaching in class. One of the merits of this strategy is that it promotes intrinsic motivation, self drive, self confidence and independence among learners. High achievers can take advantage of this strategy to prepare adequately to outshine others. However, some students when not monitored may end up doing nothing about the paper. Moreover, the strategy can disadvantage less-able learners when left to work on their own.

b) MPP with teacher intervention
In this strategy, a math practice paper was provided to students to work out the problems and the teacher got involved in supervision and monitoring the progress. Students were instructed to attempt all the questions on their own. The teacher intervened to guide students on the most challenging questions. The main role of the teacher here, was to ensure all students attempted all the questions in MPP. With the teacher involvement, students get a chance to consult and confirm their workings. This inculcates confidence to students. In addition, every learner gets involved as the teacher monitors their progress. This is a plus to the overall mean score. The teacher on the other hand, gets an opportunity to find out challenging areas that may need review.

c) MPP in group work with teacher intervention
Here, students were provided with MPP and instructed to attempt all the questions individually under the supervision of the teacher. They were then placed in mixed-ability groups of four to collaborate, share ideas and assist each other in solving the difficult problems. The teacher got an opportunity to observe group discussions and guide where necessary. The teacher ensured all the questions were thoroughly done. Students got an opportunity to collaborate, share ideas and validate their work. Though time consuming, group discussions promote maximum participation and improve learning experiences [5].

At the final stage of the study, a questionnaire was administered to find out students’ response about effectiveness of math practice papers. It was given to all 30 students, who agreed to participate voluntarily in this survey. The questionnaire was composed of five questions. Aspects of assessment were categorized as; strongly agree, agree, disagree and strongly disagree.

Result and Discussion

In this section, the effects of math practice papers on student achievement are analyzed and discussed. Figure 1 shows mean scores of tests done on various strategies of implementing MPPs. The least mean score was recorded when math practice papers were not yet introduced. This is due to the fact that students did not have enough materials to use for revision. Most likely students relied only on textbooks and classroom notes for revision which are not sufficient. On introduction of MPPs, the mean score rose significantly by a margin of 7.27. This clearly depicts that math practice papers had a positive impact on student performance. Math practice papers gave students an opportunity to attempt and familiarize themselves with questions and the way they are set in an exam. However, not all students performed well when left to attempt questions on their own without teacher intervention. This is clearly seen in figure 1
and 2. This is due to the fact that lack of follow up by the teacher makes some student relax and perhaps opt not to attempt questions. This can bring the mean score down.

Figure 1: Mean scores of various strategies of implementing MPP.

When the teacher was involved, student performance rose to 54.67 as seen below. Apart from guiding where necessary, the teacher ensured all students attempted all the questions in the paper. This gave a positive result which shows that teachers play a big role when it comes to implementation of math practice papers. Math practice paper done in groups with teacher intervention gave the best score of 57.60. Students were instructed to attempt all questions individually after which they were placed in mixed-ability groups for discussion. Students had an opportunity to shear ideas, assist each other as well as validate their answers. This accelerated the average performance of students. As seen in Figure 2, majority of the students in this strategy scored between 60-79 marks. The teacher played the role of facilitating and guiding where necessary. The teacher factor is clearly evident on student performance.

Figure 2: Scores achieved by students in various strategies of implementing MPPs.

Figure 3 and 4, below show the responses of a survey filled in by all students. From Figure 3, it is clearly seen that MPPs are more effective when done in groups with teacher intervention. This matches the result of the tests. We can thus conclude that the result of the survey is in good agreement with the result of the tests.
Majority of students preferred working out practice questions in groups under teacher intervention. Mixed-ability groups make learners benefit maximally through collaboration and exchange of ideas. Students get an opportunity to showcase their expertise as others get a chance to validate their solutions.

From the responses in Figure 4, it is deduced that introduction of math practice papers was helpful. Students acknowledged that practice papers contributed positively to their academic performance. Majority of the students gave positive responses to all the questions. This evidently shows that, constant exposure of MPPs instills a desirable attitude among learners which eventually leads to a positive math trajectory. A math practice paper, thus, can be used together with other instructional methods to enhance the teaching and learning of mathematics.

CONCLUSION

Mathematics is increasingly becoming the driving engine of careers and innovations across the world. Mathematical proficiency is thus vital in mathematics education. A quality math practice paper and the teacher success in implementing its use, can contribute substantially in student proficiency. Among other importance, a practice paper reinforces learning by promoting retention of prior
knowledge, enhancing logical thinking and reasoning, and developing a desirable attitude towards mathematics. This research focused on the usefulness and the implementation of a practice paper in a diverse classroom. It was observed that tests done after math practice papers were introduced recorded significant improvement in the overall mean score of the class. This was in good agreement with the result of the survey. Majority of students preferred working out practice problems in small groups under teacher intervention. Teacher intervention had a positive impact on student performance. Thus, it is evident that the role of a teacher in defining conditions and method of using a resource is fundamentally important in mathematics education. It was clearly observed that a math practice paper done individually followed by a group discussion under teacher intervention was very effective and convenient to students. Constant exposure to practice papers led to a positive trajectory which inculcated a desirable attitude towards mathematics. Therefore, it is convincing that a well set and planned math practice paper combined with other instructional resources and practices can be used as a differentiated teaching strategy towards achieving math proficiency.

References

Factors and the Influence on Employee Retention of the Apparel Sector Employees in Anuradhapura district.

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Abstract: Employee retention is critical for organization because employees are the driving force to achieve the development and accomplishment of the organization’s goals and objectives. Retention starts at the very early stages of the recruitment process. It is a never ending process as retention is affected by almost all aspects of the business and directly affecting the employee/employer relationships around the world. To enhance employees’ retention, the literature recommends that so many factors play an important role in the retention of employees in the organization. Thus, the purpose of this study is to investigate the relationship between employee retention and the four main predictors namely, motivation, work environment, primary hygiene factors and secondary hygiene factors of Rich Light Exports (pvt) Ltd in Anuradhapura District. With a thorough review of the literature, conceptual model was developed. The study developed validated research instruments. The model was empirically tested by collecting data from apparel sector employees’ in Anuradhapura District. A total of fifty Rich Light Exports (pvt) Ltd employees were selected for the study using the stratified random sampling technique and fifty usable questionnaires were returned. To measure the factors influence on employee retention, descriptive analysis were used and mean and standard deviation was tested. Hypotheses were developed and to test hypotheses, Pearson correlation coefficient analysis was used with the support of Statistical Package for the Social Sciences (SPSS). In connection with first objective, findings of the study revealed that all most all factors had high mean value that represents all factors were highly influence on employee retention. Regarding second, third and fifth objective, the results showed that motivation, primary hygiene and secondary hygiene have strong and significant positive relationship on employee retention. Likewise, work environment have a positive relationship but very weak relationship on employee retention. Further, this study provided conclusion of the results and recommendations for Rich Light Exports (pvt) Ltd in Anuradhapura District to enhance the level of employee retention.

Keywords: Motivation, Retention, Primary Hygiene, Secondary Hygiene, Work Environment

01. Introduction

Employee retention is critical for organization because employees are the driving force to achieve the development and accomplishment of the organization’s goals and objectives. Retention starts at the very early stages of the recruitment process. It is a never ending process as retention is affected by almost all aspects of the business and directly affecting the employee/employer relationships around the world. Regardless of the region, recruitment process and retention seem to take the biggest hits. Retaining key employee is a vital source of competitive advantage for any organization. A concept of retention is critical to ensure a highly productive workforce. It is no use having good personal if they are just as likely to leave, and there is little utility value having employees retained in the organization if they do not engage with the organization and what it do (Smith, 2004).

Retention of employees is very important for an organization but it is affected by number of factors. So, it is important to address these factors otherwise, the organization will be affected by high employee turnover. In organizations, there are always some star performers who are better than average employees. Organizations must have some retention strategies to retain especially such star performers. If they leave the organization they will leave with their experience and that can be very attractive to their competitors and headhunters always look for this kind of experienced employees. A successful marketing manager can be very desirable to the competitors of that particular company. When an organization loses this kind of an employee, it brings negative effects on the consistency for maintaining the same productivity and it creates a negative impact on the organization’s goodwill. Organizations are need to create such an environment that employees would remain happy and willing to stay. That will help the
organization to create and sustain a competitive advantage in this competitive world. It is proved that humans are the most valuable resource and; talent is the critical success factor for any organization.

Organizations must identify the factors for each efficient employee, because every factor does not have the same impact on employees. If a manager wants to reward the competent employees for their outstanding performance, he needs to know what motivates them the most. To develop a competitive advantage in a global economy, organizations must support the strategic plans and required actions for employee retention. A number of studies have Ryan, Deci, & Connell, (1989) found where retention factors such as intrinsic, extrinsic, working environment, benefits etc., were predefined based on some criteria and an attempt was made to identify how much they impacted on retaining an employee.

In this study, Researcher aimed to identify the factors that influence employee retention and will suggest these for successful retention policy in the context of Rich Light Exports (Pvt) Ltd in Anuradhapura district.

**Problem Statement**

In today’s scenario organizations take a proactive measure to formulate the retention strategies. Employee Retention Strategies helps organizations provides effective employee communication to improve commitment and enhance workforce support for key corporate initiatives. Organizations attempt towards building up of the work environment, focusing on employees, their morale, motivation, satisfaction and ability and willingness to be highly productive but still the attrition rate is quite high. Every organization has almost similar retention policies and strategies, but the influence of these retention factors implied by the employer differs from organization to organization. Thus, it is very essential or crucial to understand and identify the most influencing retention factors, according to the expectations of the employees.

Hence, the current study is mainly focused on testing the factors and relationship between employee retention and the four main predictors and the selected apparel industry employees who were the respondents of this study. It is obvious that there exists a gap in literature to examine the factors and the relationship with selected variables on employee retention, especially in the context of Anuradhapura district.

Based on the above discussion, the research problem of the study is presented as follows;

The problem of this study is to investigate “what are factors and whether there was a significant relationship between employee retention and the four main predictors namely, motivation, work environment, primary hygiene factors and secondary hygiene factors in selected Rich Light Exports (Pvt) Limited employees in Anuradhapura District”.

**Research Questions**

1. What are the factors influence on employee retention in Rich Light Exports (Pvt) Limited in Anuradhapura District?
2. Is there any relationship between motivation and employee retention in Rich Light Exports (Pvt) Limited in Anuradhapura District?
3. Is there any relationship between work environment and employee retention in Rich Light Exports (Pvt) Limited in Anuradhapura District?
4. Is there any relationship between primary hygiene factors and employee retention in Rich Light Exports (Pvt) Limited in Anuradhapura District?
5. Is there any relationship between secondary hygiene factors and employee retention in Rich Light Exports (Pvt) Limited in Anuradhapura District?

**Research Objectives**

- To find out the factors influence on employee retention in Rich Light Exports (Pvt) Limited in Anuradhapura District.
- To investigate the relationship between motivation and employee retention in Rich Light Exports (Pvt) Limited in Anuradhapura District.
- To investigate the relationship between work environment and employee retention in Rich Light Exports (Pvt) Limited in Anuradhapura District.
- To investigate the relationship between primary hygiene factors and employee retention in Rich Light Exports (Pvt) Limited in Anuradhapura District.
- To investigate the relationship between secondary hygiene factors and employee retention in Rich Light Exports (Pvt) Limited in Anuradhapura District.

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Significance of the Study

Retention is a voluntary move by an organization to create an environment which engages employees for a long term. The main purpose of retention is to prevent the loss of competent employees from leaving the organization as this could have adverse effect on productivity and profitability.

This study is therefore necessary since it seeks to establish the retention of employees. Findings and recommendations will help to ensure the much needed industrial harmony for growth and development in the country. Researcher expected to provide new solutions and evidence on the usefulness of segmentation techniques for human resource management and retention factors which are in favor of employee.

In addition to that academicians, the study would act as guidance to other researchers who will be attracted to conduct further study related to factors influence in employees retention in Rich Light Exports (Pvt) Limited in Anuradhapura District. Through this study entrepreneurs can identify what are the areas that they want to pay attention to grow their business. So this study is important to both economy and entrepreneurs. The results of this study will be disseminated via this report thus it will contribute to the stock of knowledge.

Limitation of the Study

Given the explorative nature of the study, some limitation of data should be stated. The research focused attention on the impact on retention of employees. Though the study covered production level employees of Rich Light Exports (Pvt) Limited in Anuradhapura District.

- Study was limited to production level employees only in three production lines and also, excluded the management staff of the organization.
- Due to limited time and resources only 50 respondents were drawn out of workforce of 600 working staff.
- Respondent took a longer period of time to complete the questionnaires as they were most times busy with their work. Thus leading to a delay in the collection of data.
- The responses received from participants may not 100% accurate due to subjectivity and personal biases.

02. Literature Review

According to Sue (2001) in simple terms, employee retention means keeping those members of staff that one wants to keep and not losing them from the organization, for whatever reason but especially to competitors. To Sue, organization needs to have right people with the right skills and abilities in the right place and at the right time. This relies on planning, effective recruitment, selection, training, development and retaining those you want to keep. Some of the most pressing human resources management issues in organization today center on the need to effectively obtain high performing employees which will accordingly increase productivity and profitability.

To Sue (2001) employee retention is synonymous to employee motivation. A motivated employee will be satisfied and therefore more productive and more likely to stay within the organization all other things being equal. Therefore, a key issue to address when looking to retain employee is to motivate them. Employee retention can determine the success of the organization or otherwise. If the best staff is not retained then the organization cannot retain its key clients and customers. Keeping valuable employees can be a source of competitive advantage. An organization needs to attract good people, use them effectively and reward them so it can keep the staff it wants. It costs money to keep them but failing to deal with employee retention can potentially affect the financial performance, and reduce the organization’s profit. In a service delivery organization, people tend to lose their trust in the organization and its integrity suffers.

Smith (2004) also indicates that successful organizations realize employee retention and talent management are integral to sustaining their leadership and growth in the market place. Smith asserts that becoming an employer of choice by attracting, hiring and retaining high caliber employees in today’s labour market are the things that challenge organization to manage talents and skill at all levels in the organization. It is always wiser and less expensive to retain employee than to be recruiting. According to Smith (2004) employee retention has become one of the most critical issues facing corporate leaders. This has come about as a result of the shortage of skilled labour, economic growth and employee turnover. Workforce stability is an issue because of unprecedented churn in the employment market with a focus on retaining one’s employees. Today’s labour force is different, therefore managers must take responsibility for their own employment retention, and if they neglect this critical management role, they could be left without enough good employees.
To Smith (2004) a wise employer will learn how to attract and keep good employees. He has observed that money and benefits may bring employees through the front door, but poor working conditions and poor management skills drive them out the back. When it comes to recruiting and retaining many organizations fail to see their own bad habits, faulty processes and other inefficiencies leading to low productivity and high turnover. Reduced turnover gives an organization more stability, which pleases employer, employees and clients alike. A satisfied workforce reflects positive attitude towards others. They in turn will reflect a positive attitude towards clients and thus generating higher satisfaction which grows the revenue of the organization. Employee retention is one of the primary measures of the health of an organization. If you are losing critical staff members, you can safely bet that other people in their departments are leaving as well. Exit interviews with departing employees provide valuable information you can use to retain remaining staff.

Retention of excellent employees is one of the most important challenges in organization today. Retention requires a competitive salary and great benefits. However, retention of an organization’s best employees requires a whole lot more. Employee’s involvement, recognition, development, advancement and pay based on performance just get the organization started in their quest to retain their best. What do people want? The same things they have always wanted is challenging and stimulating work, fair pay, the tools and resources needed to do their jobs, recognition for work well done and involvement in the decisions that impact their day to day lives at work (Grensing, 2000).

**Factors affecting to Employee Retention**

Amaram (2005), investigated; leaving the organization is a mental decision of the employees. Turnover is a psychological outcome of the intention to quit or to remain with the firm. When the labour market is volatile, it has been observed that the retention of the best employees is done by the companies. With high demand in the labour market retention becomes an important strategy in order to survive in the competitive marketplace. There are two types of cost, direct and indirect cost of the uncontrolled labour turnover, which, if not considered can create a huge loss for the organizations. Hokanson et al. (2011) in his study, has shown the importance of some organizational characteristics (internal career opportunities, size, organizational climate etc.) and environmental variables (available employment alternatives, economic and market conditions, etc.) which highly affect the turnover rates. A company’s reputation also helps a lot in retaining the best employees of the organization.

As stated by Herzberg et al. (1959) HR managers are facing a big challenge for to reduce the employee’s intention for a turnover. The various motivational techniques used by the employers are of no use these days. These practices are treated to be an old practice followed in today’s fast-moving environment. It is observed that turnover intention has a great influence on attrition factors for e.g. Work-life balance, flexible working hours etc. It has been observed that human resource management should be practiced not only at the strategic level, but at every day to day level. This helps in making the employees know and understand the policies of the organization. HR should look at the problems of the employees and must solve them creatively.

According to Srinivas (2012) training and development program should be organized for the employees. Training in areas like quality of work, job-related, technical etc. should be provided by the employer so that the employees get a feeling that not only the organization is growing, but also the employee in themselves are growing and developing their skills. Employees who are not satisfied with the training programs should not be left unattended. The reason behind their dissatisfaction should be identified and should be worked on. Since the technology and management practices are changing at a fast rate, training the employees and updating them has crucial. A training program is needed to develop their skills, attitudes and behaviour. Training programs should be evaluated after its completion as it helps in identifying the limitations and drawbacks.

McKeen et al (2009) stated that the importance of IT staffing practices in hiring, retention, career development and training, and performance, promotion and succession planning. The IT profession is unique in it; although the world is witnessing development in the technology, but the old technology never seems to go away. Today, organizations are also found to be using the older languages to operate systems and applications which are coded in the old languages. This confirms that as long as the organizations are using the older technology, people with experience of old technology are required by the organization.

The study of motivation is concerned with why people behave and think the way they do. Motivation is a highly complex concept that influences and is influenced by a large number of factors in the organizational environment. A number of definitions for motivation are presented in the literature. Mathias and Jackson (2002) look at motivation as the complex forces, drives, needs, tension states or other mechanisms that start and maintain voluntary activity directed towards the achievement of personal goals. Campbell and Pritchard (1976) define motivation as a set of independent and dependent relationships that explains the direction, amplitude and persistence of an individual’s behavior holding constant the effects of aptitude, skills, understanding of a task and...
the constraints operating in the work environment. According to McClelland (1961) individuals tend to develop certain motivational drives on the cultural environment in which they live and these drives affect the way people view their jobs.

Thomas et al (1990) added that there is evidence supporting the existence of a linkage between an employee’s motivational level and their individual performance. A motivated employee is a loyal employee and to be loyal implies that the employee supports the actions and objectives of the firm. Martin Bruce (1962) stated that the appearance of the job as a whole has, in fact a bearing on the willingness and quality of an employee’s performance. Porters and Steers (1991) in their study added that individuals have a number needs, desires and expectations in varying strengths and based on these needs and expectations, people act in certain ways which they believe will lead to a desired goal. This implies that the individual is provided with a feedback about the impact of their behaviour and this in turn may reassure the individual if their current way of acting is correct or not. In addition, they pointed out that the selection of certain motives over others, as well as the intensity with which such motives are pursued, may differ from person to person. The definitions and arguments reveals different perceptions about the concept of motivation, however in summary, motivation is perceived to be purposive, goal directed, and energizes human behaviour.

McKeen et al. (2009) found that people with higher education do not stay for a longer period of time with one organization, as they have a lot of opportunities in the market. It becomes easy for these types of employees to get another job and hence while recruiting, HR do go back and check on the stability of the employee. Education does play a role in letting the employees decide whether to stay with the organization or to leave it for a better opportunity. Attrition is dependent on the education factor as well, said (Sandhya & Kumar, 2011). Rewarding employees is important to retain them. Rewarding specifically on the knowledge, skills, abilities and attitudes is a good way to reduce the attrition rate. By making these employees feel attached to the organization. McKeen et al. (2009), stated that training employees with not the required skills, but also about different domains help in retaining the best talent pool. Be it any industry, pay is the factor that actually controls the attrition rate at the entry level of the organization. Employees with less experience, consider it very easy to leave the organization. They are the ones who actually need to be looked into in order to reduce the attrition rate.

When an employee is honoured, he or she stays for a longer period of time. Remuneration also matters, if the organization is not paying as per industry standards the chances of losing the employees increases. Hee and Ling (2011) said that today it’s not only about maintaining the industry standards but also about what additional does the organization do to retain the employees. Paying as per industry standards is good but something additional is required so that the employees can compare with the other organizations and this additional effort influence or force them to stay with the current organization. Radford and Chapman (2015) stated the rate at which promotion is given to the employees may act as a catalyst for retaining the employees. Along with pay if a minimum duration is followed for giving promotion, chances for the employees to stay with the organization increases. It was observed that whether an employee stays or leaves the organization depends on the actions taken by the firm. Organizations should consider approaches to different management practices like flexible working hours, competitive rewarding systems, innovative benefit plans, and inspiring reformation etc. The employer should build an effective work environment which motivates the employees to stay with the employer for a longer period of time. Robbins (2003) stated that working environment is one another factor that needs to be considered for the benefit of the organization. It helps in retaining the employees in more and effective way. Working environment and the culture of the organization influence a lot to retain the employees.

According to Daniel and Metcalf (2009) recognition is a return on an employee's effort and dedication at work, as well as his or her results. An employee recognition program can be a great morale-building tool for any organization, whether large or small. An effective recognition programme can lead to innovation, higher productivity and greater job satisfaction for the workers (Beer and Walton, 2014). Employee recognition programmes could include several levels of recognition, from a simple Certificate of Appreciation to Employee of the Month to awards given on the division and companywide level, recognition should be provided to those who exceed expectations and earn the award (Steers and Porter, 2011). Recognition is one of the strong motivation factors; employees feel comfortable when they are praised and recognized (Armstrong, 2007).

A recognition programme can help employers meet their organizational goals by helping attract and retain high-performing employees. Daniel and Metcalf (2009) reported that companies are aligning their employee recognition programmes directly to the strategies of the organization due to the following nine reasons listed according to order of importance a) Create a positive work environment b) Creating a culture of recognition c) Motivating high performance d) Reinforcing desired behaviours e) Increasing employee morale f) Supporting the organization mission and vision g) Increasing retention and decreasing turnover h) Encourage loyalty and i) Supporting a culture change. Other reasons for adapting a recognition programme includes: reducing costs, retaining key employees, increasing employee productivity, competitiveness, revenues and profitability, improving quality, safety and customer service, and lowering stress, absenteeism, and turnover (Daniel & Metcalf, 2009).
Kay and Jordan (1999), stated that it takes time for the team member to settle with the new member and increase the productivity level. Even after being trained the new employee needs the other team members help to understand the process and match their speed of working? PR costs is another a big cost bared by the organizations in order to answer the reason for the voluntary and involuntary attrition. In the exit interviews employees very clearly state that they are leaving their current employer because of the pay or remuneration and as the other company is paying them more than the current employer (Samuel & Chipunza, 2009). When the economy is doing good there is always a high number of opportunities in the market. Employees perceive that if the organization is not doing well or if any news comes up which is spoiling the reputation of the organization then the employees look for other opportunities as the employer itself is not certain about how long will it survive in the near future. Varma (2011), in his paper established that organizations should also elicit a sense of commitment towards the employees then only employees can develop a faith and be loyal to the organization. For creating employee satisfaction among the employees, a good working culture, strength of leadership, development of shared goals is needed to be developed by the employer. These factors influence the indices of employee satisfaction in any organization. Many organizations do not consider that a repetitive and unattractive job can become boredom for the employees and after 6 to 9 months employees start losing interest in their jobs. Hence employer should make the job interesting by removing repetitiveness from their day to day job.

Surviving for a longer period of time depends on these key workforces. Externally customer satisfaction is important and internally employee’s employee satisfaction is crucial. Both of them are directly related because if the employees are satisfied with the recognition and reward given by the organization based on their performance, a better and better customer support and satisfaction will be provided by the employees. A satisfied employee always tries to satisfy the customer of the organization and also to increase the number of loyal customers. According to Das and Baruah (2013) retention is basically a process in which the employer tries to encourage the employees to stay for a longer period of time. The attachment of the employee with the organization depends on many factors or variables which is important to identify and study their criticality. Both the retention process and the quitting or attrition process should be studied and researched simultaneously as this may give the employers an idea about the expectation of the employees from the organization. HR personnel should make a note of the reasons why the employees are leaving their organization and why some of the candidates want to join their organization. Analysing both of these areas may give the employer a clear picture as to where the loop-hole is exactly.

A high amount of risk is associated with the attrition rate in any organization as the human capital cost will be very high to be bared. The skilled employees once leave their current employer do get hired by the competitors and due to this the current employer not only loses on the employee but also the knowledge and information about the organization to the competitor. Since the competition to survive in the marketplace is growing organizations cannot afford to lose the employees and the information about the organization. This may bring a lot of harm to the organization. Hence the other way to stop this to happen to avoid these situations is to formulate the retention strategies in such a way that the thought of leaving the employer comes to the employee’s mind only when he or she is facing some unpredictable personal problem which is inevitable. It was said by Varma (2011) that the reason for high turnover rate faced by any organization is it private or public is because of poor human capital policies, substandard recruitment policies, imperfect supervisory practices and mediocre grievance procedure.

Employees are considered as the long-term investments for the organizations and management should treat them in that way by redesigning their job, giving promotions to the hard working and best performers, recognizing the best performers, creating a sense of belongingness among the employees etc. Every organization is trying their level best to retain their best and skilled employees but still there are some reasons which lead to attrition of the employees said (Das & Baruah, 2013). Organizations are trying to give the best facilities possible but at times these facilities also fail to retain the employees. Employers find it difficult to understand and identify the major reasons for why employees quit their jobs even after being provided with good retention policies and strategies. Satisfying the human resources are the biggest and the toughest job of the HR personnel’s. As every individual is different from each other understanding their mindset and thoughts are very difficult and challenging.

Although there are some very important and crucial factors and variables that do impact the retention of employees, still the other factors which do not influence retention to a great extent should not under-estimated. Every factor should be given equal importance while framing the retention strategies and implementing it in the organization. None of these factors can be overlooked. Kumar et al. (2014), in their research work studied the motivation factor for retaining the employees. The found that this factor can actually help the employee to perform better and which can overall improve the performance of the organization. It was stated that some of these strategies like open communication policy, reward programs, career development programs, performance based bonus etc. can act as a motivation for every employee in the organization. The employee retention program is a program that helps the employer to retain the employees for a longer period of time (William & Werther, 1996). It encourages and supports employees to remain with the employer as the employer is taking care of their desires, needs and career.
It is always said that HR personnel should hire the right person for the right job and at the right time but to encourage the employees and to retain them for a maximum period of time is difficult and challenging for the HR personnel. Employees who have talent will never sit back without a job; they have a lot of opportunities available in the market. Employees switch their job according to their choices when they are not satisfied with the organization. Successful organizations are at the top of the list as they take care of their employees and consider them as the important asset of the organization (Imtiaz et al., 2013). An organization that considers human capital resource as the crucial and important resource and works for the satisfaction and benefits of their human resource are the ones who survive and thrive in this competitive environment. Employees leave the organization due to personal and professional reasons, which the employer needs to, identify and work on it, to the extent they can control these factors.

Herzberg et al (1959) categorized motivation into two factors, motivator and hygiene. Motivator factors are intrinsic to the job content and responsible for adding meaning to the work. It comprises of factors like feeling of achievement, prospects of career growth, increased responsibility, decision taking roles, interesting work, rewards and recognitions etc. It is important to understand that absence of motivation doesn’t lead to dissatisfaction, but their presence certainly causes satisfaction. The Hygiene factors are the needs that are required for employee satisfaction and their elimination would certainly result in lack of motivation or dissatisfaction. However, even when they are adequately present, the employee’s level of motivation is only neutral. These factors include pay, working conditions, supervision, job security, HR policies, work schedule, paid leaves and interpersonal relationships. Motivators are stemming from the intrinsic context of a job whereas hygiene are stemming from the extrinsic context of the job. The key difference between motivator factors and Hygiene factors is that whereas motivators bring about positive satisfaction, hygiene factors try to prevent dissatisfaction.

The understanding of this theory is that even if motivators are absent and hygiene factors are provided for, workers will still not be satisfied with their jobs likewise will it be if motivator factors are provided and hygiene factors are not available, workers will show signs of dissatisfaction. Both must be available to bring about satisfaction and prevent dissatisfaction respectively. Fredrick Herzberg’s theory suggests that two motivating factors govern behaviour: those that increase an individual’s overall satisfaction and hygiene factors that provide no satisfaction, but create severe dissatisfaction if absent. This theory differentiates between behavioral needs, describing the reasons why employees need specific things and allowing a manager to better direct their motivation. Herzberg’s Theory can be applied by managers to motivate employees. By identifying the hygiene factors, managers can fulfill the basic needs of employees and remove any element of dissatisfaction. When employees have no dissatisfaction arising from the job environment, they are in a better mode to be motivated. By applying the theory, employees can be motivated by fulfilling their esteem and self-actualization needs. This includes a sense of achievement when they have performed their jobs satisfactorily. Therefore, managers can fulfill this need by improving job content.

Also, certain hygiene factors are motivators to some individuals. Take for example money. Money is a hygiene factor, based on Herzberg’s Theory, but it is a motivation for a lot of employees. It motivates them to work harder in order to gain recognition, which translates into a higher salary. Herzberg’s Theory parallels Maslow’s Hierarchy of Needs, thus making it easier to apply. However, the methodological bias that exists makes the theory questionable to some extent. Managers can apply the theory to motivate employees by identifying the hygiene and motivation factors. Individual differences must still be taken into account because not every employee would appreciate this method.

A salary is a form of payment from an employer to an employee, which may be specified in an employment contract. It is contrasted with piece wages, where each job, hour or other unit is paid separately, rather than on a periodic basis. From point of view of running a business, salary can also be viewed as the cost of acquiring and retaining human resources for running operations and is then termed personal expense or salary expense. In accounting, salaries are recorded in payroll accounts. Salary is fixed amount of money or compensation paid to an employee by an employer return for work performed. Salary is commonly paid in fixed intervals, for example, monthly payments of one-twelfth of the annual salary. Salary is typically determined by comprising market pay rates for people performing similar work in similar industries in the same region. Salary is also determined by leaving the pay rates and salary ranges established by an individual employer. Salary is also affected by the number of people available to perform the specific job in the employer’s employment locale. Salaries are fixed cost in nature.

Work Place Environment Workplace environment includes not only the physical elements around the work area of an employee but also all things that form part of the employee’s involvement with the work itself. World at Work, the Total Reward Association defines workplace environment as the total cluster of observable physical, psychological and behavioural elements in the workplace. A positive work environment is believed to make employees feel good about coming to work and provide the necessary motivation to sustain them throughout the day. This observation is echoed by Wells &Thellen (2002), who stress that organizations offering suitable levels of privacy and sound controls at the work place thereby improving levels of motivation and
commitment in employees have an increased ability to satisfy and retain employees. Heneman (1999) also does allude to the fact that one of the most crucial element of any organizations total reward strategy is having a positive work environment.

03. Methodology

Conceptual Framework

Figure 3.1 Conceptual Framework

This conceptual framework was developed to show the variables which are involved in the measuring the employee retention. In so far as this study find the factors influence on employee retention in Rich Light Exports (Pvt) Ltd in Anuradhapura district with the help of four variables mentioned above. The above figure gives conceptualization framework to measure the factors and relationship on employee retention.

As indicated in Figure 3.1 and discussed in chapter 2, based on the discussion the following hypotheses were formulated to achieve the second research objectives of this study.

**H₁**: Motivation will be positively correlated to employee retention

**H₂**: Work Environment will be positively correlated to employee retention.

**H₃**: Primary hygiene factors will be positively correlated to employee retention.

**H₄**: Secondary hygiene factors will be positively correlated to employee retention.

Operationalization of variables

<table>
<thead>
<tr>
<th>Concept</th>
<th>Variables</th>
<th>Indicators</th>
<th>Measurement</th>
</tr>
</thead>
</table>
| Factors influencing the Retention of Employees in the Apparel Industry. | Motivation.             | • Career Growth.  
• Job Security.  
• Healthy Workplace Environment.  
• Pay Scale.  
• Promotion Opportunities. | Likert Scale            |
Research Methodology

Methodology refers to general principles which emphasize how to investigate the social world and how to demonstrate that the knowledge generated is valid. Kelly (2004) explained that collection of philosophical and theoretical commitments may influence decisions made about the research design and the choice of specific methods of data collection and analysis. Further, there are two types of approaches used in researches such as inductive approach and deductive approach. Inductive approach is mostly concerned with the generation of new theory emerging from the data and focused on exploring new phenomena and apart from this. Deductive approach usually begins with a hypothesis and is usually used in research questions to narrow the scope of the study. Therefore, current study adopted deductive approach and to get the most reliable findings, quantitative method is used for this research. Malhotra (1993) defined quantitative research method as a research methodology that seeks to quantify the data, and typically it applies some form of statistical analysis. In this regard, Cavana, Delahaye, & Sekaran (2001) argued that to obtain the valid finding about the relationship between variables; researchers should develop a planned procedure for gathering and interpreting data. Therefore, the current study is to develop a theoretical framework to investigate the relationship between employee retention and the four main predictors such as motivation, work environment, primary hygiene factors and secondary hygiene factors based on previous literature.

Research design

Research design is a way that the requisite data can be gathered and analyzed to work out a solution (Sekaran, 2003). The purpose of the study is to find out the factors and test the hypotheses in order to achieve the research objectives, which are, to investigate the relationship between dependent and independent variables. A study can be conducted either in contrived or non-contrived settings; this study is non-contrived (natural). It could be carried out in a natural environment where things or events which are studied occur normally. Further it is a field study. The extent of researcher interference was minimal since the study was carried out in a natural environment.
out as a field study. When the researcher is interested in delineating the important variables associated with the problem, the study is called a correlative study” (Sekaran, 2003). The type of investigation of this study is a descriptive and correlative study.

Since this research studies a particular phenomenon at a particular time, it is a cross sectional study. As per Rose et al, (2015) a cross sectional study is used to address a range of research questions where the focus is on the current state of the phenomenon of interest and according to Sekaran & Bougie, (2010), the data are gathered just once, perhaps over a period of days or weeks or months, in order to answer a research question. Sekaran, (2003) stated that the unit of analysis refers to the level of aggregation of the data collected during the subsequent data analysis stage. The unit of analysis of this study is the individual employee who is working in Rich Light Exports (Pvt) Ltd in Anuradhapura district.

**Population and sample for the study**

According to Burns and Bush (2009) population is the entire group under study as specified by the research objectives. Thus the study population comprised of all the individual employees of selected Rich Light Exports (Pvt) Ltd. Moreover, the respondents are classified based on their sections or units such as, value added section employees, production unit employees and brand unit staff.

Further, employees of selected Rich Light Exports (Pvt) Ltd which are generally referred a Pioneer Association of the apparel export industry in Sri Lanka inaugurated in 2004 and Sri Lanka Directory of exports. Therefore, the target populations of this study were all the relevant units’ employees who were working in Rich Light Exports (Pvt) Ltd.

According to Burns & Bush (2009), sample is the subset of a population that suitably represents the entire group. Based on the proportion of employees the sample was selected and the data were collected from 50 respondents. The stratified random sampling method was used to administer the questionnaires to the respondents who represented the Anuradhapura District based on a proportionate basis.

**Sample Study**

<table>
<thead>
<tr>
<th>Categories Based on section</th>
<th>Total Population</th>
<th>Percentage (%) of total staff</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value Added services</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Sewing</td>
<td>400</td>
<td>67</td>
<td>34</td>
</tr>
<tr>
<td>• Printing</td>
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<td>08</td>
<td>04</td>
</tr>
<tr>
<td>• Cutting</td>
<td>100</td>
<td>17</td>
<td>08</td>
</tr>
<tr>
<td>Production staff</td>
<td>50</td>
<td>08</td>
<td>04</td>
</tr>
<tr>
<td>Total</td>
<td>600</td>
<td>100</td>
<td>50</td>
</tr>
</tbody>
</table>

(Source: Developed by the Researcher)

Research studies can use a number of methods to collect data such as self- administered questionnaires, or individually administering questionnaire. In the current study, the data were collected from the 50 respondents through a personally administered structured questionnaire. The respondents were employees of the Rich Light Exports Private Limited. The benefit of this method according to Cooper and Schindler (2003) is said to be good cooperation from participants and interviewer was able to reach even those participant who explained communication barrier of various forms. This method permitted the researcher to gain deeper insights into the perception of transfer of training factors. The data was collected from different section in the Rich Light Exports Private Limited.

The questionnaire consisted of two sections; Part I: demographic information and Part II: research information that included items of motivation, work environment, primary hygiene factors, secondary hygiene factors and employee retention. All questions in Part I on demographic information of the questionnaire were developed by the researcher. Questionnaire items of Part II were developed by the researcher as well as few items already developed research instruments on employee retention by researcher Nancykumari (2018). To measure the part II , the researcher used 23 items and respondents were asked to indicate the response from numbers 1 to 5 for each statement. The researcher had used 5 point Likert scale.

* Five-Point Likert Scale

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1. Strongly disagree
2. Disagree
3. Neither agree nor disagree
4. Agree
5. Strongly agree

Data Analysis Techniques

The data obtained from the survey questionnaire were carefully coded and checked for consistency and entered into the SPSS spreadsheet. The analysis was performed with SPSS ver.21. Descriptive statistics was employed to analyze data and the results were tested with parametric and non-parametric tests of significance. Besides, measures of central tendency (mean, standard deviation) were used to analyze the questionnaire survey result. To conduct documentary analysis SPSS ver. 21 was used to run the Pearson correlation between the independent factors and dependent factor. Measures of central tendency (mean and standard deviation) were also used to analyze the variables. Accordingly, the present study used Pearson correlation to measure the relationships among the variables.

04. Data Analysis and Presentation

Fifty (50) questionnaires were issued directly to the respondents. All 50 questionnaires were returned and those questionnaires were checked manually by the researcher in order to assess whether all data had been duly filled by the respondents. The filled up questionnaires were entered into SPSS version 21.0 and the minimum and maximum values were checked. It was confirmed that there were no missing values. As a result the researcher used the data for the data analysis.

Analysis of Demographic Information

Objective 01

The first objective of this study is to find out factors influence on employee retention in Rich Light Exports (pvt) Ltd in Anuradhapura District. The factors were as below and the demographic information in Part I of the questionnaire was analyzed through the descriptive statistics using SPSS version 21.0.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>13</td>
<td>26%</td>
</tr>
<tr>
<td>Female</td>
<td>37</td>
<td>74%</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>100%</td>
</tr>
</tbody>
</table>

(Source; Survey data, 2020)

The results indicated that the respondents who participated in the study were females (74%) while the remainders (26%) were males. The findings showed that the majority of the respondents were females than male respondents in Rich Light Exports (pvt) Ltd in Anuradhapura District.

<table>
<thead>
<tr>
<th>Age</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between 21-30</td>
<td>32</td>
<td>64%</td>
</tr>
<tr>
<td>Between 31-40</td>
<td>16</td>
<td>32%</td>
</tr>
<tr>
<td>40 above</td>
<td>2</td>
<td>4%</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>100%</td>
</tr>
</tbody>
</table>

(Source; Survey data, 2020)

According to the above table, majority of the sample represented by the age level between 21-30 years and it is 64% of the sample. There is 32 % presented age category of 31-40. And also there are low respondents in the age level of above 40 years. Also there are 4% employees are above 40 year
Descriptive Statistics for Independent Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motivation</td>
<td>3.74</td>
<td>0.416</td>
</tr>
<tr>
<td>Work Environment</td>
<td>3.69</td>
<td>0.525</td>
</tr>
<tr>
<td>Primary hygiene factors</td>
<td>3.74</td>
<td>0.524</td>
</tr>
<tr>
<td>Secondary hygiene factors</td>
<td>3.99</td>
<td>0.401</td>
</tr>
<tr>
<td>Retention</td>
<td>3.83</td>
<td>0.395</td>
</tr>
</tbody>
</table>

(Source: Survey data, 2020)

Above table describes descriptive statistics of responses of respondents related with independent variables of the study. According to the above table, mean value for Motivation indicates that Motivation makes a significant impact to the Retention of apparel sector employees (M=3.74 SD=0.416). And in case of Work environment it also shows a low significance than other variables (M=3.69, SD=0.525) towards the Retention of apparel sector employees. Mean value of Primary hygiene factors (M=3.74, SD=0.524) and Secondary hygiene factors (M=3.99, SD=0.401) too are high indicating that both variables are favorably influencing to Retention of apparel sector employees.

The results express that most of the respondents had a common opinion on employee retention and the value is 3.83. It is not high but slightly high hence organization should develop some strategies to retain the employees.

Results and Findings:

Objective Two ; “To identify the relationship between motivation and employee retention in Rich Light Exports (pvt) Ltd in Anuradhapura District”.

H₁: Motivation will be positively correlated with employee retention

<table>
<thead>
<tr>
<th>Employee retention</th>
<th>Motivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retention</td>
<td>.631</td>
</tr>
<tr>
<td>Sig. (2 tailed)</td>
<td>.001</td>
</tr>
<tr>
<td>N</td>
<td>50</td>
</tr>
</tbody>
</table>

**Correlation is significant at the 0.01 level (2-tailed)

(Source: Survey Data, 2020)

In order to find out the relationship between motivation and employee retention, the summary results of H₁ reported in the above table and it shows that the strength of association between motivation and employee retention is strong (r = 0.631) and that the correlation coefficient is statistically significant different from zero (P < 0.001). Also, 40% (0.6312) of the variation in employee retention is explained by Motivational factors. Therefore, the findings conclude that a positive correlation exists between employee retention and motivation, which is when motivation increased, employee retention also increased. Finally, the result confirmed that motivation will positively relate to employee retention which is stated in H₁. Therefore hypothesis 1 is accepted.

Objective 03; “To identify the relationship between Work environment and employee retention in Rich Light Exports (pvt) Ltd in Anuradhapura District”.

H₂: work environment will be positively correlated with employee retention

<table>
<thead>
<tr>
<th>Employee retention</th>
<th>Motivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retention</td>
<td>.245</td>
</tr>
<tr>
<td>Sig. (2 tailed)</td>
<td>.001</td>
</tr>
<tr>
<td>N</td>
<td>50</td>
</tr>
</tbody>
</table>
**Correlation is significant at the 0.01 level (2-tailed)**
(Source: Survey Data, 2020)

In order to find out the relationship between work environment and employee retention, the summary results of H₂ reported in the above table and it shows that the strength of association between work environment and employee retention is weak ($r = 0.245$) and that the correlation coefficient is statistically significant different from zero ($P < 0.000$). Also, 6% (0.2452) of the variation in employee retention is explained by work environment factors. Therefore, the findings conclude that a positive weak correlation exists between employee retention and work environment, which is when work environment increased, employee retention also increased. Finally, the result confirmed that work environment will positively relate to employee retention which is stated in H₂. Therefore hypothesis 2 is accepted.

**Objective 04 ; “To identify the relationship between primary hygiene factors and employee retention in Rich Light Exports (pvt) Ltd in Anuradhapura District”**.

H₃: primary hygiene factors will be positively correlated with employee retention

**Correlation is significant at the 0.01 level (2-tailed)**
(Source: Survey Data, 2020)

In order to find out the relationship between primary hygiene factors and employee retention, the summary results of H₃ reported in the above table and it shows that the strength of association between primary hygiene factors and employee retention is strong ($r = 0.644$) and that the correlation coefficient is statistically significant different from zero ($P < 0.000$). Also, 41% (0.6442) of the variation in employee retention is explained by primary hygiene factors. Therefore, the findings conclude that a positive strong correlation exists between employee retention and primary hygiene factors, which is when primary hygiene factors increased, employee retention also increased. Finally, the result confirmed that primary hygiene factors will positively relate to employee retention which is stated in H₃. Therefore hypothesis 3 is accepted.

**Objective 05 ; “To identify the relationship between Secondary Hygiene Factors and Employee Retention in Rich Light Exports (pvt) Ltd in Anuradhapura District”**.

H₄: secondary hygiene factors will be positively correlated with employee retention

**Correlation is significant at the 0.01 level (2-tailed)**
(Source: Survey Data, 2020)

In order to find out the relationship between secondary hygiene factors and employee retention, the summary results of H₄ reported in the above table and it shows that the strength of association between secondary hygiene factors and employee retention is strong ($r = 0.702$) and that the correlation coefficient is statistically significant different from zero ($P < 0.000$). Also, 49% (0.7022) of the variation in employee retention is explained by secondary hygiene factors. Therefore, the findings conclude...
that a positive strong correlation exists between employee retention and secondary hygiene factors, which is when secondary hygiene factors increased, employee retention also increased. Finally, the result confirmed that secondary hygiene factors will positively relate to employee retention which is stated in $H_4$. Therefore hypothesis 4 is accepted.

05. Conclusion and Recommendations

Conclusion
Based on the descriptive analysis, all independent variables are highly affected with the employee retention, motivation, working environment, primary hygiene factors and Secondary hygiene factors. Even though, work environment factors were not that much influence on employee retention and other variables were highly influences on employee retention in in Rich Light Exports (pvt) Ltd in Anuradhapura District. Respondents were gave same opinion on other variable such as, motivation, primary hygiene factors and Secondary hygiene factors. Moreover, primary and secondary hygiene factors were slightly high influence on employee retention because respondents believe that organization provide better training and development, provide opportunities to develop their skills, provide good welfare services to their employees therefore the mean value is (3.74 and 3.99 respectively). Motivation and work environment factors, organization should consider more to retain their more talented employees with in their organization. All variables show high mean value even though they should improve each factor because it is slightly near to moderate value.

To find out the relationship between dependent variable and independent variables, all independent variables such as, motivation, work environment, primary hygiene factors and secondary hygiene factors significantly correlated with employee retention. Therefore, all hypotheses were accepted. According to findings, Motivation positively correlated with employee retention of in Rich Light Exports (pvt) Ltd in Anuradhapura District. Motivation factors such as Team work, Work life balance, Respect and fair treatment, Leave benefits are directly influencing employee retention. Work environment is positive weak relationship between employee retention Based on the analysis of that data; the working environment which was established by organization is also satisfactory level to the employees. Primary hygiene factors make the positive strong relationship between the employee retention in Rich Light Exports (pvt) Ltd in Anuradhapura District. So the primary hygiene factors are directly motivated employee retention when considering the secondary hygiene factors; there is strong positive relationship between employee retention.

Recommendations

Based on the findings and conclusions of the study, the researcher forwards the following recommendations to the management of the factory. That is to say, the factory management should focus on these factors to maximize employee motivation and retention.

For the enhancement of the employee mindset the researcher suggest these recommendations to overcome relating to the motivation such as competitive advantage is mostly effect with employee motivation these kind of organizations because large number of employees working here and there are lot of employee diversity. Management should give to opportunities for teamwork in that time can earn better productivity and high employee satisfaction. Management must equal and regular pay scale that time employees can understand clearly.

The researcher is suggesting these recommendations for the working environment which was affected positively to employee retention like, Employees are better to provide supportive usage and modern working instruments, Better to introduce more flexible and easiness working instrument to support employees’ day to day duties and responsibilities, It is better to establish better health and safety system like keeping proper ventilation, considerable amount of toilet system, establishing fire extinguishers, eliminate the ergonomics, Introduce proper safety awareness to the machine operators, Rotating every single of employees’ job role for the betterment of their health and safety, Great advantage of conducting training and development program constantly.

These recommendations are suggesting primary hygiene factors which was affected positively to the employee retention of Rich Light Exports (pvt) Ltd in Anuradhapura District such as, It is better to treat all the employees equally by giving their welfare and the other facilities, All the welfare programs such as transport, meals, medical should be better to conduct equally with the other competitive organizations, better to retain strong relationship between employees and the employer and among the employees at the same time among the employers also, Workers and organization is better to link and have strong impression, All the workers are better to make happy physically and psychologically also, Better to appreciate the employees by offering annual trip, transport services, birthday celebrations party, medical treatment etc.

Finally researcher is suggesting such recommendations secondary hygiene factor which was affected positively retention of employee Rich Light Exports (pvt) Ltd in Anuradhapura District like, All the employees are better to grant equal training...
opportunities to develop their career. Offering considerable amount of mentoring opportunities with competitive industries, Employees are better to enhance their personal and professional career progression within the company. It is better to maintain growth opportunities based on workers’ experience level, Employees are better to offer on time promotion and growth opportunities.

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Truth and MLE – the only way for Eternal Global Peace on Earth

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Abstract - This article incorporates multidisciplinary contents from mathematics, physics, economics, engineering, history, Vedas, and Bible. All these subjects are also interdependent. This happens because all these subjects are supported by the same money, coming from the same single source, the central bank (CB). Thus global peace, or any phenomenon, cannot be understood from any single subject in isolation. We show that the money is the root cause for everything that happens on our earth.

Unfortunately there is no definition of truth in our modern societies. The principle that - you have your own truth and I have my own truth - is a false notion. And if this was true then Galileo would still be in jail today. If you read carefully then you will find that the following definition of truth is embedded in the pages of both Vedas and Bible: ‘(1) The laws of nature are the only truths. (2) These laws are created by the objects of nature and their characteristics. (3) Nature always demonstrates all its truths.’

You cannot have peace in your mind unless you know this truth. If you observe yourself or anyone carefully, you will find that all of us, knowingly or unknowingly, are always searching for this truth. For the same reason, a society, a nation, and the world will be in eternal peace only if they all know this truth. We show that the soul is the root cause of everything that happens in the universe, which includes the earth.

Such a truth can be implemented and maintained only when the moneyless economy (MLE) is created. MLE is the only economy that is based on the laws of nature. MLE also cannot be maintained without implementing the truth. Thus the truth, peace, and the MLE are synonyms. All problems of our earth, including threats of possible nuclear wars, will be solved almost overnight if you can implement MLE now. Only MLE can bring heaven on earth. If you understand the concept of root cause, then you immediately have the solution to all problems.

Index Terms - Root cause, Peace, Truth, Falsehoods, MLE, Destiny, Eternal Recurrence, Wars.

I. INTRODUCTION

To clarify the kind of truth we are talking about, we first present two examples from the observation of nature. These examples were discovered and then presented to the western world by Ian Stevenson (1918-2007), a Professor of Psychiatry, at the University of Virginia, USA. Some people on the internet called Stevenson as the Galileo of the modern century.

A baby boy was born in a hospital with birthmarks of a bullet wounds on his chest and back. Doctors, nurses, and parents confirmed the observation. When the boy learned to speak around the age of two, then over a period of some time he talked about his past life, which can be summarized in the following way, without the loss of generality. The boy’s name was N in previous life. He died in hospital H of town T on date D, due to a gunshot wound on his chest. Over time, the research scholars, news reporters, parents visited the hospital H and verified everything that the boy had said from the autopsy records of the man named N, who indeed died on the date D [Stevenson 1974].

Such a kid, who remembers his past life, is known as Jatiswar in Sanskrit. On another Jatiswar case, the boy had complications, and the doctors had to perform surgery on the boy to save him. The doctors found the complete straight line bullet path inside the body of the baby, exactly matching the autopsy record of the dead body of the boy’s previous life [Pasricha 2005].

The above two examples prove that (1) babies are not naturally grown inside mother’s womb. Since there was no brain during the growth period, and yet the baby was manufactured with a bullet path, (2) it was definitely created by the soul and according to the destiny [Das 2013c] of the baby. Thus the examples prove, among other things, (3) the existence of soul, reincarnation, destiny, (4) memory is in the universe and not in our brain [Das 2012c]. It should be pointed out that the blind man example of the Bible falls in this same category of truths.

Both Vedas and Bible say, ‘God is spirit.’ The spirit is same as soul. And God means creator. Samkhya [SK, 1995], a part of Vedas, explains that statement in details with systematic logic and proof. It says that every object has a soul, and that soul has created that object. The above two examples and the phenomenon is a proof of that theory of creation [Das 2017]. We later point out that the destiny is the highest level law of nature, is precisely predictable, and it contradicts the concept of God as the creator of the universe. If God is the creator of the universe, then God cannot be predictable by humans. Universe is not an object; it is the collection of all objects inside it.
Samkhya says if you track any cause and effect chain you will always end up with the same root cause, which is called the soul. That means souls are uncaused, therefore they were never created nor can be destroyed, that means they are eternally existent. This soul is the tiniest invisible particle, and is the only object in the universe that has the consciousness property. Since soul is the tiniest particle, it cannot be broken into pieces, and therefore this soul cannot be a part of another bigger soul. The entire universe is filled with such soul particles, just like the entire environment of the earth is filled with oxygen particles [Das 2017].

PROBLEM LIST (PR): Because we do not know such truths and many more related truths, our societies have created many false things which in turn created many problems, which cause pains, and therefore lack of peace. Here is a partial list of some of such Problems (Pr): Wars (local, global, nuclear), discrimination (race, gender, color, nationality, religious, academic), corruption, migration, violence (religious, political, sexual, gun, drug, domestic), family problems (divorce, children, abortion), pollution, poverty (wealth gap, homelessness), medical diseases, financial (unemployment, bankruptcy), lies, cheating, falsehoods (education, democracy), technology issues, natural (wildfire, earthquake, tornado, flood, hurricane), etc.

Any one of these problems will cause lack of peace for any individual. As an example, more than a billion people in our world are under poverty [UNDP 2018] and therefore cannot have peace. If the society cannot protect its members then the society cannot have peace also. We are all interconnected, COVID-19, the pandemic of 2020, proved that very well. Therefore, if any one suffers, then we all suffer.

CONTENTS: Rest of the article contains the following subsections. (1) First we introduce the Definitions of Truth, Peace, and Moneyless Economy (MLE). (2) Then we give an overview of what the New Peaceful World would look like if we implement Truth and MLE. (3) Next we try to see how we ended up in the present state of our world by describing how we created the items in our problem list Pr. (4) To approach the peace we then find that there is a Root Cause for every problem, and it is always the same, money at the level of earth, and then beyond money, the root cause is soul at the level of the universe. (5) This root cause then helps to characterize the problems in a unified way and we discuss Global Destiny and one of its special features called Eternal Recurrence. (6) We show in the Dependence subsection how Truth, Peace, and MLE are dependent on each other. (7) Finally we discuss Global Peace, Myths about Global Peace. (8) We discuss how a Global War for Peace or some other catastrophe that can or must happen to end this civilization. The death of every object in the universe is a law of nature, and our civilization cannot be an exception.

II. DEFINITIONS
In this subsection we give definitions of truth, peace, and moneyless economy (MLE). In another subsection we show how they are interdependent.

TRUTH
Unfortunately there is no definition of truth in our modern society. Most common understanding about the truth is that – ‘you have your own truth and I have my own truth’. But if that is correct then Galileo would still be in the jail today. If you read Vedas and Bible carefully, and for that matter all books of any religion, you will find the following definition of truth is embedded in their pages and in their theories.

Truth (Tr): (1) Laws of nature are the only truths. (2) These laws are created by the objects of nature and their characteristics. (3) The nature always demonstrates all its truths.

Clearly such truths are unique, universal, and eternal. Unique means one law will not contradict another law, they are independent, and there will be no redundancy. It also means everybody will understand them in the same way. Universal means if a law is valid in USA, then it must be valid in China also. Similarly, if a law is valid on earth it will be valid in any other planet in any galaxy in the universe. And finally, eternal means, if a law was valid million years back, it will be valid now, and will remain valid million years from now. This truth is neither objective nor subjective, because every object has a soul, and the soul is the only particle that has consciousness. Thus such truth (Tr) is the only unifying force at all levels of the universe.

Nature always demonstrates these truths for us to observe, learn, and emancipate. You can see that humans always show us, like in news, if they observe something new for others to learn. The same is true for all objects of nature, because they all have souls, and they want to interact with each other. Therefore, if something is not observed in nature then that cannot be a truth. Fortunately though, all such truths are available on the internet, but you must learn to seek them.

Examples of such laws are: Reincarnation, Destiny, Yogic Power, Eternal Recurrence, etc. Notice that none of them are known to us in modern societies; yet they are all described in all books of all religions, including Bible.

PEACE
Merriam Webster [Mwb] dictionary says peace is a state of tranquility or quietness of mind. But I can never be in such a state of mind under any one of the above Pr problems. Therefore my society also cannot be in peace. Such a definition does not help anyone to achieve peace and remain in peace. Institute for Economics and Peace, in their positive peace report 2019 document [PPR 2019], says – ‘Positive Peace is defined as the attitudes, institutions and structures that create and sustain peaceful societies.’ Clearly, peace is defined in terms of peaceful, and which remains undefined. Without a meaningful definition of peace you cannot achieve peace in our world.

We take the following definition of peace from Vedas [SK 1995], Vedas say (Pc): ‘you cannot have peace in your mind unless you know the truth’. This definition is quite obvious also, because we are all continuously searching for truth. Bible also has similar statements. For the same reason a society must also...
know the truth to remain in peace, and therefore the nations and the world must also know the truth. Thus the foundations of the world community must be based on truth to enjoy ever lasting peace. The reverse is true also, if there is no peace in the world, then there will be no peace inside the homes.

Thus peace propagates from individual to the universe and vice versa. Thus everything in the universe is simultaneously interconnected. And the root cause, as we learn from the observation of nature, behind this interaction is that we are all souls. Thus the universe is not only physically interconnected but we are also interconnected by the consciousness property of our individual souls. All people must understand and properly verify the truth about souls, only then we can have peace. See the book [Das 2014a] for many proofs for the existence of soul, viewed from three different independent angles – reincarnation, yogic power, and human destiny. Jatiswar example is one such proof which actually demonstrates all three angles simultaneously.

This knowledge or truth about the soul should be the foundation for peace, because this soul is the root cause of all causes in the universe. This is like money, in the sense that money is the root cause of all causes of everything or every activity on earth. If you continue digging deeper after money, you will then find the soul as the next deeper level root cause.

MLE

In moneyless economy (MLE) there is no money, neither digital nor paper currency, of any type. Under MLE we work free and get everything free. MLE can give us complete freedom and democracy, with any life style you want. MLE is not socialism, because socialism uses money. MLE is not slavery also, because slavery does not give freedom. It is the only natural economy, and therefore it obeys all the laws of nature.

Actually, the idea of MLE is embedded in the present form of CB (central bank economy), although MLE is a hundred year old concept [Das 2012a]. By giving money you can make anybody do anything you want. Thus CB is a dictatorship. But MLE will give you a true measure of your success, true value of your wisdom, and your true entrepreneurship for the society. MLE provides the real freedom and democracy, for everybody, rich and poor, equally. The rich can become richer and can even raise their kids in a large joint family and in large cars drivers, care givers, free cars, beautiful houses, well maintained by free gardeners, maids, painters, drivers, free cars, etc.

HOW MLE WORKS

All employees of every employer will have an electronic photo identity card. Eventually all people on earth will have such cards. Everyday all employees will swipe their cards as they enter and exit, to and from their work. This card will have, among other things, a ‘Y’ written electronically, indicating that Yes, the person has worked full time for the previous week.

When the person will go to a grocery store he will buy whatever he needs, as he does now. He will then swipe the card and leave the store. He will similarly go to his apartment or bank, for home rental or mortgage payment, and will swipe his card. There will be no money exchange anywhere. Nobody needs to know what is written in the card, just like we do not know what is written on our present credit cards. There will be a nationwide database for all such cards, just like the credit cards.

Employers will not pay any money to any employee; people will not pay any money for food and shelter. The present economy will thus run exactly the way it is now. Many other details like (1) what happens when a person does not work, (2) what if he wants a vacation, (3) how about the single mother, (4) retirement, (5) travel and hotels, etc., are all discussed in the MLE chapter in the free ebook on Soul Theory [Das 2014a].

III. NEW PEACEFUL WORLD

Let us examine how a new peaceful world will look like under Truth and MLE. It appears though that it will be easy to understand that all problems will automatically vanish and heaven will come to earth. But still we illustrate the new world using some small problems and large problems of the present world from the problem list Pr created by the central bank economy (CBE).

POVERTY: Clearly there will be no unemployed persons, because employers will not have to pay any salary. The person can go anywhere freely where he feels he will be qualified and he will be hired. He will not be forced to work on the job that is available. The travel and accommodation to job site of his choice will be free. The person can even implement his own idea and sell it to others, because labor and materials will be free, he will not be required any financial investment. More details can be found in the MLE chapter of the Soul Theory book [Das 2014a].

DIVORCE: Most of the reasons for divorce in a family are due to lack of money. That problem will vanish under MLE. Loss of love between couples will be rare also because both can get all the comforts they need. Every family can get free maid services, car drivers, care givers, kitchen cooks, elderly cares etc. People can even raise their kids in a large joint family and in large houses. A joint family can help to avoid conflicts, and provide philosophical support. However, such joint families cannot be compared with the past joint families, because they were constrained by money.

SEX WORKERS: Many families break apart because of extramarital sexual activities. For such people sex workers will be available as legal jobs. Any job that society needs will be legal and part of the society. Such workers will also live in beautiful houses, well maintained by free gardeners, lawn mowers, maids, painters, drivers, free cars, etc.

HOUSING: Suppose I desire a house in Manhattan, in New York city. Under MLE house price is meaningless. So, all houses will be free. Manhattan is now a center for financial activities. Since
money is gone under MLE those jobs will be gone too. The city will lose its demands, and people will move out and prefer to stay in houses with gardens and lawns. So there will be many vacant apartments in the sky scrapers, and anyone can occupy them. So very soon you will be able to own the entire Manhattan city, if you so desire.

**GUN VIOLENCE:** Gun manufacturers will stop their business, because there will be no need for guns for private citizens. All properties will be free for everybody, so nobody will try to steal your wealth. Migration will stop, no one will threaten your job, and so there will be no loss of employment, since employers will not have to pay salary. There will be no racism also. Because people will know the truth that in the previous birth you were a person of the race that you hate now. So the fear of job loss due to racism, migrants, religious affiliation, etc., will vanish.

**NUCLEAR WARS:** There will be no need for weapons of mass destruction, as no government will threaten any other government for stealing wealth and labor of other nations, since everything will be free. Nations will be ruled by the native people. Foreign workers will be very few and there will be highly desired and respected. High level yogis will be available to convert all nuclear materials to say, talcum powder, with no disposal hazards. See the yogic power chapter in the book on Soul Theory at [Das 2014a].

**GOVERNMENTS:** There will be no need for governments. All industries will be privately owned, there will be no need for providing security to industry owners and also for people or employees. There will be some management of people to see that at least one able bodied-family member is working. However, it is beyond imagination that somebody will not do any work, because the person will be naturally guided by the destiny, and he will not be forced to work on jobs that he does not like.

**HOSPITALS:** Health care will be provided free also. The medicine companies will not give medicine unnecessarily to keep people sick and unhealthy. Most of the drugs will vanish. Giving injections to babies will automatically stop. Unless somebody is sick drugs will not be given to people on mass scale. All medicines will be free also. Use of placebo will become more dominant.

**IV. CREATION OF PROBLEMS**

In this subsection we show how our present societies slowly created all the items in the problem list Pr over the past thousands of years. We illustrate some problems and their origins.

**IGNORANCE:** One of the most important problems is the removal of reincarnation from the Bible in around 600 AD. However, there are still many verses that may be considered to indicate reincarnation. Like the following – ‘Whatever has happened will happen again.’ This can mean that since you are here now on earth, therefore you were here before, and you will be on earth again in the future. Reincarnation is the greatest discovery of the mankind but money and money power did not like it for its business and so it was removed. Now all over the world the concept of reincarnation has almost vanished and we have all become ignorant. We now say we have only one life to live, and then heaven or hell [Das 2018].

**PROCESS:** Another important observable milestone happened when, about 400 years back, Galileo was jailed for observing the nature to discover the truth. Money, money power did not even want to see what he discovered. We call it the Galileo phenomenon. This phenomenon is still happening all over the world, in our industries, governments, and academic institutions. We have different names whistle blowers, traitors, most dangerous man, conspirators, etc.

This made all people scared, and they realized that truth cannot be discovered, because it will reveal the truth about money power. So the entire scientific process was changed. Now, it starts with assumptions, then based on manipulations of the assumptions results are created. But we know that the assumptions are false, therefore all scientific results must be false also. This is so because false can never become true. Thus our entire education system is false now. We point out some false ideas or objects that created large scale problems and falsehoods [Das 2019].

**REAL NUMBERS ARE FALSE,** because they are not objects of nature, and so you cannot touch, see, or feel a real number. Also, real numbers are considered as points on a straight line. But a straight line does not exist in nature either, because all objects in the universe are continuously moving with respect to each other. Since false can never become true, no matter in how sophisticated ways you manipulate the false (falsehoods), the entire mathematics must be false. Since physics uses mathematics, the physics must be false too. You can then see that our entire education is false. This idea of straight line created infinity which in turn destroyed or corrupted math, physics, and engineering [Das 2012b].

Professor Quigley (1910-1977), a mentor of US President Bill Clinton (1993-2001), said education has three negatives and one of them is – ‘never teach the truth [Quigley 1966].’ Interestingly, how did Mark Twain and many other western philosophers come to know the same conclusion ‘Majority is always in the wrong’? What insights they had? How can you expect peace when our education is false? So, from childhood days we are giving false education. People do not understand now why and how everything is happening and we all remain frustrated.

**ASSUMPTIONS AND EXPERIMENTS:** Just to convince the reader a simple example, Newton’s first law is described. Newton said – ‘An object will continue in motion with a constant velocity in a straight line.’ Clearly nobody has seen such an object, because Newton assumed an isolated environment or in the absence of an unbalanced force’, which is not possible, since
gravity is there everywhere in the universe. Moreover, there is no straight line in the universe. For more examples see [Das 2019]. It should be noted that Einstein also assumed that Newton was correct and used it, as inertial frame, in his special relativity theory; therefore SR must be wrong too [Das 2014b].

No engineering experiment can prove any theory, because all experiments will automatically reject all assumptions of the theories, because engineering is part of nature. And since without the assumptions the theories are all wrong, therefore no experiment has proven any theory. Therefore so far, nobody has verified any theory correctly. Realize that all engineering experiments are correct, they prove or demonstrate a law of nature, but they can never prove any theory based on any assumptions.

ENGINEERING IS CORRECT, because engineering uses objects of nature. However, engineering is unreliable, unsafe, and pollutes the environment. This happens because engineering also uses false mathematics, false science, and false money [Das 2012b]. Any product that deals with objects of nature is called engineering. Therefore cooking, foods, medical surgery, chemistry, roads, bridges, computers, airplanes, rockets, missiles, etc., are all engineering activities or products.

MONEY IS FALSE ALSO, because money is not an object of nature. Since money is false, money must be free and abundant at its source, which is the central bank (CB). Bloomberg News found that CB gave secretly more than 10T dollars as bail out money to save the banks during 2008 recessions. At that time US GDP was nearly 14T dollars [Das 2011]. This false money separated, isolated, or discriminated every individual from everything else, that is, from another person, from nature, and therefore from peace. Notice that money is a real number too.

You will never be able to justify the statement – Apple is $10. We have assigned money value to every object on earth, and none of them can be justified by any means. You can say that land is $1, labor is $2, etc., and so total will be $10. But the question still remains the same – why the land is $1. Similarly, we have assigned to Mr. X $10/hr and Mr. Y as $1000/hr, which cannot be justified either.

Since every object and every activity is assigned a money value, you will not find any event, including peace, which is not influenced by money and money power. Therefore the root cause of every problem in Pr can be always traced to money. Thus we are wondering and running around like headless chickens inside a false society created by the false money and the money power.

POVERTY: All activities of the central bank economy (CBE) are designed to create rich people. But you cannot become rich without stealing from others. The major processes for the CBE are private businesses, giving loans, interest charging, creating recessions, etc. Examine the graphs to see how rich is getting richer and poor is getting poorer in [Das 2011].

Let us see how businesses create rich and poor. We make a product at $5, then sell it at $15, and thus steal $10 from every person. The owner of the industry becomes richer and the people become poorer. Thus profiting is same as cheating or stealing. Creating recessions is another way for large scale nationwide theft of wealth by the rich. A Stanford University article says more business means more poverty. See the graphs, created from government data, to examine how interest rate creates unemployment in the article [Das 2011].

Keynes, a well known figure in the economic theories, says – ‘By a continuing process of inflation, governments can confiscate, secretly and unobserved, an important part of the wealth of their citizens. By this method they not only confiscate, but they confiscate arbitrarily; and while the process impoverishes many, it actually enriches some. … The process engages all the hidden forces of economic law on the side of destruction and it does it in a manner which not one man in a million is able to diagnose’.

As we know that governments are also controlled by money coming from the central bank. There are many US presidents and modern economists who also have said the same thing [Das 2011]. Note the phrase ‘not one man in a million’ is very much similar to what Mark Twain said, ‘Majority is always in the wrong’ [Twain 1915].

V. ROOT CAUSE

We find that there is a root cause for every object and every activity in the universe. This root cause is same in every case. Therefore this root cause will give us a unified theory to understand the universe. In our technology for example, we have a microprocessor, which can solve all problems from all subjects.

ROOT CAUSE

For every effect there is a cause [Das 2017]. Since cause and effect are similar we can call them by any name. Thus for that cause there will be another cause. So if we trace any chain of cause and effect, after a finite number of causes, we will end up with a cause which will not have any more causes. This last cause will be same for all chains. This cause is thus uncaused and is called the root cause. This root cause is called the soul. Souls are thus eternally existent. This root cause cannot be eliminated. A soul cannot be killed. All souls together create the global destiny, which therefore is also eternally existent.

Princeton University has demonstrated that even man-made objects like an electronic circuit board has a soul and it can interact with human intentions. A Japanese scientist has shown that water crystals change shape according to our desires. All animals also have souls, we have given butterfly example here. Thus every object including earth, nations, societies, have souls. They all behave in the same unified way as humans do, and according to the same global destiny [Das 2019].

On our earth, a little thinking will show that the root cause is money. Since every object and every activity is assigned a money value, everything that happens is a consequence of money. However, since money is not an object of nature, therefore money is false, so money can be removed, and will not affect anything in our life. We can create moneyless economy
(MLE). Thus at the level of earth, the root cause is money and at the level of universe the root cause is soul. If you search any cause and effect chain beyond money, of course, you will find the soul.

ROOT CAUSE ANALYSIS

Root cause is always known, it is soul at the level of the universe, and it is money at the level of the earth. However, for a better understanding of events, we can try to find the cause and effect relationships for any event that we want to investigate. In many cases it is very difficult to know which one is cause and which one is effect. That is, we may not know if A caused B, or B caused A, since cause and effect are similar in nature. It is also possible that there may be a chain of causes X1, X2, X3, etc., which eventually caused A. Or even there may be a cause R which directly caused both A and B. Since there is a root cause, therefore the last option is always the correct one, where R is soul or R is money.

AN EXAMPLE: Let us consider the example of eclipse. You can ask why the eclipse happens. Here eclipse is the effect or the event and the answer to your why question will give you the first cause. You can say that the shadow of the earth falls on the moon. You can stop here and feel happy, but then you will not know the root cause. So you can ask again why the shadow covers the moon. The answer will be because the moon rotates around the earth. You can then ask why moon rotates around earth. The answer is – otherwise they will fall on each other. Why they will fall, because of gravity.

But gravity, fall, attract are synonyms. We have seen that humans can levitate, fly, and walk over the ground. Saint Joseph of Cupertino is an example [Grosso 2015]. Thus we do not know the gravity, and therefore we do not know why the eclipse happens. If we do not know the root cause then we will always remain ignorant about all our questions. Such ignorance will keep us unhappy. We will not know that we do not know, but we will be devoid of peace. We will not be able to solve any of our problems in Pr.

ASK NO QUESTIONS: The scientists stopped us at gravity and they did not want to ask any more questions to go beyond that point. It is the money and the money power that stopped them from investigating the Saint and they said levitation is false. So the root cause here is money at the level of earth. But the real answer is soul at the level of the universe. By performing yogic meditation we can learn how to levitate and then know that the real reason is the soul. We do not need wings to fly. If one soul can do something then every soul can do the same thing [Das 2018]. However, we are all guided by our destiny; we cannot do anything we want. We are not our bodies or brains, we are our souls.

Asking a series of questions will lead to the root cause, and the answers will always end with money and then to soul. But we can also stop at any point and feel satisfied with our answers. But then you will never know the truth and become happy. The entire society will remain unhappy and nobody will be in peace. In case of gunshot death, for example, we can get the shooter and jail him. And never try to track the cause and effect chain. Such situations make everybody unhappy.

VI. GLOBAL DESTINY

NO FREEWILL: We must have some reasons for any action we take. Therefore our reasons control our actions. So, we cannot have freewill then. Since reasons come before we act, our past reasons control our present action. Thus we cannot have freewill at the present moment. In the same way our past is controlled by another past. Bible also confirms this rational – ‘what we sow is what we reap.’ Thus no-freewill is a law of nature, and therefore is a Truth, according to Tr. For proofs by observation of nature on no freewill see Pat Norris example [Green 1977].

NO CHOICES: Our mind works sequentially, that is, we cannot think nor do two things simultaneously at any time. We always do only one thing at a time. You can verify it yourself by monitoring your thoughts for few minutes. Thus at any moment we can only have one choice. We analyze the first choice first, and then in the next time slice we analyze our second choice. Therefore, moment by moment, or in every time slice, we always have only one choice. This property of mind is also a law of nature for every object in the universe.

SIMULTANEOUS LAW: The most important example of truth Tr is the destiny law. Look at the operational features inside of any engineering corporation. Everybody is working there like a robot. Nobody has any freewill and any choices while inside there. The corporation has a precise plan for every project, all projects are broken into small tasks, people have been assigned to each one of these tasks, and has a schedule for them. Such a precise plan gives us very good peace at work. When I go tomorrow to my work, I know exactly what I have to do, and there are no worries, no complex politics, no complex thinking, etc.

In the same way, the life of every human being is guided by the global destiny or the global plan of the universe. No-freewill, no-choices are thus two real laws of nature also [Das 2014a]. Our individual destiny is derived from this global destiny of the universe, and similarly the global destiny of the earth, the nations, and the societies, etc., are also linked to this same global destiny of the universe. Destiny is created by the simultaneous interactions of all objects in the universe, just like the way a corporation works [Das 2013a].

PROOF OF DESTINY: Another feature of the destiny law is that the destiny can be predicted exactly with all details, before the events happen, by any high level seer yogi, with the power of third eye. In many cases ordinary people can also predict what will happen to you. Sometimes, someone will come to you and ask you some questions and in response you may predict your own future events correctly. This happens because we are all souls, and all souls know all truths, but we are guided by the destiny. Here is an example of precise destiny prediction.

The well known western palmist Cheiro examined the hands of Mark Twain in 1895, when he was bankrupt and $94,000 in debt. Cheiro predicted that he would suddenly become rich in his 68th year (1903). It came true and he signed a contract. Twain wrote –
‘They guarantee me $25,000 a year for five years, but they will yield twice as much as that for many a year, if intelligently handled [Twain 1915].’ Cheiro was a high level yogi.

Quantum Mechanics (QM) says that you cannot predict anything correctly, because of their Uncertainty Principle (UP). But it has been proven that UP is wrong, it has invalid assumptions; see the details here in [Das 2013b].

Observe that this predictability is also quite natural. We can predict who is doing what at any time inside the corporation, because we know exactly the complete plan. The same will be true for the universe, every soul knows the exact plan, and therefore can predict the future also. This destiny is written in the memory of the universe, and any high level yogi with the power of third eye will be able to see this memory. Since destiny is precisely predictable and cannot be changed, because we neither have freewill nor have choices, God cannot exist and God has no role in our life.

Thus the global concepts, universal truths, laws of nature, destiny, MLE, and peace are all synonyms. Understanding any one of them implies the knowledge of all others. For many proofs of destiny and examples see the book [Das 2014a].

VII. ETERNAL RECURRENCE

Eternal recurrence is a law of nature which was popularized in the west by the German philosopher Nietzsche [Das 2018]. Another name for it is the common statement – History repeats itself. It is a just beautiful name for periodicity of everything in nature, so common in electrical engineering and software engineering.

Eternal recurrence is a special feature of the destiny law. It says that similar events will happen or repeat periodically. Bible also says ‘Whatever has happened will happen again.’ The reason behind this law is that every life in the universe is periodic – birth, growth, death, dead period, and reincarnate – is one cycle. Eternal recurrences can happen for individuals, businesses, nations, and earth. Roman Empire, Mughal Empire, British Empire have gone through the similar phases. Ramayan War, Mahabharat War, WW2 also have high level similarities. Eternal recurrence cannot be avoided, we can only extend the period, by changing the environment with both Truth and MLE.

Eternal recurrence is a consequence of the principle that says a combination of periodic events will also be periodic. You can draw some periodic waveforms, add them together, and see that a new periodic wave will be generated with different and longer periods. Vedas say that even the entire universe also repeats, and from those graphs you will find it is quite natural too. Thus these periods of events can be 10, 50, 100 years, may be even 1000, million, and billion years long.

MONARCH BUTTERFLIES provide an excellent example of eternal recurrence [Bittel 2017]. They migrate from east coast of Canada to the west coast of Mexico, a 3000 mile journey. They cannot make it in one life, so they die, reincarnate, and continue with the same objective. Scientists have captured a bunch of them, moved them, and released them in different places, but amazingly, they changed their directions to match the original path towards Mexico. This shows, reincarnation is valid for every object in nature, and we continue with the same objectives in the next life, from where it ended in the previous life. Gita also confirms this phenomenon of continuity of objectives in verse [G.5.23]. This is how software engineering is designed also.

Killing any human or regime change will not therefore solve any problem, since that person is a soul, and a soul cannot be killed. That person will reincarnate, will be guided by the destiny, and will continue working from the same state of mind when he died last time. Thus unless we change the environment to truth and MLE, the history will repeat the same falsehoods, and peace will remain unreachable.

VIII.DEPENDENCE

In this subsection we show how Truth, Peace, and MLE are dependent on each other and why they are synonyms. Peace will come only when all problems of Pr will simultaneously vanish for all time and permanently. Thus peace and problems in Pr are related. Truth will be visible when falsehoods are eliminated or understood. Thus truth is related to falsehoods. MLE will eliminate both Pr and falsehoods.

MLE AND PEACE

MLE will eliminate Pr and therefore will bring peace. We give some examples to show how Pr is eliminated under MLE.

DISCRIMINATION: This is one of the problems in the Pr list. At the present time we have CBE (central bank economy). We see that CBE cannot give us peace, we do not see any peace anywhere, and we have the problem list Pr. CBE means producing more wealth for the rich and forcing people to consume more for businesses to make more money for the rich. As we have explained before, using such process CBE cannot create rich without making others poor. On the other hand MLE can create rich without any kind of discrimination.

NO DEMOCRACY: CBE controls the governments by its lobbyists who use carrot and stick polices to control elected members of the governments around the world. Public uses the secret ballot but elected officials cannot use secret ballot. This way we can see that there is no democracy for people. CBE has ensured that the nations are controlled, by businesses using its money, and not by people. It is called the dysfunctional democracy. No secret ballot means no democracy. Thus it is the CB that creates wars, creates weapons of mass destruction, guns, and all the items in the problem list Pr. Again, the root cause for all activities of all nations is the same false money. Only MLE can stop this process and bring lasting peace in the whole world.

LOSS OF QUALITY: Now we do not care for the quality of the products, we care for money only. As an example, we created cars that kill 30,000 people per year in USA alone. We did not try to create safe cars; instead we created more businesses by providing car body insurance, accident health insurance, emergency health care hospitals, car parts and repair businesses, etc. MLE will eliminate all such unsafe engineering and bring peace, and yet manufacture cars.
Since everybody is forced to work for money, everybody is cheating everybody, including parents, husbands, wives, children, and therefore everybody has become selfish. There is no real love, respect, and sacrifice anywhere in this society. The consequence of such an environment is very severe. I am cheating myself, knowingly and also unknowingly. How can you expect peace in a society based on such deception? Every family is suffering, mentally, physically, and economically. Quality of life has degraded beyond all measures.

**LOCAL SOLUTIONS:** All local solutions for peace are bound to fail, because they are all controlled by falsehoods, like false money and false education. Our every action is corrupted by false money. Thus stopping a war alone will not solve all problems in Pr, and therefore cannot bring peace. Since MLE uses no money and therefore all Pr problems will vanish and will bring global peace.

Peace should not mean creating a positive environment for CBE business and economy. CBE business means creating poverty, creating pollution, and destroying planet. You cannot become happy by punishing people to remain poor, and displaced from their homes. Such CBE cannot give us peace.

We are all simultaneously connected and interactive. It is not just physical and economical connection. It is connection among all souls using their consciousness properties. Soul connections are more powerful than everything else. See the yogic power section of [Das 2018]. If anybody suffers then eventually everybody will suffer. Thus MLE is the only solution for eternal global peace. Only MLE can remove poverty, stop pollution, and stop all wars.

**TRUTH AND PEACE**

We have listed several problems in Pr, all of which can create lack of peace to anyone and everyone. If you can remove all of them with certainty and permanently, only then we can have eternal peace on earth. But since we are inside the false environment we cannot ensure that any solution will give us permanent removal with certainty. We will see that only truth can give us real solution.

**IMPERMANENCE:** Our medical industry has the data to show that every disease has been cured by placebo medicine [Rankin 2012]. Medicine companies do not know why placebo works; and therefore they also do not know why medicines work. This shows that the truth is somewhere else: Medicines do not cure diseases; their effect is nothing but placebo effect.

We give injections to people to prevent influenza, but we have seen even after injection people get flu and even die with that disease. Thus there is no certainty that we have a solution, in fact we do not know of any solutions. Thus there is no permanent cure for any kind of diseases. Every now and then we see same problems reappear. These are essentially eternal recurrences in smaller periods. The situation is similar for all cases in the problem list Pr.

**GOALLESS:** Since we now realize that the entire environment of the present society is false, therefore we cannot have any peace under such a system and its management. We are all frustrated here, we do not know the goals of our lives, and we are all, including doctors, engineers, servicemen, etc., working for somebody else and not for us. As a result we do not enjoy our work; we wait for vacations, holidays, etc, to find peace. We are forced to work; we are incompetent, because our education is false. We are not thinking, not searching for truth. If we search and find truth, we know we will become a victim of the Galileo phenomenon under CBE.

In a false environment everything, including all basic definitions must be false. Therefore the words like truth, peace, wars, love, caring, sacrifice, honesty, sincerity are all false and meaningless. If you know the truth, if you know that the truth is unique, universal, and eternal, only then you will realize the correct meaning of these words. Otherwise, even leaders will also not know the correct strategies for leaderships. Every time the leaders change, the rules will also change. But the laws of nature are unique and universal. Leaders will try different democracies, different economic systems, but the money power will steer everything in its own false direction, which is based on accumulation of wealth. People will not know what they are supposed to do, and the real peace will remain forever illusive.

**WE ARE SOULS:** If we can tell everybody that we are souls and not our physical bodies then that truth alone can make a significant impact on our understanding of all truths. Soul is the root cause of all causes at the level of the universe. People must verify and understand the concept of soul. The society will then automatically move towards lasting peace. Such fundamental truth about soul is missing in our life at present time on our earth and so we do not have peace.

**TRUTH AND MLE**

MLE can eliminate falsehoods or make us understand the falsehoods. Once falsehoods are understood truths will automatically appear again.

Money is false, so money can be manipulated secretly and also openly to control anything and everything, including the truth. We have seen that there is no truth in the modern society under CBE. Truth and money are contradictory forces, since money represents false. Whatever we create using false money, must be false, because false can never become true. Thus without MLE truth cannot be seen and therefore peace cannot be achieved either.

The reverse is also true. MLE also cannot be achieved or maintained without a thorough understanding of truth. It is not necessary to give money to make somebody work. Everybody needs food and shelter, so people will work free to get them free. They will work according to their interests. We do not have to force them to work in areas that they do not need or like. They will work for truth, to discover truth that they enjoy. Somebody may want to sing all day, find new meaning of life through music, spread that information, and people will also enjoy. That will be his work. Thus MLE will work only when people will be allowed to work for truth.

Therefore MLE cannot be achieved inside a false environment. Thus a completely different education system must be used to train people to observe the nature. We are part of nature and we are immersed inside the laws of nature. Galileo was the only person in modern times, out of two billion people on earth, who...
saw the truth. A truth seeker must have the characteristics of Galileo: sincere, dedicated, and persistent in the pursuit of truth. Only MLE can support such characteristics.

IX. GLOBAL PEACE

ALLOW TRUTHS: People must know the truths, the reasons behind all problems, the root cause, etc. Only the truth can establish the permanent global peace. Keeping truths hidden cannot bring permanent peace anywhere in the world. You never know - how much power a human soul has, and what is stored in the global destiny. Given equal opportunity anyone may come up to the task of implementing global peace by implementing MLE. Note that without MLE there will be no peace. Knowledge of such truths can trigger a new generation of souls and can create a new era for the global peace in near future.

PAST FAILURES: Local solutions cannot bring global peace. A piecemeal approach cannot even make any incremental peace, because we are living inside a false environment, and false can never become true. Such solutions will also never be sustainable. Great honors were given to many people in countries around the world. But do we see peace in those countries after 30-40-50 years? Do we have peace in South Africa, Israel, and Palestine? Things must be tuned with the laws of nature. Wars and Military are not the only things that destroy peace; creation of some of the problems in the list Pr is a much bigger way for slow and painful death of humanity.

LESSONS LEARNED: Formation of EU was one of the major achievements towards the global peace. But EU management, particularly by ECB, did not pay attention to create the environment for preventing the reemergence of problems in Pr. Thus ECB did not know the truth about eternal recurrence, and therefore economic objectives did not mature. Note that, just like the CEO is responsible for every activity of a corporation, similarly the CB is also responsible for every activity of the entire world economy.

Thus along with EU, which is a first step towards the one world order, we must also implement truths, or at least let the people know about the truths defined by Tr. Only then global peace can be achieved. Otherwise similar problems will come up, due to eternal recurrence, in similar forms in every few decades, and centuries, and peace will never happen. Loss of peace will appear in different forms, not necessarily as physical wars but as pollution, economic wars inside a country or between nations, spreading of diseases, natural disasters, etc. Therefore regime changes, as was done in EU, alone cannot bring peace. The ground work for MLE, which is truth, must be created also. Eternal recurrence should be considered as a major lesson from the events within the last hundred years. A reincarnated soul will not be able to perform the same activity if the CBE changes to MLE or truth is implemented globally.

ELECTION FOR MLE

MLE EDUCATION: Without a thorough understanding of the truths Tr, peace cannot happen. Peace has a practical implication also, MLE must be implemented. MLE is the only natural economy [Das 2012a]. MLE represents the truth. Therefore Peace, Truth and MLE are synonyms. Implementing MLE is the major requirement for creating a permanent global peace on earth. Propagating the truths about life and the universe is a necessity for understanding and sustenance of MLE.

The MLE concept should be debated and understood worldwide at various levels. It is necessary to propagate the idea to convince that MLE cannot harm anyone, including the riches. Universities should offer courses on the subject. MLE is the only real and natural economy, which obeys the laws of nature. Just like nature cannot hurt anyone, in the same way MLE also cannot hurt anyone. Just like nature allows any soul to become as powerful as it wants, like a galaxy, or the sun, similarly MLE also gives you equal opportunity to take your goals for the society to any heights.

GRASSROOTS: Organizations should be created to promote people to stand for election at local, state, and national levels. The mission of the candidates will be to implement the MLE once elected, in small steps, or on overnight. Modern technology can help to make the transition smoothly and peacefully.

MLE can be implemented secretly if desired, without even people knowing it. Only way the people will see the results is that there will be plenty of jobs, wherever you want to work, because employers will not have to pay for the salary. You can also start your own job easily, because people and resources will be free. Other methods are described in the MLE chapter of [Das 2018].

Within five years the power of truths will automatically stabilize the MLE process successfully. If required, all present day solutions to all problems of the CBE can be modified, extended, and implemented for MLE, with a little thought. Our global history for last 300 years provides many examples of efforts in vain. It is time that we follow the natural laws.

X. MYTHS ABOUT PEACE

If we do not have a meaningful definition of peace then we cannot create peace. Many institutions and prominent people say - you will get peace if you introduce education, remove corruptions, create democracy, implement equality, create action plans, stop wars, etc.

But we have shown that education is false and therefore this education cannot give you peace. Corruption cannot be eliminated unless we remove money, because money itself is false, and therefore is the source of all corruptions. We do not want equality, we want equal opportunity. Equality is discrimination in disguise, because no two objects in nature are equal. We also know that there is no democracy in the world, because there is no secret ballot in any capitol of any nation. Public ballot for elected officials invalidates the concept of secret ballot for people. Our elected representatives in the capitol are controlled by the CB using the carrot and stick policy through their lobbyists. No action plan for peace can work in the false environment; money will destroy it eventually, the effort will be wasted. Wars are inevitable in a false environment, because falsehoods will create suppressor and suppressed among nations.
There is no peace in the world now. In USA, California is burning with wild fire; and there is severe flood, tornado, hurricane, earth quakes, gun violence, large scale incarcerations, drug addiction, etc., in other parts of USA. In EU we see instability in Portugal, Spain, France, mismanagement due to Brexit, Grexit, migration problems, racism, etc. There is wild fire and earth quake in Australia, and in many places we see volcano and mud slides, rise in ocean water level, etc. It is not just the war that is creating absence of peace; earth itself is not in peace. Over and above we have added global pandemic due to corona virus now.

No local solution or prevention of wars can bring global peace, not even local peace, because the world is integrated. We must establish the truth and implement the MLE to bring peace; no other way can give us global peace. If we do not take proper action then the earth will take action, environment will be polluted, and we all will be destroyed.

XI. GLOBAL WAR FOR PEACE

Death and reincarnation is a periodic law of nature. Even the entire universe dies and reincarnates as a result of this periodicity. So the present society will also eventually die just like it happened for all past empires and societies. But by implementing truth and MLE we can bring peace and extend life. We present some history of wins, losses, and the inevitable events.

VEDIC WARS: Vedas describe two major wars, one in Ramayan period and the other one in Mahabharat period. There was probably a million year gap between them. In both wars all powerful kings were killed, millions of people were killed, and billions were rescued. Each war was led by one very high level seer yogi, and a new long peaceful period was established, based on Truth. The book [Das 2014a] describes some high level and detailed level similarities between the two wars. They justify the Bible statement ‘There is nothing new under the sun’.

MODERN WARS: Professor Carroll Quigley, mentor of the US President Bill Clinton, wrote in his classic book Tragedy and Hope [Quigley 1966], that ‘the financial system has a goal to implement a unified system all over the world’. Along that line, during the WW1, it was planned and claimed that this war would be the war to end all wars. But that goal was not achieved. WW2 was pretty successful in creating EU, and virtually eliminated wars in major parts of the world. Many kings were killed, millions of people were killed, and billions of people were rescued from the European colonies. EU was the first successful local approach for One World Order. But unlike the Vedic wars, the fundamentals were not changed, the truth Tr was not established.

Then the wars were started in the remaining parts of the world. Again many kings were removed or killed; CB was established in those countries. Wars are still continuing but the mission has been accomplished – unified financial system (CBE) is in place in those countries. But this time also truth was ignored. As a result the nationalism, dismantling of global approach, anti-migration, local views, border walls, etc., have resurfaced in the world again, including in the EU, which WW2 claimed to have solved. Thus eternal recurrence happened, history was repeated again, but there was no long peaceful period. Unless truth Tr is established peace will never come.

TWO NATIONS: All but two nations do not have western style central bank: North Korea and Iran. As a result war drums are beating against them. But if we can implement MLE then these upcoming wars can be avoided, and they will also automatically implement MLE. Otherwise the war will be inevitable. This war will most likely be a nuclear war and many people will die but still peace will not come, because all the problems of Pr will still be there. Although deaths do not really matter, because we are all souls, souls cannot be killed, we will all reincarnate, and this will still be a part of the global destiny. But in every life people will continue to suffer with no peace in sight.

THERE ARE INDIVIDUALS among us who have succeeded in achieving peace. They have good health without visiting any doctor. There are people who die peacefully without suffering. There are yogis among us who can heal other people. There are people who get cured by placebo medicine. Even placebo surgery also works for many. All of them knew the truths and experienced them in their lives also. We must increase the population of such people by spreading the universal truths to everybody to bring global and ever lasting peace.

GREAT FAILURES: On the other hand, because of falsehoods, we see great failures in implementing peace at larger scales. Most notable is Gandhi’s failure to free India from the British rule even after a long sustained non-violent opposition for decades. Similar is the failure of the worldwide occupy-movements of 2011 that started around the Wall Street as a grassroots phenomenon. Failure of war on poverty movement is another major example. Victor Hugo described poverty 150 years back, in his book Les Miserables, but that poverty is still there in the same way. It has now spread all over the world, and the wealth gap is still increasing. We can give trillion dollar tax cut for the rich, but we do not want to give trillion dollars to eliminate poverty, even though money is free.

SUPPRESSOR AND THE SUPPRESSED: The fact is that - never in the history of the world, a suppressed community was successful in their liberation from their suppressors, without an active support from someone in the suppressor community. Freedom of African-American slaves, freedom from South African apartheid, etc., are such examples of support from the suppressors. But these results are still not permanent solutions for peace, because falsehoods remained. We have only transformed one problem to another. This suppressor and suppressed concept is valid even between nations, between businesses, inside a business, inside governments, and even inside homes.

TRUTH IS A MUST: The above examples illustrate the point that under falsehoods no peace efforts, grassroots movements, unified financial system (CBE), or wars can succeed. We must spread the truth to the level of societies and nations. To know the truths clearly, we must also know the falsehoods. We have shown that everything in our world is false now. Most of our teachers do not know the truths; therefore the students and the people cannot...
know the truths also. In such environment only those who seek the truth can know the truth. All truths are known, and are there on the internet. Everybody will know them only when the environment is corrected.

THE RICH, it seems, really do not know the fundamental truth that - you cannot become rich without making me poor. As mentioned before, there is no win-win situation, win-lose is a law of nature. Thus under the CBE (central bank economy), all economic activities are designed to rob wealth from the people [Das 2014a]. But under MLE the rich can remain rich, become even richer, but equal opportunity and democracy will be available for everybody. Once understood, the rich can play a major role in spreading the truths.

BIGGEST WAR: Milton Friedman, a Nobel laureate in economics, said [Friedman 2006] – ‘How to get rid of the CB is an unsolved problem of the day’. And he is very correct. Therefore one greatest hope for peace is that one day the CB will switch from CBE to MLE on its own as a part of its own destiny. If we cannot switch to MLE peacefully, then another high level yogi will have to take birth, just the way Vedas have mentioned, and also as a consequence of eternal recurrence, to create another major world war, far bigger than what we have seen before, to produce One World Order, establish the truth Tr, implement MLE, and emancipate billions of people who are suffering from the problems in Pr.

We should realize, as mentioned, that regime change cannot solve the problems, because a soul cannot be killed. We will reincarnate with our past characteristics at the time of death. Eternal recurrence will happen, to destroy the peace, because we did not eliminate the falsehoods. Truth and MLE must be implemented together for eternal peace to happen.

The next global war, if it becomes required, would likely be devastating. And until then the present status will continue, pollution will grow, poverty will increase, racism will be on the rise, incarceration in jails will fill up every nation, equal opportunity will be prevented, and increasing the wealth gap will severly destroy our population. That is, each item in Pr will remain and become only more severe.

XII. CONCLUSIONS

No human being, society, or nation is isolated on our earth and from the universe. They are all interconnected by two means: (1) by using the consciousness property of their individual souls at the level of universe and (2) by the money and money power originating from the same single source, the central bank (CB), at the level of earth.

Therefore no isolated local solution for peace will ever work. Valiant efforts were given by many political leaders, institutions, and individuals for decades, but the peace still remained an illusion only. This article presented an unified approach based on the root cause and the laws of nature that can give global peace all at once and simultaneously all over our planet. This concept should be understood, propagated, and systematically pursued. Eventually, one day this effort will bring the desired result. The result can be achieved immediately, if you can implement it now.

As long as money is there peace cannot happen, because falsehoods will remain. Thus MLE must be implemented for global and eternal peace. But MLE cannot be implemented without implementing the truth. Thus truth is required for MLE which in turn is required for eternal global peace.

DECLARATIONS

ABBREVIATIONS
MLE: Moneyless Economy
CB: Central Bank
CBE: Central Bank Economy
ECB: European Central Bank
WW: World War

ACKNOWLEDGMENT

There was an email forum which helped this author in many different ways in his research. Without their active help this project could not have reached at its present level. Almost all of the members had PhD degrees in their respective fields. They were author’s colleagues, friends, and relatives. They worked in various corporations and universities in US and abroad. All of them were significantly better than this author. This author remains deeply indebted to them. The group became inactive once the major parts of the project were completed.

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The Effect of Giving Fish Cork Albumin Gel (*Channa Striata*) to the Mice Wound Closure

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**Abstract**- Gel is a semisolid or thick preparation, which is made by mixing an extract (active substance) with a suitable base. During this time cork fish albumin consumed in the form of extract or powder. Cork fish albumin is consumed orally, many do not like it because of the pungent odor and easy stale. So that new innovations are needed to develop albumin products into albumin gels that can be applied with a rub to the skin. The gel has the advantage of not being sticky, easily applied, easy to wash and does not leave an oily coating on the skin thereby reducing the risk of further inflammation.

The results of Phase 1 research showed that differences in the concentration of cork fish albumin extract affected the quality of albumin gel, namely pH, viscosity, albumin content, protein content, fat content, water content. The best albumin gel was obtained at 6% cork fish albumin extract concentration with the following results: pH 7, viscosity 3594 cP, albumin content 2.00%, protein content 3.18%, fat content 2.72%, and water content 93.31%. Amino acid profile test results obtained the highest results of L-serine 830.17 mg / kg and the lowest L-valine 155.64 mg / kg. Then proceed to Phase 2 of the study namely amino acid profile test, zinc levels and animal mice obtained observations on day 3, day 5, and day 7 showed the best 6% albumin concentration gel treatment had a wound closure process. Wound character closed 80% on the 7th day.

**Index Terms**- gel, albumin, wound closure, amino acid profile

**I. INTRODUCTION**

Cork fish has albumin levels to speed up the process of healing internal or external wounds. Albumin is a globular protein that is often used for nutrition improvement and postoperative wound recovery. This album works on osmotic pressure in the blood (Firlianty and Pratasik, 2018). In addition to albumin, the wound cover on several components, namely the role of collagen, omega 3 fatty acids and omega 6 (Nicodemus et al., 2014). Collagen is a key component in the phase of wound closure. The collagen characteristics that attach cells to form new connected tissues (Siregar and Suprayitno, 2019). The collagen used is collagen from grouper skin because grouper has the best collagen content (Suprayitno, 2019). Omega-3 and omega-6 fatty acids are PUFAs (Double Unsaturated Fatty Acids). Arachidonic acid is a derivative of omega-6. Omega-3 fatty acids are available in the form of DHA and EPA. Omega-3 and omega-6 fatty acids play an important role in the process of wound healing (Nicodemus et al., 2014). Source of omega 3 fatty acids from soybean oil and omega 6 fatty acids from sunflower oil.

Cork fish albumin has been consumed in extract or powder form. Albumin extract is consumed orally. Weakness of cork fish extract, among others, many people who do not like albumin extract because the pungent odor causes nausea when consumed and is easily stale. The solution to overcome the adverse effects of albumin extract is that albumin extract is developed into a gel that can be applied directly to the skin of patients (Tungadi, et al., 2018). Gel is a semisolid, which is made by mixing the extract as an active ingredient. Gel has the advantage of being non-sticky, easily applied, easily washed and does not cause irritation. This research was used to develop albumin extract with the addition of collagen, fatty acids from essential oils containing omega 3 and omega 6 into cream gel so that people more easily apply it to cuts.

**II. MATERIALS AND METHODS**

2.1 Material
The research material used consisted of raw materials for the production of albumin extract, namely cork fish, NaOH, astic acid and aquades. Materials for making collagen are grouper skin, materials for making collagen is grouper skin, NaOH, astic acid and aquades. Materials for making albumin gel are albumin extracts derived from cork fish extract, collagen, sunflower oil as a source of omega 6, soybean oil as a source of omega 3 and fillers using HPMC (Hydroxypropyl Methylcellulose), propylene glycol (PG), metal parabens, propyl parabens, triethanolamine (TEA), aquades. Formulations for making albumin can be seen in the following table.

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Concentration (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3%</td>
</tr>
<tr>
<td>Extract albumin</td>
<td>3</td>
</tr>
<tr>
<td>Collagen</td>
<td>0.6</td>
</tr>
<tr>
<td>Sunflower oil</td>
<td>3</td>
</tr>
<tr>
<td>Soybean oil</td>
<td>2.4</td>
</tr>
<tr>
<td>HPMC</td>
<td>3</td>
</tr>
<tr>
<td>Triethanolamine</td>
<td>2</td>
</tr>
<tr>
<td>Propylene glycol</td>
<td>5</td>
</tr>
<tr>
<td>Methyl paraben</td>
<td>0.18</td>
</tr>
<tr>
<td>Propyl parabens</td>
<td>0.2</td>
</tr>
<tr>
<td>Ad Aquades</td>
<td>100</td>
</tr>
</tbody>
</table>

This research method is an experimental method. In this research, 2 stages were carried out. Stage 1 and stage 2 research. Stage 1 aims to obtain what is the optimal concentration of cork fish albumin extract added to the making of albumin gel so that the best gel quality is obtained for stage 2 research. While the stage 2 study aims to look at the process of wound closure in experimental animals using gel the highest quality albumin compared to negative control and negative control.

2.1.1 Making Albumin Extract

The making of albumin extract begins with the preparation of raw materials ie cork fish is turned off, then weeded, filleting, diced and washed. Furthermore, cork fish weighed 250 grams, then put into steam at a temperature of 70°C. Cork fish meat steamed for 30 minutes. After that filtered and taken filtrate. Cork fish extract is ready to use.

2.1.2 Making the Collagen

The first collagen production is done by preparing grouper skin that has been removed from the scales. Then grouper skin is cut 1 x 1 cm. Furthermore, the skin of grouper soaked in 0.1 M NaOH for 24 hours with a ratio of skin and solution of 1:10. After that the grouper skin is neutralized with aquades. Furthermore, soaked with acetic acid in the ratio of 1:10 for 24 hours. Then filtered and taken the filtrate. After that, precipitation was done with NaCl 0.9 M for 24 hours. Then centrifuged at a speed of 3500 rpm for 20 minutes. Further dialysis with 0.5 M acetic acid with a ratio of 1:10. After that it is inserted into the cellophane membrane. Then immersed in 0.1 M acetic acid solution for 6 hours. Furthermore, soaked with aquades to neutral pH. After that, collagen is ready to use.

2.1.3 Making Gel Albumin

Preparation of albumin gel begins with HPMC dissolved in aquades and then TEA is added. Methyl paraben and propyl paraben are dissolved in propylene glycol, then albumin extract is added with concentrations of 3%, 4.5%, and 6%, then respectively grouper skin collagen, soybean oil, and sunflower oil are added. After that all the ingredients are mixed and added to 100 ml of aquades. Albumin gel analyzed physics (pH and viscosity), albumin levels, chemistry (protein, fat, and water), and organoleptics.

III. RESULT AND DISCUSSION

3.1 pH
The pH of albumin gel with different concentrations of albumin extract results in different pH values. At 3% albumin extract concentration produced a pH value of 6.6, a 4.5% concentration of 6.8, and a 6% albumin extract concentration obtained pH 7. The highest pH value was obtained from the highest albumin extract concentration of 6% with a pH value of 7, and the lowest was obtained at a concentration the lowest cork fish albumin extract was 3% at 6.6. The pH value of albumin gel produced is still within the pH range that is safe for the skin that is 5.8-7.2 (Vashist, et al., 2015), so that the albumin gel does not irritate the skin or make the skin dry.

3.2 Viscosity

Viscosity value at 3% albumin extract concentration of 1280 cP, 4.5% concentration obtained viscosity value of 2651 cP, and at 6% concentration of 3595 cP. The results of the viscosity of the gel which has the highest value is albumin gel with a concentration of 6% albumin extract of 3595 cP, and the lowest results obtained at a concentration of 3% of 1280%. The viscosity range for good gels is 2000-4000 cP (Husnani and Muazham, 2017).

3.3 Albumin Content

Albumin concentration at 3% albumin extract concentration was 1.3%, 4.5% concentration was 1.5%, and albumin concentration of 6% cork fish albumin extract was 2.0%. The highest albumin content was shown at a concentration of 6%, which was 2.0%, while the lowest albumin level was at a concentration of 3% at 1.3%. The albumin content in the resulting albumin gel showed an increase along with the increasing concentration of the albumin extract given.

3.4 Protein Content
The protein content of albumin gel at cork fish extract albumin concentration of 3% was 2.76%, the concentration of 4.5% was 3.02%, and the concentration of 6% had a protein content of 3.18%. The highest protein content obtained 6% concentration of 3.18% and the lowest concentration of 3% of 2.76%. It can be concluded that the higher the concentration of albumin extract, the greater the protein content produced. Albumin is part of the protein, so if the cork fish albumin extract increases so does the protein content.

3.5 Fat Content

Fat content in cork fish extract albumin concentration of 3% was 2.44%, 4.5% concentration was 2.54%, and fat content at 6% concentration was 2.72%. The highest fat content was found in albumin gel concentration of 6% by 2.72%, while the lowest concentration of 3% was 2.44%. Fat content contained in albumin gel comes from omega 3 source oil, omega 6 source oil added and fat content in the fish cork.

3.6 Water Content

The result of water content at 3% albumin extract concentration was 94.45%, at 4.5% concentration was 94.01%, and 6% concentration was 93.34%. The highest value of water content at a concentration of 3% was 94.45% while the lowest water content at a concentration of 6% was equal to 93.34%. The value of water content decreases with increasing concentration of albumin extract.
given in the making of albumin gel. That is because the higher the concentration of albumin extract, the higher the value of important chemical compositions in the albumin gel

3.7 Organoleptic

Organoleptic assessment of albumin gel with different concentrations shows differences. In the treatment of 3% albumin extract concentration the color parameter showed a value of 5.30, at a concentration of 4.5% was 4.27, and at a concentration of 6% showing a value of 3.20. While the treatment of different albumin extract concentrations on the aroma parameters showed different values. Aroma value of concentration of 3% was 5.27, concentration of 4.5% was 4.30, and at concentration of 6% it showed a value of 3.13. color and aroma parameters obtained the highest value of each at a concentration of 3%, while the concentration that has the lowest value is the 6% albumin extract concentration. The highest values of color and aroma parameters at a concentration of 3% were 5.30 and 5.27, respectively. The highest value here indicates the panelists liked the color and aroma of the albumin gel produced from the concentration of cork fish albumin extract 3%. While the lowest values of color and aroma parameters at a concentration of 6% were 3.20 and 3.13, respectively. The lowest value obtained indicates that panelists dislike the color and aroma of albumin gel produced from a concentration of 6%.

3.8 Animal Testing

After knowing the optimal concentration of albumin extract for the production of best quality albumin gel is 6% concentration which is then tested on animals to determine the effect of albumin gel on wound closure, further testing is the analysis of the amino acid profile of albumin gel, and zinc content test. The best concentration of albumin gel is 6% concentration then compared with negative control and positive control. Mice were injured with a wound length of 2 cm. The process of wound closure was measured for 7 days with observation on the 3rd day of the 5th day and 7th day.

On the 3rd day different treatments showed different results of wound closure. The negative control treatment showed an average wound length of 2 cm, a positive control treatment of 1.8 cm, and a 6% albumin gel treatment of 1.5 cm. The best wound closure on day 3 was obtained by an albumin gel treatment of 6% concentration with 1.5 cm remaining, while the longest wound closure was negative control treatment of 2 cm. This can be interpreted that the wound closure process at the best treatment on the 3rd day was 25%.
Different treatments show different results of wound closure on the 5th day. The negative control treatment showed an average wound length of 1.7 cm, a positive control treatment of 1.4 cm, and a 6% albumin concentration gel treatment of 1.1 cm. The best wound closure on day 5 was obtained by a 6% albumin gel concentration of 1.1 cm, while the longest wound closure was a negative control treatment of 1.7 cm. This can be interpreted that the process of wound closure at the best treatment on the 5th day was 45%.

Perawatan yang berbeda menunjukkan hasil penutupan luka yang berbeda pada hari ke-7. Perawatan kontrol negatif menunjukkan panjang luka rata-rata 1.5 cm, perawatan kontrol positif 1.1 cm, dan perawatan albumin gel 6% 0,4 cm. Penutupan luka tercepat pada hari ke 7 diperoleh dengan perawatan albumin gel konsentrasi 6% 0,4 cm, sedangkan penutupan luka terpanjang adalah pada perawatan kontrol negatif 1.5 cm. Ini dapat diartikan bahwa proses penutupan luka pada perawatan terbaik pada hari ke 7 adalah 80%.

3.9 Amino Acid Profile

<table>
<thead>
<tr>
<th>No</th>
<th>Parameter</th>
<th>Unit</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>L-Glutamic acid</td>
<td>mg/kg</td>
<td>1680.77</td>
</tr>
<tr>
<td>2</td>
<td>L-Phenylalanine</td>
<td>mg/kg</td>
<td>1366.03</td>
</tr>
<tr>
<td>3</td>
<td>L-Isoleucine</td>
<td>mg/kg</td>
<td>619.20</td>
</tr>
<tr>
<td>4</td>
<td>L-Valin</td>
<td>mg/kg</td>
<td>549.07</td>
</tr>
<tr>
<td>5</td>
<td>L-Serin</td>
<td>mg/kg</td>
<td>853.52</td>
</tr>
<tr>
<td>6</td>
<td>L-Alanin</td>
<td>mg/kg</td>
<td>1510.06</td>
</tr>
<tr>
<td>7</td>
<td>L-Arginine</td>
<td>mg/kg</td>
<td>362.60</td>
</tr>
<tr>
<td>8</td>
<td>Glycine</td>
<td>mg/kg</td>
<td>947.88</td>
</tr>
<tr>
<td>9</td>
<td>L-Lysine</td>
<td>mg/kg</td>
<td>1798.09</td>
</tr>
<tr>
<td>10</td>
<td>L-Aspartic Acid</td>
<td>mg/kg</td>
<td>2582.45</td>
</tr>
<tr>
<td>11</td>
<td>L-Leucine</td>
<td>mg/kg</td>
<td>1202.99</td>
</tr>
<tr>
<td>12</td>
<td>L-Tyrosine</td>
<td>mg/kg</td>
<td>44.94</td>
</tr>
<tr>
<td>13</td>
<td>L-Prolin</td>
<td>mg/kg</td>
<td>247.68</td>
</tr>
<tr>
<td>14</td>
<td>L-Threonin</td>
<td>mg/kg</td>
<td>708.42</td>
</tr>
<tr>
<td>15</td>
<td>L-Histidine</td>
<td>mg/kg</td>
<td>810.00</td>
</tr>
</tbody>
</table>

The highest essential amino acid content in cork fish albumin extract was L-Lysine at 1798.09 mg / kg and the lowest was L-Arginine at 362.60 mg / kg. While the highest non-essential amino acid content was L-aspartic acid of 2582.45 mg / kg and the lowest
was L-tyrosine of 44.94 mg / kg. Cork fish albumin extract is then used as an active ingredient in gel albumin. The amino acid gel albumin profile is as follows.

<table>
<thead>
<tr>
<th>No</th>
<th>Parameter</th>
<th>Unit</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>L-Glutamic Acid</td>
<td>mg/kg</td>
<td>441.45</td>
</tr>
<tr>
<td>2</td>
<td>L-Phenylalanine</td>
<td>mg/kg</td>
<td>226.24</td>
</tr>
<tr>
<td>3</td>
<td>L-Valin</td>
<td>mg/kg</td>
<td>155.64</td>
</tr>
<tr>
<td>4</td>
<td>L-Serin</td>
<td>mg/kg</td>
<td>830.17</td>
</tr>
<tr>
<td>5</td>
<td>L-Alanin</td>
<td>mg/kg</td>
<td>404.49</td>
</tr>
<tr>
<td>6</td>
<td>Glycine</td>
<td>mg/kg</td>
<td>459.14</td>
</tr>
<tr>
<td>7</td>
<td>L-Lysine</td>
<td>mg/kg</td>
<td>362.34</td>
</tr>
<tr>
<td>8</td>
<td>L-Aspartic Acid</td>
<td>mg/kg</td>
<td>399.37</td>
</tr>
<tr>
<td>9</td>
<td>L-Leucine</td>
<td>mg/kg</td>
<td>225.81</td>
</tr>
<tr>
<td>10</td>
<td>L-Tyrosine</td>
<td>mg/kg</td>
<td>329.46</td>
</tr>
<tr>
<td>11</td>
<td>L-Proline</td>
<td>mg/kg</td>
<td>214.80</td>
</tr>
<tr>
<td>12</td>
<td>L-Threonine</td>
<td>mg/kg</td>
<td>239.36</td>
</tr>
</tbody>
</table>

The highest essential amino acid content in albumin gel is L-Lysine of 362.34 mg / kg and the lowest is L-Valine of 155.64 mg / kg. While the highest non-essential amino acid content was obtained L-Serin of 830.17 mg / kg and the lowest was L-Proline of 214.80 mg / kg.

3.10 Zinc Content

The best concentration of Zn in albumin gel was 3.95 mg / 100g. The content of Zn enhances and accelerates the wound healing process. This can happen because Zn plays an important role in protein synthesis and in cell multiplication. Albumin and Zn together play an important role in wound healing because albumin has the ability to bind Zn and transport it in blood plasma.

IV CONCLUSION

Cork fish albumin concentration of 6% is the optimal concentration to produce the best albumin gel. include a pH value of 7, a viscosity value of 3594 cP, an albumin content of 2.00, a protein content of 3.18, a fat content of 2.72, and a moisture content of 93.31.

The results showed that giving different treatments to wounds had a significant influence on the process of wound closure. At the observations of the 3rd day, 5th day, and 7th day, the process of wound closure was 80% as good as the experimental animals treated with gel albumin on the 7th day.

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Bacterial abundance and potential grazing (top-down) influence on Specific Growth Rate of heterotrophic bacteria in the river Cauvery and its upstream tributaries in southern Karnataka.

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Abstract: The specific growth rate of heterotrophic bacteria is determined by dividing the production between the biomass, is an indicator of the capacity of the bacterial population to replace its biomass. The eukaryotic heterotrophic flagellates and ciliates are important grazers on bacteria, thus potentially influencing the abundance by selective feeding within the ‘microbial loop’. Midstream surface water samples from all the water courses selected were collected in a sterile glass bottles. Water samples were screened through Whatman GF/A (1.63 µm nominal pore size) glass micro fibre filters. The SGR was calculated by taking only the abundance of bacterioplankton at the beginning (0 h) and at the end (48 h) incubation period. Mean value of SGR of bacteria was similar in the rivers Harangi (0.0024 h\(^{-1}\)), Hemavathy (0.0031 h\(^{-1}\)), Lokapavani (0.0030 h\(^{-1}\)) and Cauvery (0.0033 h\(^{-1}\)). But it was more and significantly different in the river Lakshmanatheertha (0.0042 h\(^{-1}\)). More negative variations of SGR of bacteria was noticed in the river Lakshmanatheertha (15); compared to rivers Harangi (2), Hemavathy (1), Lokapavani (3) and Cauvery (2). The negative growth rates were due to decrease in the observed bacterial cell counts after 48 h incubation. The calculations of Pearson’s Correlation Coefficients after log\(_{10}\) transformation showed both negative and positive relations of bacterial abundance with the SGR. The negative correlation implies that, lesser the bacterial abundance higher will be the SGR of planktonic bacteria. Relatively low bacterial abundance could be ascribed to the differential interactions among bacterial growth rate, substrate supply, bacteriophages, bacterivory and other predation in regulating bacterial abundance.

Key words: Bacterial abundance, river Lokapavani, Bacterial growth, Heterotrophic flagellates, Negative correlations.

I. INTRODUCTION

Heterotrophic bacteria in the fresh water ecosystem form a major part of the food web and mediate important processes in the carbon budget (Findlay, et al., 1998; Kirchman, 2008). This food web plays a crucial role in the regulation of carbon transfer (Jugnia, et al., 2000; Kirchman, 2015), and as a consequence of the high growth potential of the heterotrophic bacterioplankton (Azam et al., 1983; Sanders et al 1992; Simek, et al., 2006). There are many studies which have suggested that heterotrophic bacteria can also utilize a large fraction of the carbon that flows within the ecosystems, and by virtue of their abundance, ability to use dilute substrate, high assimilation efficiencies and rapid growth rates represent a significant resources available to support the next higher trophic level in the aquatic ecosystem (Kritzberg, et al., 2004; Alonso-Sáez et al., 2008; Kirchman et al., 2009). The ecological importance of heterotrophic bacteria has led to much attention being paid to the abundance, biomass and activity of bacterioplankton. Over the last decade or so, there has been emphasis on obtaining estimates of bacterial growth and secondary production, in many trophodynamic studies of planktonic bacteria (Chrzanoski and Grover, 2001). Pace, et al., (1990) reported that on annual time scale, the abundance is remarkably stable, growth rates are sufficient to allow population turnover in much
shorter time scales. The specific growth rate, determined by dividing the production between the biomass (Iribarri et al., 1990; Lønborg et al., 2011). Much of the primary production in aquatic ecosystems is processed by planktonic bacteria (Giorgio and Cole, 1998). The heterotrophic bacteria serve as food for protozoan and metazoan (Hessen, 1998) and can ultimately support the growth of micro crustaceans (Travnik, 1998). The eukaryotic protozoa, especially the heterotrophic flagellates and ciliates, are important grazers on bacteria (Jürgens and Massana, 2008; Vaqué et al., 2014), thus potentially influencing the abundance by selective feeding within the ‘microbial loop’ to interfere with the growth of the bacterioplankton. More recently, several investigators have demonstrated that, bacterial growth in aquatic ecosystems can be limited by the predation (Caron, 1991; Huete-Stauffer et al., 2015), substrate supply (Rivkin and Anderson, 1997), allochthonous DOC (del Giorgio and Peters, 1994; Church, 2008), and viral infections (Proctor and Fuhrman, 1992; Vaqué et al., 2014), rather than the supply of organic carbon (Pomeroy, et al., 1995; Carlsson and Caron, 2001). Furthermore, estimations of bacterial growth rate and production are essential for determining the role of bacteria in the trophic dynamics of ecosystems (Iribarri et al., 1990). New estimates of bacterial growth rates have been made over the past few years by a variety of techniques (Li, 1984), but the study of growth dynamics of natural bacterial assemblages in situ is still very much in its infancy. The most research on the population ecology of marine bacteria continues to be carried out in rich coastal and shelf waters. Much less has been done in open ocean regions and also in lotic ecosystem like streams and rivers (Sinsabaugh et al., 1997; Foreman, et al., 1998; Yamakanamardi and Goulder, 1999, Harsha et al, 2009). This author is aware of only a limited number of studies that have quantified the specific growth rate of bacterioplankton, Berman et al., (1994); Chrzanowski and Grover (2001); Carlsson and Caron (2001) and Šimek et al., (2006) have measured bacterial growth rate in response to substrate addition. So far there are no studies reported on the specific growth rate of planktonic heterotrophic bacteria in river Cauvery and its important tributaries like Lakshmanatheertha, Harangi, Hemavathy and Lokapavani in Karnataka state, India. Hence, this investigation on the specific growth rate of planktonic bacteria was under taken. The main aims of the study were: 1] To test the hypothesis that the mean specific growth rate of heterotrophic bacteria in all the four upstream tributaries is similar to each other, but markedly different in the main river Cauvery. 2] To investigate the relationships between specific growth rates (k) of heterotrophic bacteria with other microbial variables in these five water courses. 3]. To know, the potential control of mean specific growth rate of heterotrophic bacteria by top-down control or grazing.

II. MATERIALS AND METHODS

Sample collection

For the study of specific growth rate of planktonic bacteria, mid stream surface water samples from the river Lakshmanatheertha, Harangi, Hemavathy, Lokapavani and Cauvery were collected in a sterile glass bottles (Schott-Duran, Germany) and were transported back to the laboratory on ice. The water samples were screened through Whatman GF/A (1.63 µm nominal pore size) glass micro fibre filters to remove micro zooplanktons which act as grazers. This filtration process does not reduce bacterial numbers although phytoplankton was largely removed (Lambert, Taylor and Goulder, 1993, Yamakanamardi and Goulder, 1999, Harsha et al 2009). Approximately 505 ml of pre filtered sample was transferred to 1 liter sterile glass conical flask (Borosil India Ltd, Mumbai). Two replicate flasks were used for each site. All the flasks were closed with aluminum foil. A 5 ml aliquot was taken from each flask at zero time and fixed immediately with 0.2 µm filtered neutral formalin (2% final concentration). Then all the conical flasks were placed in an Environ-Orbit shaker (Lab-line Instrumentals, USA) running at river water temperature (water temperature which was mean of all the sampling sites) and 90 revolutions per minute.

Evaluation of method

On two occasions mid-stream surface water samples from all five sites were collected. Next, two 5 ml of aliquots were collected at 12, 24, 36 and 48 h and were fixed immediately with 0.2 µm filtered neutral formalin (2% final concentration) and
were stained with Acridine orange stain. The bacterial abundance from these fixed samples was counted by using Epifluorescence microscopy. In this study, specific growth rate (as cells per cells per hour), was routinely calculated from direct counts of bacteria at beginning (0 h) and end of incubation for 48 h in GF/A filtered, unsupplemented natural water samples. Koch (1981) mentions use of the symbols K and µ for specific growth. Ducklow and Hill (1985); Fry (1990) however, preferred µ (h⁻¹) for specific growth rate. In the present work K (h⁻¹) is used to express the specific growth of bacterioplankton. The specific growth rate (k h⁻¹) of bacterioplankton was determined using the following two approaches- (1) From linear regression of logₑ cell concentration against time. A graph was plotted using concentration of acridine orange counts of bacteria at 12, 24, 36 and 48 hours against time, with the help of sigma plot 4.0 (Jandel Scientific Corporation, USA). Regression lines were fitted through the plotted data and it was found that there was significant linear regression (P<0.05 to P<0.001) are given in Table 1. Such plots are shown in Figure 1. Hence, the growth was exponential over the 48 h incubation period in all the five rivers studied. The slope of the regression line gave specific growth rate (k) of bacterioplankton.

(2) In routine determinations made at intervals over 24 months, two 5 ml aliquots were taken only at 0 and 48 h. In the preliminary determinations, SGR (h⁻¹) was obtained from linear regression of logₑ of the bacterial concentration against time where SGR equaled the regression coefficient. From direct counts of bacteria at 0 h and 48 h. Exponential growth was assumed and the Specific Growth Rate (k) of bacterioplankton was calculated using the following equation (Koch, 1981):

\[
\logₑ N_t = \logₑ N_0 + kt
\]

\[
\therefore \logₑ N_t - \logₑ N_0 = kt
\]

\[
\therefore k = (\logₑ N_t - \logₑ N_0) = t
\]

\[
\therefore k = \logₑ (N_t / N_0) = t
\]

Where, \(N_0\) = is the concentration of bacteria at zero time (ml⁻¹)

\(N_t\) = is the concentration of bacteria at 48 h (ml⁻¹)

\(t\) = is the duration of incubation (h)

\(k\) = Specific Growth Rate of bacterioplankton (h⁻¹).

Both the methods gave similar \(k\) values in that the second method was within the 95% confidence intervals around \(k\) obtained by the first method. It was therefore decided to use the second method for routine determination of Specific Growth Rate (k) since counts were needed only at 0 h and 48 h. This was therefore, an economical and quick method. Hence, in routine measurements 5 ml aliquots were collected from each replicate flask only at the beginning of the incubation at 0 h \((N_0)\) and at 48 h \((N_t)\).

**Statistical Analysis**

Scaled (so that all values were >1) and then log₁₀ transformed values of Specific Growth Rates (k) were used for the one-sample Kolmogorov-Smirnov test, the Student–Neuman-Keuls test, one-way ANOVA and calculation of Pearson’s correlation coefficients and stepwise multiple regression analysis. To scale raw \(K\) values the lowest positive value was added to all values, the values were then multiplied by a constant to make them >1. All the negative \(K\) values which were obtained from all the five water courses were considered as zero values, for these tests.

**III. RESULT AND DISCUSSION**

The results from routine determination of the specific growth rate (k) of heterotrophic planktonic bacteria measured, for all the five rivers studied are summarized in Table 2. The mean values with different superscripts are significantly different (p< 0.05) as shown by one-way ANOVA post hoc non-parametric Student-Newman-Keuls test (SNK test) is also shown in this table. The interrelationship between the specific growth rate of bacterioplankton and other microbial variables were investigated by calculation of Pearson’s Correlation Coefficients after log₁₀ transformation of all five water courses are given in Table 3. The mean value of specific growth rate (SGR) of heterotrophic bacteria was similar in the rivers Harangi (mean 0.0024, range -0.0016 - 0.011h⁻¹), Hemavathy (mean 0.0031, range -0.0024 - 0.011h⁻¹), Lokapavani (mean 0.0030, range -0.0019 - 0.009h⁻¹) and
Cauvery (mean 0.0033, range -0.004 - 0.0105 h⁻¹). But it was more and was also significantly different in the river Lakshmanatheertha (mean 0.0042, range -0.0009 - 0.009 h⁻¹) when compared to remaining four water courses studied. Further, there was a mean growth rate of 0.0024 h⁻¹ which equal to 0.06 bacterium per day in river Harangi, 0.0031 h⁻¹ which equal to 0.07 bacterium per day in river Hemavathy, 0.0030 h⁻¹ which equal to 0.07 bacterium per day in river Lokapavani and 0.0033 h⁻¹ which equal to 0.08 bacterium per day in river Cauvery. In contrast, in the river Lakshmanatheertha, the mean specific growth rate of heterotrophic bacteria was 0.0042 h⁻¹ which was equal to 0.10 bacterium per day. This observation suggests that the river Lakshmanatheertha was more favorable environment for the growth of planktonic bacteria. The initial hypothesis was that the four upstream tributaries are similar to each other in having similar mean SGR of heterotrophic bacteria, but are markedly different from that of the main river Cauvery was rejected, because the mean SGR of heterotrophic bacteria was comparatively more and significantly different in the river Lakshmanatheertha only. Low level of water, intense human activities, discharge of sewage, agricultural wastes and eutrophic nature was noticed in the river Lakshmanatheertha, all of which might have enriches the nutrient level, may be the reason for increased bacterial SGR in this river. Similarly, the nutrient rich in the water markedly stimulated the bulk of bacterioplankton production, as well as changes in the growth rate of bacterioplankton as represented by Simek, et al., 2005; Jezbera, et al., 2005. Recently, several investigators have demonstrated that, bacterial growth in aquatic ecosystems can be limited by the availability of allochthonous DOC (del Giorgio and peters, 1994; Church, 2008). Further, in the present investigation, comparatively more negative SGR of heterotrophic bacteria was noticed in the river Lakshmanatheertha. For example, out of 50 determination 15 in river Lakshmanatheertha, 2 in river Harangi, 1 in river Hemavathy, 3 in river Lokapavani, and 2 in river Cauvery (Figure 2). The negative specific growth rates were due to decrease in the observed bacterial cell counts after 48 h incubation. Coveney and Wetzel (1992) have reported the negative specific growth rates in Oligotrophic lake water samples, ranged from -0.1 to greater than 1.5 per day. Yamakanamardi and Goulder (1999) reported negative growth rate in the Holderness Drain for eight occasions out of 28 determinations. Chrzanowski and Grover (2001) have also recorded negative growth occasionally in control bottles of their experiments. Similarly, negative growth rates were recorded in the river Cauvery and its downstream tributaries (Harsha et al 2009), suggesting higher grazing-induced mortality (Jezbera, et al., 2005; Simek, et al., 2005; Jürgens and Massana, 2008; Vaqué et al., 2014). Further, some of the bacteria may have become attached to the walls of the experimental flasks; hence these bacteria would not be counted, thus rendering the 48 h bacterial counts less than 0 h bacterial counts (Kristiansen, et al., 1992). The calculations of Pearson’s correlation coefficients (p<0.01) between SGR of heterotrophic bacteria and other microbial variables (Tables 3) revealed that the SGR (k) of heterotrophic bacteria showed few correlations with the other microbial variables. In the river Lakshmanatheertha the SGR of heterotrophic bacteria showed only negative correlations with abundance of directly counted free living bacteria, particle bound bacteria, total bacteria and CFU’s. In the river Harangi, the SGR of bacteria was negatively correlated only with the abundance of directly counted particle bound bacteria. In river Hemavathy, the SGR of heterotrophic bacteria was positively correlated with mean length of free living and particle bound bacteria. In rivers Lokapavani and Cauvery the SGR of planktonic bacteria was not correlated with any of the microbial variables. Generally, the negative correlation between SGR and bacterial abundance in the rivers Lakshmanatheertha and Harangi implies that, lesser the bacterial abundance higher will be the SGR of planktonic bacteria (Kirchman, 2008). For instance; the carbon and energy source or essential nutrients becomes completely used up by the heterotrophic bacteria during their growth, when a carbon source is used up it doesn’t necessary mean that all growth stops. This is because, dying bacterial cells can lyse and provide source of nutrients for growing bacteria. Hence, the negative relation between the abundance and growth rate may suggest that endogenous metabolism (Maier, 2000). Relatively low bacterial abundance could be ascribed to the differential interactions among bacterial growth rate, physical circulation, substrate supply, bacteriophages, bacterivory and other predation in regulating bacterial abundance (Ducklow and Shiah., 1993; Hahn, et al., 1999; Church, 2008; Vaqué et al., 2014). Berman et al., (1994) reported that even though samples were prefILTERED gently through 1.0 μm and 0.8 μm polycarbonate membranes, some flagellates or other bacteriovorous protozoa, as well as bacteriophages, may have been present and could have

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interfered with bacterial growth rate (Chrzanowski and Grover, 2001; Carlson and Caron, 2001). The planktonic bacteria were also eliminated by viruses which induced bacterial mortality (Vaqué et al., 2014). Whereas, in the river Hemavathy, the bacterial growth rate was positively correlated with the mean lengths of bacteria. Similar positive correlation was also noticed in the Holderness Drain of North-East England (Yamakanamardi, 1995), and in the river Cauvery and its four downstream tributaries of south Karnataka, India (Harsha et al, 2009).

### Table. 1. Table showing Specific Growth Rate (SGR) of aquatic heterotrophic bacteria \((k \, h^{-1})\) values determined by linear regression.

<table>
<thead>
<tr>
<th>Sampling Sites</th>
<th>Mean (Range)</th>
<th>F value</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>River Lakshmanatheertha</td>
<td>1.380 (1.10 - 1.83)</td>
<td>12.19</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>River Harangi</td>
<td>1.124 (0.89 – 1.34)</td>
<td>6.253</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>River Hemavathy</td>
<td>1.142 (0.97 - 1.29)</td>
<td>7.525</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>River Lokapavani</td>
<td>1.528 (1.30 - 1.82)</td>
<td>9.192</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>River Cauvery</td>
<td>1.274 (1.09 – 1.45)</td>
<td>5.126</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

The \(\log_e\) transformed direct counts of bacteria at 0, 12, 24, 36, and 48h, of both the replicates, were used for linear regression analysis, hence \(n=10\). Overall F and P values for each rivers are given. The regression coefficients of SGR of all the rivers were significantly different.
Table 2. Summary of Specific Growth Rate of heterotrophic bacterioplankton in the surface waters from Rivers Lakshmanatheertha, Harangi, Hemavathy, Lokapavani and Cauvery.

<table>
<thead>
<tr>
<th>Bacterial variable</th>
<th>River Lakshmanatheertha</th>
<th>River Harangi</th>
<th>River Hemavathy</th>
<th>River Lokapavani</th>
<th>River Cauvery</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (Range) CV%</td>
<td>Mean (Range) CV%</td>
<td>Mean (Range) CV%</td>
<td>Mean (Range) CV%</td>
<td>Mean (Range) CV%</td>
</tr>
<tr>
<td>SGR (Kh(^{-1}))</td>
<td>0.0042(^b) (-0.0009 - 0.009) 105</td>
<td>0.0024(^a) (-0.0016 - 0.011) 83</td>
<td>0.0031(^a) (-0.0024 - 0.011) 71</td>
<td>0.0030(^a) (-0.0019 - 0.009) 73</td>
<td>0.0033(^a) (-0.004 - 0.0105) 79</td>
</tr>
</tbody>
</table>

Mean Values with different superscripts are significantly different (P<0.05, Student-Newman-Keuls test, after log\(_{10}\) transformation). CV= Coefficient of Variation, SGR= Specific Growth Rate.

Table 3. Relationships between Specific Growth Rate (k) of heterotrophic bacteria and other microbial variables, in river Cauvery and its four upstream tributaries.

<table>
<thead>
<tr>
<th>Sampling Sites</th>
<th>DC-FLB</th>
<th>DC-PBB</th>
<th>DC-TB</th>
<th>CFUs</th>
<th>%CCFUs</th>
<th>CFUs as % of AODCs</th>
<th>ML-FLB</th>
<th>ML-PBB</th>
<th>Phytoplankton</th>
<th>Zooplankton</th>
<th>Total plankton</th>
</tr>
</thead>
<tbody>
<tr>
<td>River Lakshmanatheertha</td>
<td>- 0.29*</td>
<td>- 0.28*</td>
<td>- 0.29*</td>
<td>- 0.41**</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>River Harangi</td>
<td>NS</td>
<td>- 0.35*</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>River Hemavathy</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>0.31*</td>
<td>0.29*</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>River Lokapavani</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>River Cauvery</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
</tbody>
</table>

DC-FLB= Directly Counted Free Living Bacteria, DC-PBB= Directly Counted Particle Bound Bacteria, DC-TB= Directly Counted Total Bacteria, CFUs = Colony Forming Units, CCFUs = Chromogenic Colony Forming Units, CFUs as % AODCs= Colony Forming Units as Percentage of Acridine Orange Direct Counts, SGR= Specific Growth Rate, ML-FLB= Mean Length of Free Living Bacteria, ML-PBB= Mean Length of Particle Bound Bacteria.
Figure 1. Graph showing log$_e$ transformed direct count of Heterotrophic Bacteria per ml plotted against time in GF/A filtered samples from respective rivers. There were two replicate incubation of each water samples.
IV. CONCLUSION

In conclusion, more and significantly different SGR of bacterioplankton was noticed in the river Lakshmanatheertha. Further, the result described here revealed that, there was a mean growth rate of 0.0024 $h^{-1}$ which equal to 0.06 bacterium per day in river Harangi, 0.0031 $h^{-1}$ which equal to 0.07 bacterium per day in river Hemavathy, 0.0030 $h^{-1}$ which equal to 0.07 bacterium per day in river Lokapavani and 0.0033 $h^{-1}$ which equal to 0.08 bacterium per day in river Cauvery. In contrast, in the river Lakshmanatheertha, the mean specific growth rate of heterotrophic bacteria was 0.0042 $h^{-1}$ which equal to 0.10 bacterium per day. This observation suggests that the river Lakshmanatheertha was more favorable ecosystem for the bacterial growth than the other four watercourses studied. This was due to maximum anthropogenic activities, increased nutrient level, pollution, sewage and other effluent contamination. Several studies supportively evidenced that, the nutrient rich in the water markedly stimulated the bulk of bacterioplankton production, as well as changes in the growth rate of planktonic bacteria. Further, only few negative correlations were noticed between SGR and other microbial variables in the rivers Lakshmanatheertha and Harangi implies that, lesser the bacterial abundance higher will be the SGR of planktonic bacteria. While in river Hemavathy the SGR positive correlation with the mean length of bacteria. Similar positive correlation was also noticed in the Holderness Drain of North-East England (Yamakanamardi, 1995), and in the river Cauvery and its four downstream tributaries of south Karnataka, India (Harsha et al, 2009). Further, in the present investigation, comparatively more negative SGR of heterotrophic bacteria was noticed in the river Lakshmanatheertha. For example, out of 50 determination 15 in river Lakshmanatheertha, 2 in river Harangi, 1 in river Hemavathy, 3 in river Lokapavani, and 2 in river Cauvery. The negative specific growth rates were a result of decrease in the observed bacterial cell counts after 48 h incubation. Relatively low bacterial abundance could be ascribed to the differential
interactions among bacterial growth rate, physical circulation, substrate supply, bacteriophages, bacterivory and other predation in regulating bacterial abundance which in turn interfere with the growth rate of planktonic bacteria.

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Evaluation The Success Restoration of Mangrove Ecosystem In South Malang Ecotourims Area Using Macroinvertebrates As Bioindicator

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Abstract- The potential of an ecotourism location can be analyzed based on evaluating the success of the restoration program using several indicators, one of which is macroinvertebrates diversity. This research was conducted in Bajulmati Beach, Clungup Mangrove Conservation (CMC) Beach, and Kondang Iwak Beach with 3 different lengths of restoration (except Kondang Iwak as a reference site). The measured data include physicochemical parameter, mangrove vegetation profiles, and macroinvertebrate profiles. Furthermore, it is used as a basis for the formulation of a restoration recommendation strategy. The results of the study showed that the presentation of land cover in Bajulmati and Kondang Iwak were classified as rare (<5%), while CMC was classified as tight (between 5 - 25%). Macroinvertebrates were found in a total of 20 species of gastropods and 9 species of crabs. It shows that the macroinvertebrates had a special tendencies in certain habitats.

Index Terms- Ecotourism, Macroinvertebrates, Mangrove Restoration

I. INTRODUCTION

Mangrove is one of the important ecosystem in coastal area between land and sea environments, affected by tides in the tropics and subtropics [1]. Mangrove has crucial roles, including balancing environmental quality and neutralizing pollutants. Mangroves also provide food (both in the form of plants and animals that can be consumed by humans), medicines, fuels, and building materials and increase the value of biodiversity for the local community.

Humans contribute to mangrove degradation by carrying out various activities around mangrove conservation areas such as the conversion of conservation land to settlements, ports, ponds, tourist sites and other means of life. Most of these activities do not pay attention to aspects of environmental sustainability, causing biodiversity loss due to increased coastal community activities [2]. Mangrove forests which were continually eroded by human activities will have an impact on the availability of habitats for various species of animals that inhabit the ecosystem. It also causes a decrease in the ability of ecosystems to neutralize pollutants, so that the level of ecosystem vulnerability becomes disturbed.

Based on data from the Dinas Kelautan dan Perikanan of Malang Regency in 2016, mangrove forests on the coast of Malang Regency covered an area of 343.5 hectares (ha) with a damage level of 161.1 ha. The mangrove rehabilitation program itself on average each year is only for an area of 5-10 ha. Therefore, various organizations ranging from formal institutions to local non-governmental organizations make some efforts to overcome the degradation of mangrove ecosystems. These efforts include replanting mangroves (reforestation) as a form of ecosystem restoration.

Restoration based on its function is one the strategy to rehabilitate and restore degraded ecosystems and promote the restoration of threatened species, their reintroduction into their natural habitat under suitable conditions [3]. The restoration program has been carried out on several beaches in South Malang, including Clungup Beach, Bajulmati Beach and Kondang Merak Beach. Based on interviews with managers, it is known that the Bajulmati and Clungup Mangrove Conservation areas have been carried out restoration programs almost every year. It is a program that was launched in every ecotourism activity. Kondang Iwak beach is one of the unspoiled beaches in the South Malang, so the mangrove ecosystem is still considered natural (have not been rehabilitated before).

Ecotourism is one of the approach to support environmental program, including restoration. According to Zambrano [4], ecotourism is an activity that usually used to study biodiversity, conservation, and ecology. Ecotourism was one of the ideal strategies to achieved a management balance between ecology and economy in the area. Some examples of research on restoration-based ecotourism in Indonesia are on the Pramuka Island of the Seribu Island National Park which has a Tourism Suitability Index (IKW) of 73.68% in 2016 [5]. Whereas in Malang Regency based on Harahab's [6] research, it has IKW of 84.95% for mangrove ecotourism which are included in the appropriate category.

The success of restoration can be evaluated from numerous aspect. One of the aspect to evaluate restoration program is evaluate the availability of Ecosystem Services (ES), especially as a habitat for various fauna that inhabits mangrove ecosystems. Mangrove ecosystems provide provisioning services that are very important for environmental sustainability and community welfare in the form of the presence of several animals that can be
utilized by humans such as fish, crabs, and shellfish, and mangrove trees trunks producing wood production [7]. The research objective was to evaluate the success of the restoration program and providing recommendations for the management of mangrove sustainable ecotourism in South Malang.

II. METHODOLOGY

A. Study Area

The research was conducted in two mangrove conservations in South Malang. The locations were Bajulmati Beach and Clungup Mangrove Conservation (CMC), and Kondang Iwak Beach (as reference site). Each location was divided into 3 stations, (except Kondang Iwak) where each station represents the years of the restoration. Station 1 Bajulmati was 5 years, station 2 in 7 years and station 3 in 10 years, while in CMC station 1 was 6 years, station 2 in 7 years, and 15 years in station 3. Kondang Iwak consisted of 1 station that represented the natural state (reference site) of the mangrove ecosystem in South Malang. Each station has three line transects, with two plots each transect. The total plot is 42 units.

B. Data Collection

Data collection was carried out in November 2019 until January 2020, while data analysis was carried out in February to April 2020 in the Laboratory of Ecology and Biodiversity University of Brawijaya, Malang. Measurement of environmental parameters was done in situ which was carried out directly on-site and ex-situ analyzed in the laboratory. Parameters that can be measured directly on site were water temperature and pH. While salinity, turbidity, BOD, nitrate, orthophosphate, and DO were analyzed at the Animal Ecology and Diversity Laboratory, University of Brawijaya Malang.

Fauna data covering all types of macroinvertebrates from gastropods and crabs species associated with the mangrove were recorded based on the number of individuals and species obtained in the plot. Observation of macroinvertebrates was carried out using a plot measuring 1 x 1 meter. The identification of gastropods using “Catalogue of Marine Molluscs” by Anirudha Dey, while crabs identification using “Keptting Uca di Hutan Mangrove Indonesia” by LIPI. The results of aquatic fauna data which were processed to get an abundance of fauna using the unit ind/m².

The procedure for collecting vegetation data was counting the number of individuals (trees with 10 x 10 m of plots, saplings in 5 x 5 m, and seedlings in 2 x 2 m) of mangroves contained in a multilevel plot using a visual counting method [8]. As or the category of trees namely woody plants with a diameter of >10 cm, while for the size of saplings ≤10 cm and for seedlings have a height of ≤1 m. The abundance parameters of each species were scored with a cover scale and tree abundance with reference to the Braun-Blanquet (BB) scale [9].

III. RESULT AND DISCUSSION

A. Analysis of Mangrove Vegetation

Stations 2 and 3 at Bajulmati were located in the western watershed of the Bajulmati river estuary and were closed to residential areas so that the mangrove area was very vulnerable to direct impacts from human activities. Both of the stations were dominated by mangrove trees with a total abundance of 10.3 and 10.17 Ind/m² respectively. While station 1 was the Bajulmati river estuary which was directly adjacent to Ungapan Beach. This area was a fishing boat base and there were shrimp ponds and sugar cane plantations around it. Station 1 has the highest total seedling abundance than saplings and trees at 4.3 Ind/m². Station 1 and 2 in CMC is an area that flooded adjacent to tourist areas and streams towards the estuary. Both stations have the highest total abundance in the seedling category, which is 29.7 and 32.5 Ind/m², respectively. Whereas at station 3 it was dominated by mangrove trees at 22.17 Ind/m² (fig. 1).

The highest total abundance value is at CMC. It shows that the mangrove rehabilitation program in the CMC was very structured and better than in Bajulmati. Whereas the famous Iwak has the lowest abundance of all locations. That is because the restoration program has not been carried out at that location, and when data collection occurred there was severe damage to the condition of the mangrove ecosystem due to illegal logging and land burning by irresponsible individuals.

The total abundance of mangrove vegetation at all three stations in Bajulmati and Kondang Iwak Beach showed the condition of mangrove ecosystems in a rare category with a small cover or less than 5% based on BB scores (table 1). The small cover was caused by a large number of mangrove trees felling to be used as firewood and building materials by local residents. In addition, floods in the area of stations 2 and 3 often occur, causing stunt and seedling growth to be hampered. Station 3 in CMC was an estuary where the water trapped can not flow into the sea and it surrounded by plantations owned by citizens, including corn, cassava, beans, and bananas plantations.

The high total abundance indicated that there were a number of individuals covering 25 - 50% of the area in station 1 and 2, while the lowest percentage of land cover at station 3 was less than 5% (table 1). The composition of mangrove trees in Station 3 was quite tight, but in the category of saplings and seedlings were very little found so that although there were many trees, the percentage of land cover was small.
Table 1. Percentage of Land Cover Based on Braun-Blanquet (BB) Score

<table>
<thead>
<tr>
<th>Location</th>
<th>Restoration Time (year)</th>
<th>BB Scale</th>
<th>Land Cover (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K. Iwak</td>
<td>0.1</td>
<td></td>
<td>&lt;5</td>
</tr>
<tr>
<td>Bajulmati</td>
<td>0.1</td>
<td>0.1</td>
<td>&lt;5</td>
</tr>
<tr>
<td></td>
<td>0.5</td>
<td></td>
<td>&lt;5</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>0.5</td>
<td>&lt;5</td>
</tr>
<tr>
<td>CMC</td>
<td>6</td>
<td>3</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>2</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>1</td>
<td>&lt;5</td>
</tr>
</tbody>
</table>

B. Analysis of Water Quality

Water quality parameters were reviewed for pollution levels based on seawater quality standards according to MENLH No. 51 of 2004 concerning Sea Water Quality Standards for marine biota. Criteria for seawater quality standard parameters based on MENLH No. 51 of 2004 for turbidity must not be more than 5 NTU, the temperature of mangrove ecosystems ranges from 28 – 32, values between 7 - 8.5 for pH, the percentage of salinity for mangrove ecosystems is maximum 34%, the minimum concentration of 5 mg/L for DO and maximum 20 mg/L for BOD and not more than 0.015 mg/L for orthophosphate and 0.008 mg/L for nitrate (Table 3).

The forty-two plots showed a temperature range between 23 to 38 °C, where Bajulmati has an average temperature of ± 27 °C, while in CMC at ± 29.8 °C and Kondang Iwak averages ± 26.8°C (table 3). Temperature conditions in accordance with the criteria marine water quality standard for marine biota only at the CMC with the range of 28 – 32 °C for the mangrove conservation area, while the other two locations do not match the criteria of marine water quality standards for marine biota. That's because the sampling time was done in the morning when the temperature conditions are down and the low intensity of sunlight.

Table 2. Sea Water Quality Criteria for Marine Biota (MENLH No. 51 of 2004)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turbidity</td>
<td>NTU</td>
<td>&lt; 5</td>
</tr>
<tr>
<td>Temperature</td>
<td>°C</td>
<td>Mangrove: 28-32</td>
</tr>
<tr>
<td>Chemistry:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pH</td>
<td></td>
<td>7 - 8.5</td>
</tr>
<tr>
<td>Salinity</td>
<td>%</td>
<td>Mangrove: s/d 34</td>
</tr>
<tr>
<td>DO</td>
<td>ppm</td>
<td>&gt; 5</td>
</tr>
<tr>
<td>BOD</td>
<td>ppm</td>
<td>20</td>
</tr>
<tr>
<td>Phosphate (PO4-P)</td>
<td>ppm</td>
<td>0.015</td>
</tr>
<tr>
<td>Nitrate (NO3-N)</td>
<td>ppm</td>
<td>0.008</td>
</tr>
</tbody>
</table>

Turbidity at three locations showed values between 3.45 - 385 NTU. Turbidity in Bajulmati and CMC ranged on average 19.56 and 385.24 NTU. This condition was not in accordance with the seawater quality standard for marine biota with a value of ≤5 NTU, while the turbidity in Kondang Iwak is 3.45 NTU (table 3), which means that the turbidity in Kondang Iwak is in a suitable condition for marine biota based on MENLH No. 51 of 2004 for marine biota.

The high turbidity value in Bajulmati caused by sandy mud substrate is the result of a mixture of the Bajulmati watershed which empties into Ungapan Beach. That causes very high turbidity and sedimentation which can kill the growth of marine biota in the surrounding area. In addition, the results from the disposal of shrimp pond waste and oil spills from ships used by tourists for river banking also contributed. Turbidity at the CMC location was very high especially at Station 2, it was caused by the substrate of mud and sand resulting from frequent flash floods that hit the area of Station 2.

The degree of acidity (pH) of water at the three locations showed relatively normal results because it was still in the range of 7 - 8.5 in the seawater quality standard for marine biota. The pH of Bajulmati showed an average value of 7.5 while the average CMC was 7.6 and Kondang Iwak has an average value of 8.2 (table 3). According to Millero [10], seawater has the ability as a buffer in maintaining pH to always be alkaline, so that its value is relatively stable and this system is known as the seawater carbonate system. High or low pH of the water was influenced by the content of compounds in the water. Factors that affect the pH of the water are the rest of the feed and sediment that settles to the bottom of the water.

Salinity levels in Bajulmati showed a range between 11.8 - 15.7% indicated that this location was in a suitable condition for marine biota while in CMC was 19.2 - 28.2% (stations 2 and 3) but for station 1 showed the value unsuitable for marine biota which was 37.7% based on MENLH No.51 of 2004 concerning water quality standards for marine biota with a maximum value of 34%. The salinity condition of 0% in Kondang Iwak was caused by the condition of the waters located in the trapped water that is far from the sea (it called Kondang) (table 3). Salinity describes the total concentration of ions contained in a body of water with the main constituent ions such as sodium, potassium, magnesium, and chloride [10]. Salinity will vary vertically and horizontally depending on freshwater, rainwater, and evaporation inputs. Salinity has an important role in the life of marine organisms and the solubility of gases in seawater. Salinity is also one of the environmental factors that influence the existence of mangrove species.

Dissolved oxygen (DO) showed that the highest average was at station 3 in Bajulmati with a value of 5.32 ppm, followed by Kondang Iwak 4.075 ppm then CMC (stations 2, 3 and 1) respectively 3.6 ppm, 3.2 mg ppm, and 3.1 ppm, the lowest DO in Bajulmati (station 2 and 1) respectively 2.7 ppm and 2.4 ppm (table 3). DO values other than at Station 3 Bajulmati were classified as low and not in accordance with seawater quality standards based on MENLH No. 51 of 2004, which is not less or a minimum of 5 ppm. A low range on DO value allegedly caused by the sampling time which pertained morning.

The DO value was expected to increase with increasing sunlight intensity and the photosynthesis process. DO levels according to Effendi [11] fluctuate daily (diurnal) and also seasonal, depending on the mixing and movement (turbulence) of water masses, photosynthetic activity, respiration, and effluent into the water bodies. DO is a gas that is needed by all living things, both on land and water. The water body can be said as good and has a low level of pollution if it has DO levels greater than 5 ppm [12].

BOD concentrations in the three locations averaged between 3.3 - 9.29 ppm (table 3). The BOD value was still below the standard...
according to MENLH No. 51 of 2004 concerning seawater quality standards for marine biota, which is 20 ppm. BOD value is known to indicate the level of pollution in the waters [12]. The range of BOD values in the three locations showed that the waters were included in the low pollution level. Low pollution levels have a BOD range of 0 to 10 ppm [12]. Nitrate is one of the three main forms of nitrogen compounds in seawater. Nitrate is often used as an indicator of water fertility. Nitrate levels in the three locations ranged from 0.02 to 0.11 ppm (table 3), all of which exceeded the quality standard of MENLH No. 51 of 2004, which is 0.008 ppm. The high concentration of nitrate in seawater was influenced by its solubility [13].

### Table 3. Water Parameters Result

<table>
<thead>
<tr>
<th></th>
<th>Bajulmati</th>
<th>CMC</th>
<th>K. Iwak</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5  7  10  6  7  15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temp</td>
<td>29  27.5  24.5  34.7  26.2  28.8  26.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pH</td>
<td>8.06  7.18  7.2  7.7  7.8  7.4  8.18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DO</td>
<td>5.32  2.64  2.37  3.6  3.07  3.15  4.07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salinity</td>
<td>11.83  14.7  15.7  37.7  19.17  28.17  0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turb</td>
<td>10.58  35.63  12.45  257.2  492.2  406.3  3.45</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BOD</td>
<td>8.27  5.79  3.5  8.75  8.02  9.29  3.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nitrate</td>
<td>0.1  0.08  0.11  0.05  0.02  0.05  0.09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PO4</td>
<td>0.2  0.14  0.18  0.07  0.07  0.02  0.23</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The results of testing orthophosphate levels in water samples at the three study sites showed values between 0.07 - 0.23 ppm (table 3). This concentration has exceeded the seawater quality standard for biota according to MENLH No.51 of 2004, which is 0.015 ppm. High and low levels of phosphorus in the waters were influenced by the input of organic matter carried by the river flow. On average all stations have low salinity values and tend to be brackish [14].

### C. Analysis of Macroinvertebrates

The results of macroinvertebrate identification which were divided into two major groups namely gastropods and crabs were found 20 species of gastropods and 9 species of crabs (table 4). Species diversity (H’) is characteristic of the level of community-based on its biological organization. H’ can be used to express the structure of a community, it can also be used to measure community stability, namely the ability of a community to keep itself stable even though there were disturbances to each of its components [15]. H’ from gastropods at station 3 CMC, Kondang Iwak, and station 2 Bajulmati were classified low based on the diversity index benchmark values, respectively 0.2, 0.4, and 0.9 (less than 1). The highest H’ value was found in Station 3 Bajulmati, which is 2.2. This value was also classified as a medium based on the benchmark index of diversity (between 1 - 3) (fig. 2).

The more number of species with the same or a close number of individuals, the higher level of heterogeneity. The highest H’ value of crabs was at station 1 CMC with 2.4 (fig. 2). The value was still classified as moderate based on the diversity index benchmark (between 1-3). In line with the dominance and E values, the crabs at the three Bajulmati stations and Kondang Iwak were zero (0) because only one type of crab was found in the area.

### Table 4. Distributions of Gastropods and Crabs

<table>
<thead>
<tr>
<th>Taxa</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bajulmati</td>
</tr>
<tr>
<td>G</td>
<td></td>
</tr>
<tr>
<td>Cerithidea decollata</td>
<td>+</td>
</tr>
<tr>
<td>S</td>
<td></td>
</tr>
<tr>
<td>Cinguloteretra anilis</td>
<td>-</td>
</tr>
<tr>
<td>R</td>
<td></td>
</tr>
<tr>
<td>Clithon corona</td>
<td>+</td>
</tr>
<tr>
<td>O</td>
<td></td>
</tr>
<tr>
<td>Pirenella incisa</td>
<td>-</td>
</tr>
<tr>
<td>P</td>
<td></td>
</tr>
<tr>
<td>Species x</td>
<td>+</td>
</tr>
<tr>
<td>D</td>
<td></td>
</tr>
<tr>
<td>Telescopium telescopium</td>
<td>-</td>
</tr>
<tr>
<td>C</td>
<td></td>
</tr>
<tr>
<td>Terebralia palaestris</td>
<td>+</td>
</tr>
<tr>
<td>G</td>
<td></td>
</tr>
<tr>
<td>Vitta usnea</td>
<td>+</td>
</tr>
<tr>
<td>S</td>
<td></td>
</tr>
<tr>
<td>Vitta virginiae</td>
<td>-</td>
</tr>
<tr>
<td>R</td>
<td></td>
</tr>
<tr>
<td>Vittina coromandeliana</td>
<td>-</td>
</tr>
<tr>
<td>O</td>
<td></td>
</tr>
<tr>
<td>Vittina gagates</td>
<td>-</td>
</tr>
<tr>
<td>D</td>
<td></td>
</tr>
<tr>
<td>Vittina natulensis</td>
<td>-</td>
</tr>
<tr>
<td>P</td>
<td></td>
</tr>
<tr>
<td>Vittina turrita</td>
<td>-</td>
</tr>
<tr>
<td>S</td>
<td></td>
</tr>
<tr>
<td>Meretrix meretrix</td>
<td>-</td>
</tr>
<tr>
<td>M</td>
<td></td>
</tr>
<tr>
<td>Mytilus edulis</td>
<td>-</td>
</tr>
<tr>
<td>P</td>
<td></td>
</tr>
<tr>
<td>Perna viridis</td>
<td>-</td>
</tr>
<tr>
<td>C</td>
<td></td>
</tr>
<tr>
<td>Polymesoda expansa</td>
<td>-</td>
</tr>
</tbody>
</table>

Factors that influence the presence and selection of aquatic fauna living areas were environmental factors that comprised the habitat. Each component of these elements has different effects on each type or group of types. Environmental factors have a beneficial or detrimental impact on the presence of aquatic fauna. Each habitat type has a combination or set of factors that are different from other habitat types [16]. This means that water conditions, habitats, or ecosystems changes that affect the waters will also affect the community structure and function of aquatic fauna. The Importance Value Index (IVI) showed the importance of a species and its role in the community, where the significance value was obtained from the sum of Relative Abundance (RA) and Relative Frequency (RF). In this case, the total amount of RA and RF must be 100%, so the total amount of IVI is 200%. The existence of a dominant species at the study site becomes an
indicator that the community is an appropriate habitat and supports its growth.

Figure 2. The Diversity Index of Gastropods and Crabs

The highest IVI of gastropods was occupied by mangrove snail species, *Terebralia palustris* which were found in almost all locations except in Kondang Iwak (fig. 3). According to Frattini, *et al* [17], *T. palustris* is a gastropods that has a shell composed of calcium carbonate which has the ability to life in tidal conditions. *T. palustris* tends to choose a place to life only on the surface of sediments which sand and muddy substrate [18]. Turbidity in the CMC location has the highest value compared to the other two locations, it reinforced the notion that the high IVI value of *T. palustris* at CMC was due to the high turbidity value.

Figure 3. Important Value Index of Gastropods

The highest IVI value of crabs was from the mangrove crabs species, *Scylla serrata* that found in all study sites (fig.4). Mangrove crab or mud crab or sometimes called black crab is one of fisheries resources that live in the coastal area and in particular in the mangrove area. Ecological conditions play an important role in the sexual maturity of mud crab through the amount of available food and the environmental temperature. Reduction in mangrove swamp area may perturb the food chain in the mangrove swamp affecting crab sizes at sexual maturity while the spawning [19]. Almost all the types of crabs were in the form of the first crab stage (juvenile). Juvenil inhabits the upper intertidal area (sometimes hiding under rocks or areas between pneumatophores of *Avicennia marina* near the mangrove fringe) during low tide and to avoid larger aquatic predators [20]. The juvenile according to Baylon [21] can not survive at temperatures below 20 °C, while Nurdiani [22] stated that the best survival rates were reached at 28 and 29 °C, respectively and with minimum salinities of 25–30, that is the reason juvenile of *Scylla serrata* was found in all study sites because the average of temperature conditions above 23 °C and were in high salinity.

Figure 4. Important Value Index of Crabs

More recently, characteristics of the faunal community in mangrove forests areas are being included in rehabilitation assessments. Due to their conspicuousness and importance in ecosystem function, mollusks, mudskippers, and crabs are commonly used as indicators [23]. The study of Irma, *et al* [24] in Sumatra, Indonesia concluded that gastropod abundance positively correlates with the age of rehabilitated mangroves. Although mudskippers have not been used specifically to assess mangrove rehabilitation, they have been suggested as potential bioindicators for the health of mangrove ecosystems.

D. Principal Component Analysis (PCA)

PCA is a descriptive statistical method that aims to display data in graphical form and maximum information contained in a data matrix [25]. The PCA have a component that were called Biplot. Biplot serves to determine the grouping and the parameters of identifiers based on the zone and observation period of this analysis is used to observe the similarities and linear correlations between objects and environmental parameters observed [26]. PCA analysis using PAST3 (Paleontological Statistics) software. The results of the PCA analysis show the research parameters or variables that play an important role, especially those that affect the existence of aquatic fauna [27].

Based on PCA analysis, it was found that the dominant physicochemical parameters affecting mangrove vegetation were salinity, nitrate and orthophosphate, with a total variance of the two components of 81.782% (fig. 5). Mangrove vegetation and salinity were positively correlated only at CMC. That is because the sea water supply is greater than the other two locations which were mostly supplied with brackish water. It shows that restoration program in CMC better than Bajulmati did. In addition, as explained above that the location of Bajulmati often floods,
causing mangrove saplings that have just been planted damaged by the flood currents. The longest restoration year actually shows the results of the structure of mangrove vegetation which tends to be lower than the newly restored. That's because the high density at the level of saplings and seedlings that overflows the study plot, on the contrary, trees dominate over the longest year restoration area.

Abiotic parameters that affect the gastropods diversity were salinity, orthophosphate and BOD, with a total variance of the two components of 77.425%. Orthophosphate and gastropods were positively correlated in Bajulmati and Kondang Iwak (fig. 6). According to Kurniawaty, et al [28], gastropod groups living in mangrove ecosystem areas tend to choose habitat criteria that have open land, fine mud, large enough puddles, and have a high availability of organic matter. It was accordance with the conditions of organic material in Bajulmati and Kondang Iwak which tend to be higher than CMC, which causes a high diversity of gastropods.

The diversity of crabs based on the results of the PCA analysis was influenced by salinity, BOD and orthophosphate, with a total variance of the two components of 78.069%. BOD and salinity levels were positively correlated with crabs diversity in CMC (fig. 5). According to Unthari, et al [29], the range of salinity that can be tolerated by mangrove crabs is 10% - 33%, but also from several studies that mangrove crabs can still survive for salinity that is more than 33%. The high BOD value and diversity of crabs in CMC illustrates that at these locations crabs carry out many metabolic activities so that the results of these activities can affect the BOD levels of waters.

The longest restoration year actually shows the results of the structure of mangrove vegetation which tends to be lower than the newly restored. That's because the high density at the level of saplings and seedlings that overflows the study plot, on the contrary, trees dominate over the longest year restoration area.

**Figure 5. Principal Component Analysis of Mangrove Vegetation**

E. Recommendation Strategies Based on Evaluating The Success of Restoration Program

There are some strategies that can be recommended for the sustainability of the restoration program based on the evaluation results of the success of the restoration program. First, the adoption of a policy to stop the conversion of conservation areas to other uses. In this case, the official authorized to do so by giving the sense that in addition to the role of mangrove ecosystems vital for life, also has a high economic if managed properly. The second strategic step, is to improve the governance of mangrove conservation areas, National Parks, Nature Reserves and wildlife reserves. This step is very much needed for Bajulmati location because CMC has been designated as a conservation area and protected by law. With the existence of mangrove conservation areas that are maintained then at least there is a mangrove area that really functions as a protected area, which mangrove ecosystem is really maintained.

The third strategic step, is that mangrove protection conservation programs must be community-based, because so far many conservation or rehabilitation programs have failed because they do not involve the surrounding community. CMC is located quite far from residential areas, so the conservation program will not interfere with the activities of the surrounding community. Compared with Bajulmati are adjacent to the settlement, so that the role of the community will greatly help the success of the conservation program.

CMC is one of the most developed mangrove ecotourism areas. Most of the ecotourism activities at CMC were only centered on mangrove conservation. Because as well known, mangrove ecosystems not only contain these plants, but also other biotic components that associated with mangrove. Same as in Bajulmati, ecotourism activities in Bajulmati were only planting mangrove seedlings. The last recommendation strategy is making an ecotourism in the conservation area that preserves aspects of local wisdom and involving local community while maintaining ecosystem health. Several ways to develop the potential of ecotourism there were opening fishing, birdwatching, increasing the participation of relevant agencies in improving facilities and infrastructure, community education level, access to the location, and the zoning of the area.

**IV. CONCLUSION**

The success of mangrove restoration in terms of the assessment of provisioning services showed sufficient results to provide a variety of benefits both for the ecosystem and surrounding communities. The products from the restoration program were in the form of wood production and the presence of various types of aquatic fauna. The land cover in all three locations showed a moderate percentage (between 5 - 50%). Gastropods found in all locations (except Kondang Iwak) were *Terebralia palustris* (mangrove snails), while crab species found in all locations were *Scylla serrata* (mangrove crabs) and fish that have the highest IVI, was *Periophthalmus sp*. Both products can be used as an ecological approach to protect coastal areas from degradation, one of which made the area an ecotourism location.

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Modelling Groundwater Potential using Geospatial Technologies in Meru County, Kenya

Gitonga, D and Eshton, B.

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Abstract- Spatial analysis is key to mitigating ground water resource problem related to lack of reconnaissance prior to prospecting using terrameter. Traditionally, time consuming and expensive resistivity measurements are indiscriminately applied for feasibility of ground water potential. The results have often led to exploitation of dry ground wells. Ground water modelling is essential to preliminarily identify potential sites for deployment of resistivity measurements. Major economic activity in Meru County is rain-fed agriculture solely dependent on erratic rainfall. The big disparity in altitude and rainfall impacts on availability of reliable water sources especially during the dry season when locals travel long distances in search of water. The groundwater potential mapping will support exploitation in an effort to compliment available water sources in the county. The purpose of this study was to model ground water suitability site in Meru County using Geographic Information Systems/Remote Sensing (GIS/RS) technologies. The study adopted quantitative research designs. This was achieved through application of GIS/RS technologies that entailed preparation, evaluation, modeling and interpretation of parameters touching on climate, geophysics and geology data. The dataset were appropriately weighted in a modified DRASTIC based overlay scheme. Software’s used for the study included: GIS ArcGIS (V 10.1) with Spatial Analyst, 3D Analyst, ArcHydro and SWAT extensions. RS ERDAS Imagine 9.3 and ENVI 4.7. The study revealed the most suitable areas for groundwater prospecting are in the central, northern and eastern areas of the county. Existing water points are available in these regions and thus served to validate the study findings. The study recommends in these regions studies to verify the variations in DRASTIC factors and the prevailing water quality.

Index Terms- Geographic Information Systems, Remote Sensing, DRASTIC model, Meru County.

I. INTRODUCTION

GIS/RS analysis has been widely used, often with great success in environmental assessment and monitoring. However, there is limited use in prospecting of ground water resources (Rahman, 2008). The original DRASTIC model was developed to map groundwater pollution potential developed by Aller et al. (1987). It features seven factors (depth to water, recharge, Aquifer media, soil media, topography (slope), impact of the Vadose zone and Conductivity of the aquifer), that are weighted according to the significance of each factor in determining pollution potential. The resulting weighted overlay then depicts the pollution potential for each spatial region

II. GROUND WATER OCCURRENCE

Groundwater is one of the earth’s most important resources and its development can play a big role in a country’s economy. It becomes a usable resource when the water bearing formations are permeable enough to allow water to infiltrate through them, to yield adequate quantity of good quality water for use through boreholes, dug-wells and springs, and can be replenished from recharge sources to permit continued exploitation forming a vital resource for agriculture, domestic and industry water supply. It is also the single largest and most productive source of irrigation water and plays a critical role in maintaining agricultural production during droughts. Groundwater can therefore be exploited if potential areas with abundant groundwater can be identified (Murphy, 2000).

III. APPLICATION OF DRASTIC MODEL IN GROUND WATER MAPPING

A variety of techniques are used to give information on potential occurrence of groundwater since it cannot be seen directly from the earth’s surface as argued by Ganapuram et al. (2009). Systematic planning of groundwater development using modern techniques is essential for proper utilization and management of this natural resource (Kamaraju, 1996). As posited by Kumar (2010), the existing methods for groundwater exploration using geophysical and geo-electrical techniques are expensive and time consuming hence there is a need to exploit new technologies of GIS/RS in the exploration of groundwater. Remote sensing (RS), with its advantages of spatial, spectral and temporal availability of data covering large and inaccessible areas within short time has become a very rapid and cost effective tool in assessing, monitoring and conserving groundwater resources. According to Kuria et al. (2012) Geographical Information System (GIS) on the other hand, is a powerful environment for real time database development, especially in studies such as delineating groundwater potential zones and recharge sites.

In mapping ground water, the factors that are used are Lithology, Surface drainage density, Soil types, Slope steepness, Rainfall distribution, land-cover and topography, with the spatial overlay concepts used in the DRASTIC methodology as described by Pandiyani and Annadurai (2013).

Drainage/lineaments, lithology and topography define geology and geomorphology data employed with their significant influence exhibited through the various landforms and structural features (Crawford & Brackets, 1995). Lineaments are commonly surface expressions of tectonic fractures and faults in the bedrock,
emphasized on the surface by topography, drainage, and vegetation and can be identified by remotely sensed data. Drainage density is defined as the closeness of spacing of stream channels. It is a measure of the total length of the stream segment of all orders per unit area. Drainage provides recharge to groundwater hence higher potential where there is high drainage density. These features are favorable for the occurrence of groundwater and are classified in terms of groundwater potential. Some of these features are deciphered from remote sensing data. (Rao et al; 2009)

When groundwater moves through soil, the structure of the soil affects its movement. The three particles that determine soil structure are sand, silt and clay. The amount of groundwater recharge, storage, discharge, as well as the extent of groundwater presence all depend on the soil properties: texture (grain size, texture classification, soil series classification), porosity, specific yield and permeability attenuation capacity (Sankara, 2002). Slope is the one of the factors controlling the infiltration of ground water into sub-surface; hence an indicator for the suitability for ground water prospect. In the gentle slope area the surface runoff is slow allowing more time for rain water to percolate, whereas high slope area facilitate high runoff allowing less residence time for rain water hence comparatively less infiltration as argued by Sener et al. (2005).

Rainfall and land cover determine the amount of water input and surface influence to infiltration respectively. Vegetation reduces amount of runoff thereby allowing longer time and higher infiltration of rainfall water that provides the major source of ground water. In view of the aforesaid factors, the DRASTIC Index provides only a relative evaluation tool and is not designed to provide absolute answers. Therefore, DRASTIC is a reconnaissance tool, but has proven its value as an indicator of areas deserving a detailed hydrogeological evaluation (Matí, 2005).

Table 1: Data and derivative employed in the model

<table>
<thead>
<tr>
<th>Data</th>
<th>Derived modeling variable</th>
<th>Data source</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEM and Landsat 7 ETM+ (4 scenes)</td>
<td>Surface drainage and lineament density</td>
<td>USGS, ASTER</td>
</tr>
<tr>
<td>Lithology</td>
<td>Lithology</td>
<td>ILRI</td>
</tr>
<tr>
<td>Soil</td>
<td>Soil texture</td>
<td>ILRI</td>
</tr>
<tr>
<td>DEM</td>
<td>Slope</td>
<td>ASTER</td>
</tr>
<tr>
<td>Rainfall Data</td>
<td>Rainfall distribution</td>
<td>ILRI</td>
</tr>
<tr>
<td>Land Use/Land Cover</td>
<td>Land cover</td>
<td>ILRI</td>
</tr>
<tr>
<td>DEM and Topographic base map</td>
<td>Topography</td>
<td>ASTER, Survey of Kenya</td>
</tr>
</tbody>
</table>

Lineament mapping was undertaken based on geomorphological features such as aligned ridges and valleys, displacement of ridge lines, scarp faces and river passages, straight drainage channel segments, pronounced break in crystalline rock masses and aligned surface depression. Various data sets, including multispectral satellite imagery (Landsat) and DEM, as well as geological data describing fractures, faults, and hydrology were used to map and validate the lineament and drainage distribution in the study area. Lineaments were delineated by visual interpretation of the false color composite (FCC) 471. After all the lineaments were interpreted, they were merged with the DEM derived streams to form one dataset called Surface drainage and lineament shown as Figure 1. The DEM was also used to generate other features like hill shade shown as Figure 2, slope and topography. The results are presented as lineament and drainage density map. The zones of high lineament intersection density are feasible zones for groundwater prospecting in the study area.

IV. GAP ANALYSIS

A range of challenges exist that inhibit efficient, cost effective and sustainable exploration, development and use of ground water resources. The challenges include use of time and costly techniques of exploration and limited capacity within the sector domain to undertake ground water modelling. In Meru, the government is implementing a borehole program that is heavily relying on on-site geophysical investigation at the first instance without reconnaissance survey. Adoption of GIS/RS would improve on the siting of appropriate sites and save both time and cost, yet there exist limited empirical studies to address this concern. This study is an empirical attempt to fill this gap. Further, application of GIS/RS in ground water exploration and in particular the DRASTIC model is a recent phenomenon and has scantily been studied. This study addressed this knowledge gap by modelling the ground water potential based on modified DRASTIC model.

V. MATERIALS AND METHODS

GIS/RS were employed in this research. Software’s used for the study included: GIS ArcGIS (V 10.1) with Spatial Analyst, 3D Analyst, ArcHydro and SWAT extensions. RS ERDAS Imagine 9.3 and ENVI 4.7.

Table 1 shows the various data used with corresponding derivative employed in the model. Landsat imageries (30 m resolution) were downloaded from the United States Geological Survey (USGS) website, topographic base map from the survey of Kenya, Advanced Spaceborne Thermal Emission and Reflection Radiometer, (ASTER). Digital Elevation Model (DEM) from NASA, with other data obtained from the International Livestock Research Institute (ILRI). Fig. 1 and 2 maps out the derivatives.
The numerical ranking system, another DRASTIC component was used to assess the groundwater potential for each hydrogeological variable. The system contains two parts, weights and ranges. Each modified DRASTIC parameter has been assigned a relative weight in percentage (heuristically arrived at based on the interpretation of the relative significance of the factor), with the most significant factor having higher percentage and vice versa in regards to their influence to existence of groundwater as presented in Table 2. In turn, each of the variables is "sub-divided" into either numerical ranges (e.g. elevation in meters above sea level,) or media types (e.g. soil texture) hereby called ranges, signifying how a factor impacts on groundwater existence. Table 2 illustrates the weights and ranges of the variables employed in the model.
Table 2: Variable, weight and ranges employed in modeling

<table>
<thead>
<tr>
<th>Variable/Factor</th>
<th>Weight %</th>
<th>Classification</th>
<th>Ranging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lithology</td>
<td>10</td>
<td>Rock type classes</td>
<td>Igneous, Metamorphic, Sedimentary and unconsolidated rocks (4 classes)</td>
</tr>
<tr>
<td>Surface drainage and lineament</td>
<td>22</td>
<td>Drainage/lineament density</td>
<td>High to low density (4 classes)</td>
</tr>
<tr>
<td>Soil</td>
<td>8</td>
<td>Soil texture</td>
<td>Very clayey, Clayey, Loamy and sandy (4 classes)</td>
</tr>
<tr>
<td>Slope</td>
<td>20</td>
<td>Slope</td>
<td>4 classes of degree of terrain sloppiness</td>
</tr>
<tr>
<td>Rainfall distribution</td>
<td>8</td>
<td>Annual rainfall</td>
<td>4 classes of annual rainfall in mm</td>
</tr>
<tr>
<td>Land cover</td>
<td>12</td>
<td>Major land cover classes</td>
<td>Forest, Bushland/Grassland, Agriculture/plantation, built-up and Barren (5 classes)</td>
</tr>
<tr>
<td>Topography</td>
<td>20</td>
<td>Elevation</td>
<td>4 classes of low to high altitude in meters above sea level.</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

VI. MODIFIED DRASTIC INDEX

Mathematically, the final result for each hydrogeologic setting (i.e., geographic area) is a numerical value obtained using the equation below:

\[
\text{Groundwater Potential} = \sum_{i=1}^{7} R_i \sum_{j=1}^{6} W_j
\]

Where: \( R = \) ranging and \( W = \) weight of parameter

A high numerical index resulting from Equation is assumed to be indicative of a geographic area having more potential to groundwater.

Placed within a spatial context, the methodology was based upon a series of seven maps, one for each hydrogeological parameter as presented in Figure 3. The modified DRASTIC methodology was implemented by means of visual map comparison, resampling, reclassification and overlay within GIS/RS softwares.
VI. RESULTS AND DISCUSSION

Figure 4 illustrates the result of the modified DRASTIC based map overlay. From this map, it can be seen that the central and eastern parts of the county are suitable for groundwater exploration. South western parts of the county, closest to Mount Kenya have lowest suitability mainly due to altitude, rock type and slope factors.
VIII. CONCLUSION

The use of geospatial technologies in estimating the groundwater potential of Meru County was achieved through preparation of both raster (satellite images) and vector datasets and modeling within GIS/RS software. Modified DRASTIC approach in delineation of groundwater potential zones was applied. The study revealed most suitable areas for groundwater prospecting were shown to be those in the central, northern and eastern areas of the county. Existing water points are available in those regions, thus validating the study.

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Assessing Farmers Risk Attitudes and Coping Strategies Among Apple Growers
Emerging Evidence from Ahmad Aba, Paktia, Afghanistan
-Risk Behaviors Model (RBM), and Regression Approach-

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ABSTRACT

Multidimensional exogenous and endogenous factors are introducing a high degree of uncertainty and inversely impacts farmers’ income as well as the gross national product of the country. This study elucidates apple growers’ risk attitudes and risk-smart options, in Ahmad Aba, Paktia. The study applies Risk Behavioral Model (RBM) and regression analysis using 85 samples among apple farming households, from January to February 2020. The study reveals that 76.47% of the farmers have been deprived of access to extension services, meanwhile the extension work are positive and significantly related to farmers’ risk attitudes. Also, the result shows that 55.29% of the respondents are risk-averse; moreover, 44 and 20 percent of the respondents have experienced mild and sever risk, respectively. Besides, the result of regression analysis shows that production, age of the farming household head, education, gender, and off-farm income are significant in explaining farmers’ risk attitudes in the selected area. The risk smart-arts chosen by farmers to mitigate the prevalence risk level include intercropping, off-farm employment, decrease in expenditures, participation in unions, post-harvest management, and financial/credit reserve strategies.

KEYWORDS: Risk Attitudes, Risk Determinant, Coping Strategies, Apples, Paktia, Afghanistan

1. INTRODUCTION

Apples are the major producing fruit in Afghanistan, providing subsistence food nutrients and generates employment opportunities to growers across the country. Given the favorable climate conditions throughout the county, apple growers able and produced abundant amounts with greater improvement in the latest two decades. Nevertheless, in Afghanistan, most of the apple producers are small-scale farmers, with fewer opportunities for access to credit, extension workers, and membership in the business and social organizations. Besides, the lack of information on farmers’ risk preferences has created ambiguity for researchers and policymakers in designing sophisticated risk management instruments (Lucas and Pabuayon, 2011; Ellis, 2000; Ayinde, 2008). Moreover, agricultural activities are affected by various types of risk, that includes production risk (such as risk associated with yield, climate risk, and epidemic diseases); the risk associated with currency exchange rates; price volatility risk; and risk of competition in the global markets (Ullah et al., 2016; Abay et al., 2009). Consequently, the empirical result of various studies shows that farmers attitudes toward risk influences most of their production and economic decisions; for instance, cropping patterns (Maynard, Harper, Hoffman, 1997), willingness to
participate in crop insurance (Nieuwoudt and Bullock, 1985; Sulewski, Gajewska, 2014), and technology adoption (Chavas and Holt, 1996; Liu, 2013), which in large extent influences the success of many development programs in the rural areas (Adejoro, 2000; Tonye et al., 1977). Thereby, assessing farmers’ attitudes toward risk are essential factors shaping farmers’ decisions overall the uncertain circumstances (Akcaoz and Ozkan, 2005).

In the landlocked developing countries, agriculture and raising livestock are the backbone of the rural economy; hence, most of the farmers’ decisions are driven by ‘safety-first’ rule; implying that farmers firstly ensure their future safety, then take an action toward a secured direction (Scandizzo and Dillon, 1976). Meanwhile, farmers’ opportunities and challenges differ depending on their psychological make-up and the surrounding socio-economic circumstances. Moreover, factors affecting farmers’ behavior and state of risk aversion taken by a particular group of farmers could be estimated from their observed behaviors (Moscardi and Javry, 1977). The state of risk aversion in most of the agricultural entrepreneurship can be estimated by pests and widespread diseases, weather-related problems, low yielding varieties, miss-management, and lack of technology and owner capital (Isiaka 1998; Apantaku et al., 1998; Famure, 1988; and Eekeren et al., 1995). Eventually, all these factors lead to a low level of the farm gross revenue; the study arrived by Pender, 2001 stating that the variation in productivity and deviation from the mean gross revenue can be minimized by proper handling of risk-management activities. In addition, the selection of appropriate coping strategies and risk-smart options are an alternative solution for the farmers to avoid or alleviate the dominant risk level. The risk coping options studied by Hardaker et al., 2004 include access to valid information sources, cooperative membership, employment of appropriate technologies, livelihood diversification, access to the credit and insurance services.

Despite the lack of knowledge that we have on the sources of risk and that why it occurs; perceiving individual risk attitudes are the main criterion to recognize their economic characteristics (Reynaud and Couture, 2012); moreover, understanding farmers’ economic behaviors are the key factor in designing a responsible agricultural development strategy (Euphrasie B.H., et al; 2012).

In addition, in this study, we assess farmers’ perceptions of various risk sources. In agriculture, sources of risk might be categorized into production, market, institutional, and financial risk sources (NIPC, 2006; Njavro, 2009; Dercon, 2002, and Mikhaylova, 2005). Given the high interdependence between input and output, market and production risks are highly correlated to each other. Therefore, fluctuation in input and output prices result in market risk. Furthermore, market risk can be the result of market cartel, an organization willing to control the market prices by excluding the small competitors from the market. Eventually, the uncertainty introduced by fluctuations in the market is hindered by production planning, which in turn leads to inefficient resource allocation (Ellis, 1998 and Ellis, 2000; Hazzel, 1998). Another source of risk in the study area is institutional risk; four decades of political instability across the country is the main cause of institutional risk. Institutional risk can be either political relating to the instability in governance and their policies, or sovereign risk occurs due to not commitment of foreign governments to the mutual agreements such as trade agreements (Hardaker et al., 2004) or transaction risk which is the results of opportunistic behavior and the reliability of transacting partners (Dorward et al.,2007).

Considering the previous studies, risk attitudes are significantly variant among the respondents (Flaten et al. 2005) because of heterogeneity in the age (Ashraf and Routray 2013; Kammam and Bhagat 2009; Iqbal et al. 2016; Kisaka-Lwayo and Obi 2012), respondents’ education level (Dadzie and Acquah 2012; Khan et al 2010), income (Einav et al 2010), experience in farming (Lucas and Pabuayon 2011), income obtained from non-farm sources (Ullah et al. 2015), and farm size (Iqbal et al. 2016; Lucas and Pabuayon 2011). This study aims to investigate farmers’ risk attitudes, risk determinants, farmers’ perception about risk sources, and coping strategies among apple farmers in Ahmad Aba, Paktia, Afghanistan.
2. METHODS AND ANALYTICAL TECHNIQUES

2.1. STUDY SITE AND DATA COLLECTION

This study is conducted in the southeast of the country focusing on four villages in the Ahmad Aba district. The study area is chosen because of its proper soil, socioeconomic, and suitable climatic condition for apples growing. Moreover, the study is conducted in a rural area where the majority of the residents are living on small-scale farming and raising livestock. The data used in this study have been collected through face-to-face interviews using a structured questionnaire. For the purpose, 85 apples farming households were randomly selected and interviewed for their risk preferences, socio-economic conditions, risk perception, and coping-strategies for effective risk management in the study area.

2.2. ANALYTICAL TECHNIQUES

Descriptive statistics have been used to summarize the main characteristics of respondents in terms of frequencies and percentages, purposively. Furthermore, farmers’ risk preferences were analyzed using the Risk Behavioral Model (RBM). The model is driven by safety-first rule, ensuring the minimization of the probability of suffering from the shortfall in income lower than a certain critical level. The specific model developed by Roy (1952), followed by Sekar and Ramasamy (2001) and Salimonu and Falusi (2007), is given as follows:

$$\Psi_i = (\bar{c}i - \mu_i)/\sigma r$$

(1)

Where, $\Psi_i$ shows the risk aversion index, represents respondent monthly returns disaster level indicates farm expected return, and stands for the standard deviation of the household income. It is worth noticing that, the income disaster level ($\bar{c}i$) is the amount of income in which the farm household is compelled to borrowing or selling-off farm-related assets to alleviate the extreme poverty level. Moreover, the socio-economic circumstances with a decision-maker could determine the income disaster level (Sekar and Ramasamy, 2001). The individual farmer toward his behavior is risk-averse if, $\Psi_i < 0$, the respective respondent is risk neutral in case of $\Psi_i = 0$; lastly, the respondent is risk seeker if $\Psi_i > 0$.

In this study, the socioeconomic factors affecting farmers’ risk attitudes is determined using ordinary least square multiple regression model, empirical structure of the model is specified as bellow:

$$Y = \beta_0 + \beta_1X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6$$

$$+ \beta_7X_7 + \beta_8X_8 + \beta_9X_9 + \beta_{10}X_{10} + \varepsilon$$

(2)

Where; $Y$ represents farmer risk aversion Index (as indicated in equation 1), $X_j$ ($j = 1,2,\ldots,n$) is the vector of predictor variables used in the analysis (including socioeconomic characteristics of farmers and their orchards related variables, that consist apples production, garden size, age of the household head, education level, experience in farming, cooperatives membership, gender, marital status, experience with risk, household size, access to credit, and access to extension work). $\beta_{ij}$ is the vector of unknown parameters to be estimated ($i = 1,2,\ldots,p; j = 1,2,\ldots,n$); and $\varepsilon$ is indicating the random noise term.

Multinomial logit model is employed to analyze the effects of socioeconomic characteristics on the selection choice of farmers’ risk coping strategies. The risk coping options used in the multinomial logit model against the socioeconomic characteristics of farmers include intercropping, off-farm employment, decreasing in expenditures, membership in unions (production/ business), post-harvest management, financial/credit reserve, and no risk strategy. In the study model, no risk strategy is normalized and used as a “reference or base” category. Besides, Hausman-test is employed to assess the reliability and validity of the model used for the analysis, purposively. Subsequently, the result indicated that the multinomial logit model is applicable to risk-coping strategies affected by the dominant socioeconomic factors. Hence, a multinomial logit model is employed to analyze the existing relationship between a polytomous explained variable and a set of explanatory variables (Onubuogu and Esiobu, 2014).

The structured form of the modal is as follows;

$$Pr (Y_i = j) = e^{\beta j x i j}, \quad j = 0,1,2,3,\ldots,6$$

$$1 + \sum_{m=1}^{6} \varepsilon_{m \times j}$$

(3)

$$P_j = Pr(Y_i = j) = e^{\beta j x i j}, \quad j = 0,1,2,3,\ldots,6$$

$$1 + \sum_{m=1}^{6} \varepsilon_{m \times j} \quad m = 0$$

(4)
Here, \( Pr(Y_i = j) \) represents the probability of preferring any of the risk coping-strategies; and \( j \) is the number of risk-coping strategies in the choice set of options, \( X_i \) indicates vector of explanatory socio-economic variables, \( \beta_j \) is vector of the estimated parameters. The probability response is represented as below.

Where, \( P \) is indicating response probability

\[
(1 = 0, 1, 2, 3, \ldots, 6) \tag{6}
\]

\( Y \) is showing risk coping category; where \( j = 1, 2, 3, 4, 5, 6 \) (in our study that includes intercropping, off-farm employment, decreasing in expenditures, membership in unions (production/business), post-harvest management, and financial/credit reserve strategy).

3. **STUDY RESULT**

3.1. **DESCRIPTIVE RESULT**

Table 1 reported the respondents’ characteristics by looking at the frequency and percentage. Result revealed that the majority of farmers in the area are between 20 to 40 years old (52%), pointing out that they are still younger and can obtain the technical skills and adopt new technology and innovations. It is also observed that most of the farming household heads are uneducated (40%, indicated in the table 1). On the other hand, farmers’ education is directly related to their contribution toward development programs, awareness, and adoption of innovations, and it could enhance their risk management skills (Fawole and Fasina, 2005). Moreover, 44.7% and 20% of the farming households have experienced mild and severe risk, respectively. It is also observed that the majority of farming households are having more than 8 persons as a family; moreover, the empirical results of various studies (Gebremedhin and Scott 2003; Babalola and Babalola, 2013) have found that household size is directly related to the expected expenditures. On the contrary side, family young members contribute to the farm as a labor (Peter and Susan, 2014), hence a bigger size of households provides adequate labor leading to a decrease in the farm labor cost. The data describes that most of the farmers have no access to extension services (76.47%); (Chikaire et al., 2011) have found that farmers’ access to the extension can enhance their access to technology learning and improved production inputs for being effective in risk management and efficiency in farm production. Implying, that the fruit producers deprived of access to extension workers are more vulnerable for being more risk-averse. Also, the descriptive result revealed that majority of the farmers have no access to formal credit services (82.35%), the empirical results of various studies have shown that imperfect credit markets result in influencing farmers’ demand for agricultural inputs and crop insurance (e.g., Binswanger-Mkhize, 2012; Giné et al., 2008; Karlan et al., 2014; Farrin and Miranda, 2013).

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Frequency (n= 85)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;20</td>
<td>6</td>
<td>7.06</td>
</tr>
<tr>
<td>20-40</td>
<td>45</td>
<td>52.94</td>
</tr>
<tr>
<td>&gt;40</td>
<td>34</td>
<td>40</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>35</td>
<td>41.18</td>
</tr>
<tr>
<td>Primary</td>
<td>28</td>
<td>32.94</td>
</tr>
<tr>
<td>Secondary</td>
<td>20</td>
<td>23.53</td>
</tr>
<tr>
<td>Tertiary</td>
<td>2</td>
<td>2.35</td>
</tr>
<tr>
<td>Experience in farming</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 5 years</td>
<td>22</td>
<td>25.88</td>
</tr>
<tr>
<td>Between 11 to 15</td>
<td>45</td>
<td>52.94</td>
</tr>
<tr>
<td>More than 15</td>
<td>18</td>
<td>21.18</td>
</tr>
<tr>
<td>Membership in a cooperative</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>49</td>
<td>57.65</td>
</tr>
<tr>
<td>Yes</td>
<td>36</td>
<td>42.35</td>
</tr>
<tr>
<td>Access to extension services</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>65</td>
<td>76.47</td>
</tr>
<tr>
<td>Yes</td>
<td>20</td>
<td>23.53</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>4</td>
<td>4.71</td>
</tr>
<tr>
<td>Male</td>
<td>81</td>
<td>95.29</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>12</td>
<td>14.12</td>
</tr>
<tr>
<td>Marriage</td>
<td>73</td>
<td>85.88</td>
</tr>
<tr>
<td>Experience with risk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>30</td>
<td>35.29</td>
</tr>
<tr>
<td>Mild</td>
<td>38</td>
<td>44.71</td>
</tr>
<tr>
<td>Severe</td>
<td>17</td>
<td>20</td>
</tr>
<tr>
<td>House hold size</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equal to 8 or less</td>
<td>22</td>
<td>25.88</td>
</tr>
<tr>
<td>More than 8 person</td>
<td>63</td>
<td>74.12</td>
</tr>
<tr>
<td>Access to credit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>70</td>
<td>82.35</td>
</tr>
<tr>
<td>Yes</td>
<td>15</td>
<td>17.65</td>
</tr>
<tr>
<td>Total</td>
<td>85</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Field survey data, 2020
3.2. RESULT AND DISCUSSION

This study was employed to provide the baseline information regarding farmers’ attitudes toward risk and uncertainty in apple production. Table 4 shows the summary statistics for the risk version levels in the risk behavioral model. The findings show that 55.29% of the respondents are risk-averse. Indeed, the result reaffirms the generally accepted statement that most of the farmers are risk-averse in their daily decisions; also, the result is consistent with that of the empirical results of various studies (Adubi, and Ramasamy, 2001; Shahabuddin et al 1986). Furthermore, the risk-averse attitude of farmers reveals that they are not willing to utilize any opportunity associated with any kind of risk and uncertainty. Moreover, the remained 27.06% of respondents are risk prefer, and less proportion of the respondents are found to be risk-neutral (17.65%).

Table 2: Status of the respondents by risk preferences

<table>
<thead>
<tr>
<th>Category</th>
<th>Risk aversion index</th>
<th>Frequency (n=85)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk averse</td>
<td>&lt;1</td>
<td>47</td>
<td>55.29</td>
</tr>
<tr>
<td>Risk indifferent</td>
<td>1</td>
<td>15</td>
<td>17.65</td>
</tr>
<tr>
<td>Risk preferring</td>
<td>&gt;1</td>
<td>23</td>
<td>27.06</td>
</tr>
</tbody>
</table>

Source: Computed from field survey, 2020

Estimates for regressing the socioeconomic variables one farmers’ risk attitudes are reported in table 5. The R2 value exhibited that 64% of the variation in farmer risk attitudes was explained with the explanatory variables given in the study model for the analysis purpose. The rest of the variation is due to the independent variables which are not included in the study model, known as the error term. Also, the F-statistic is significant at the alpha level of 1%, implying that all of the explanatory variables have a joint impact on the explained variable. The socioeconomic variables that include apple production, farm household head age, education level, farming experience, gender, experience with risk, off-farm income, and extension work are found to be significant in explaining farmers’ risk attitudes. According to the result, the age of the household head is varying inversely with the attitudes toward risk, indicating that the higher the age of the farmer, the less risk-averse he/she will be. Indeed, older farmers are well acquainted with risk; hence they have accumulated more wealth and it can assist them to combat risk and lessen the negative effects of risk on their expected output (Aye and Oji, 2007). Also, older farmers are more likely to have a strong social profile and social incentives that contribute them to develop a risk-prefer plan of action; the finding is consistent with that of Ullah et al. (2015), Dadzie and Acquah (2012), and Iqbal et al. (2016).

Although the coefficient sign of orchard size is positive, it is found to be insignificant revealing that not likely to influence farmers’ attitudes toward risk. The finding is contradictory with the study result of Foster and Rauser (1991), stating that the proportion of the cultivated area is inversely related to the farmer risk attitudes. The logic behind our result is the sufficient income generation for fulfilling farmer subsistence requirements; thus the marginal effects of income received from a cultivated area gradually decrease as income rises beyond the subsistence requirements of a farming household (Ayinde, 2008). The result showed that education is significant and varying inversely with farmers’ attitude toward risk, indicating that the higher the education level, the lower risk-averse is the farmer; furthermore, access to technical information on various sources of risk is directly attributed to the education level of farmers; hence an educated farmer can choose from a choice group strategies ensuring a confident return to the farm, the finding is consistent with the study result of Yesuf (2007). The coefficient of experience in farming is positive and significantly influencing farmers' risk attitudes, enlightening that apple growers with more experience are found to be more risk-averse compared to that of having less experience along with apple production. The study result is contradictory with the finding of Ayinde (2008) revealing that experience in farming is inversely related to the risk aversion behaviors of farmers. Furthermore, the dummy variable of gender is consistent with the prior sign expectation, a positive and significant relationship was found between gender and farmers' risk attitudes, implying that male farmers are more risk-prefer in comparison to their female counterpart, in line with the empirical findings of various studies such as Weber, Blais, and Betz 2002; Harris, Jenkins, and Glaser 2006; Byrnes, Miller, and Schafer 1999.
Off-farm income as a scale variable of the study had a positive and statistically significant impact on farmer risk preferences. Meaning that low off-farm decision-makers are more risk-averse compared to the higher off-farm income farmer. Furthermore, farmer with higher off-farm income has stronger risk bearing capability and less vulnerable from the negative effects of risk; consistent with the findings of Iqbal et al. (2016), and Lamb (2003), stating that the off-farm income and risk aversion coefficient is trading-off to each other, low off-farm income is associated with the higher risk aversion and vice versa. Access to extension services was inversely related to farmers’ risk attitudes; in line with the study findings of (Ayinde, O. E., 2008) revealing that the technical benefit from the extension work can increase the willingness of the farmer to take a further risk; and (Arce, 2010) it has a policy implication, that further extension contacts ought to be conducted to enhance farmers’ behaviors and potential for effective risk management.

**Table 3: Impact of socioeconomic determinants on farmers’ risk attitudes**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>9.231</td>
<td>-6.325*</td>
</tr>
<tr>
<td>Production</td>
<td>0.452</td>
<td>3.047**</td>
</tr>
<tr>
<td>Garden size</td>
<td>0.046</td>
<td>0.487</td>
</tr>
<tr>
<td>Age</td>
<td>0.234</td>
<td>2.341**</td>
</tr>
<tr>
<td>Education level</td>
<td>0.074</td>
<td>-3.403**</td>
</tr>
<tr>
<td>Experience (year)</td>
<td>0.212</td>
<td>2.480**</td>
</tr>
<tr>
<td>Membership in Coop.</td>
<td>0.087</td>
<td>1.265</td>
</tr>
<tr>
<td>Gender</td>
<td>0.402</td>
<td>3.450**</td>
</tr>
<tr>
<td>Marital status</td>
<td>0.205</td>
<td>0.030</td>
</tr>
<tr>
<td>Experience with risk</td>
<td>0.034</td>
<td>5.431*</td>
</tr>
<tr>
<td>Household Size</td>
<td>0.182</td>
<td>1.583</td>
</tr>
<tr>
<td>Off-farm income</td>
<td>0.342</td>
<td>2.378**</td>
</tr>
<tr>
<td>Access to Credit</td>
<td>0.451</td>
<td>0.673</td>
</tr>
<tr>
<td>Extension Agent</td>
<td>1.345</td>
<td>-2.507**</td>
</tr>
</tbody>
</table>

Source: computed based on field survey (2020)

***Significant at 1 %, **Significant at 5, *Significant at 10; %, R² = 0.643, F- value = 32.825

Despite risk is a widespread and unavoidable phenomenon in every business, it is distinctive in farming, mainly arising due to the unwanted weather conditions, the density of pests and diseases, production seasonality, production geographical dispersion, changing consumer behaviors (Ullah et al. 2015; McNeil et al. 2015), natural catastrophes (World Bank 2011), fluctuation in yields and their prices (Musser and Patrick 2002), and lack of financial facilities along with risk management strategies such as credit and insurance (Jain and Parshad 2006; Musser and Patrick 2002).

Figure 1 documented various sources of risk and farmers’ perception, in the study area. In this study, marketing, financial, political, environmental, and social uncertainties are considered as the main sources of risk that affect farmers’ daily decisions. It is worth noticing that, the term marketing used in this study involves the whole channel of apples possessing from the orchard to the final consumer, which includes transportation, storage, processing, selling and post-harvest management. Risk associate with marketing risk is perceived as highest and intensive by the respondents compared to the other sources of risk in the study area. Similar to the other landlocked developing countries, high transportation and marketing costs have isolated farmers from national and international markets across the country. Furthermore, the production and market risks are highly correlated to each other, and the degree of correlation is depending on the integrity of regional markets (Sadoulet and De Janvry, 1995). Moreover, market volatility introduces uncertainty into farm planning which makes it difficult to define the future pathway confidently; in the case, inefficient resource allocation can be expected (Ellis, 1998; Hazzel, 1998; and Ellis, 2000). Risk management instruments are documented by (Hartwich and Gandorfer, 2014) revealing that the risk instruments for fruit production are essentially subject to on-farm risk management tools (Deunick et al., 2008). From output price risk perspective, on-farm risk management instruments comprise marketing channels diversification (Mencarelli-Hofmann, 2009), proper fruit storage (Hirschauer and Mußhoff, 2012), prolongation of the fruitage period (Dierend et al., 2009) and products vending via reputable producer organizations (Steinborn and Bokelmann, 2007).

In the below figure 1, political risk is perceived by the farmers to be highest following the marketing risk. Political risk should not be underestimated, it is influencing various aspects of farmers’ performances throughout the nation and globe, especially in a landlocked developing country, such as Afghanistan. Political

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risk is mainly arising from the unsteadiness in government structures, strategies and policies; another related category with political risk is a sovereign risk, which takes place due to the not commitment of the foreign government to the mutual agreements on trading issues (Hardaker et al., 2004), such instance of transaction risk is occurring due to the opportunistic behavior of transacting partners and highly reliability on them (Dorward et al., 2007).

Agriculture is inherently risky, because a wide range of exogenous factors is affecting the vast farming area, the majority of such environmental factors are out of human control. Thereby, farmers perceived environmental risk as a cause of uncertainty in the study area. Considering the high degree of fluctuation associated with environmental phenomena adaptation to climate change is the environment-friendly option for the farmers to combat risk and decrease the vulnerability rate inversely impacting farmers’ output potential (Bradshaw et al., 2004). Such instance of environmental adaptation strategies includes but not limited to: diversification of crop varieties, planting in different points of time, proper irrigation, trees planting (Deressa et al. 2009; Bryan et al., 2009); soil conservation (Di Falco et al., 2011) and crop and livestock management practices (Nhachchena and Hassan ,2007). Moreover, Bryan et al. (2009), and Nhachchena and Hassan (2007) argued that firstly climate changes ought to be perceived by farmers, then chose appropriate individual adaptation strategies, purposively. Furthermore, the key determinants of the adaptation are identified including access to credit, markets, Information on climate change, access to fertile land, access to electricity and technology, and extension services Bryan et al. (2009); Nhachchena and Hassan (2007); Di Falco et al. (2011); Deressa et al., (2009). Moreover, risk arisen from exchange rates technically termed as currency risk are perceived to be very high in the study area; in addition, (Hardaker et al., 2004) argued that unpredictable exchange rates lead to currency risk.

Result of the multinomial logit model is shown in Table 7, documenting the effects of socioeconomic variables on farmers’ preferences. Risk-coping strategies assessed in the study include intercropping, off-farm employment, decrease in expenditures, participation in cooperative unions, post-harvest management, financial/credit reserve and no-coping strategy (reference or base category), these all are assessed based on the given socioeconomic characteristics of farmers.

According to the likelihood ratio, the $\chi^2$ statistics (1403.45) is highly significant at 1% alpha level, indicating that the socioeconomic variables has a joint impact on farmers coping strategies for effective risk management in the study area.

The finding is consistent with the prior sign expectation of this study, revealing that garden size is positive and significantly related to the selection of various risk-coping strategies. Pointing out, that larger farm size has easiness and other incentives for various types of technology adoption, which assist farmers in the selection of numerous strategies to combat risk. Besides, the age of the farming household head was directly related to risk-coping strategies; implying that older farmers are more likely, skillful, and capable in risk management. The result is consistent with the empirical findings of studies arrived by Esiobu et al., (2014), and Kwesi and de-grafts Acquah (2012) stating that most of the farmers in the age of 41 to 50 years have more probability to accept innovations, because they are technically efficient, and could bear the risk involved in the production process.
Table 4: Result of the Multinomial logit model on farmer risk-coping strategies and socioeconomic variables

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Intercropping</th>
<th>Off-farm employment</th>
<th>Decreasing in expenditures</th>
<th>Membership in unions (production/business)</th>
<th>Post-harvest management</th>
<th>financial/credit reserve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td>34.30**</td>
<td>15.11</td>
<td>-20.7**</td>
<td>10.43</td>
<td>8.0***</td>
<td>22.45</td>
</tr>
<tr>
<td>Garden size</td>
<td>15.12</td>
<td>0.23</td>
<td>19.12**</td>
<td>12.85</td>
<td>18.5***</td>
<td>11.1</td>
</tr>
<tr>
<td>Age</td>
<td>15.73**</td>
<td>20.10</td>
<td>15.73**</td>
<td>20.1</td>
<td>15.73**</td>
<td>20.1</td>
</tr>
<tr>
<td>Education level</td>
<td>15.76**</td>
<td>12.13</td>
<td>3.34</td>
<td>0.73</td>
<td>34.3***</td>
<td>13.11</td>
</tr>
<tr>
<td>Experience (year)</td>
<td>-13.34</td>
<td>17.20</td>
<td>18.46**</td>
<td>14.52</td>
<td>8.23</td>
<td>2.55</td>
</tr>
<tr>
<td>Membership coop.</td>
<td>25.3</td>
<td>1.92</td>
<td>15.73**</td>
<td>20.1</td>
<td>35.45**</td>
<td>6.01</td>
</tr>
<tr>
<td>Gender</td>
<td>15.67</td>
<td>0.62</td>
<td>28.2***</td>
<td>4.15</td>
<td>-24.12**</td>
<td>14.15</td>
</tr>
<tr>
<td>Marital status</td>
<td>-10.23**</td>
<td>24.11</td>
<td>16.1</td>
<td>2.11</td>
<td>18.20**</td>
<td>15.25</td>
</tr>
<tr>
<td>Risk experience</td>
<td>13.02**</td>
<td>3.43</td>
<td>38.12</td>
<td>2.13</td>
<td>20.76</td>
<td>0.43</td>
</tr>
<tr>
<td>Household size</td>
<td>12.53</td>
<td>2.25</td>
<td>70.23**</td>
<td>35.21</td>
<td>33.23</td>
<td>1.61</td>
</tr>
<tr>
<td>Off-farm income</td>
<td>32.15**</td>
<td>5.00</td>
<td>5.25</td>
<td>0.5</td>
<td>25.002</td>
<td>2.02</td>
</tr>
<tr>
<td>Access to credit</td>
<td>2.52</td>
<td>45.00</td>
<td>23.5</td>
<td>0.55</td>
<td>7.23</td>
<td>2.15</td>
</tr>
<tr>
<td>Extension agent</td>
<td>17.1***</td>
<td>13.20</td>
<td>-27.0**</td>
<td>17.05</td>
<td>5.06</td>
<td>0.6</td>
</tr>
</tbody>
</table>

Reference Category: No-risk coping strategy

Likelihood Ratio Chi-square ($\chi^2$): 1403.45
Pseudo R-Square: 79.064
Total Observation: 85

Source: Stata result from field survey, 2020

*Statistically significant at 10%; **statistically significant at 5%; *** statistically significant at 1%

Also, the study found Gender to be significantly related to farmers’ risk-coping strategies. Implicating that male farmer are more likely to use various option for effective risk management; the finding is identically in line with that of (Onubuogu et al., 2014) arguing that greater proportion of male farmer are technical efficient and productive because male farmers have tendency to be more labor efficient. The make-up of Afghan dominant culture also gives an advantage to the male farmer compared to the female ones on open access for choosing various options to manage the risk more effectively. Result, elucidated that education level of the household head had positive and significant impact on farmers’ risk-coping strategies. Educated farmer has stronger capability in comparison to that of the uneducated farmers in effective risk management, and mitigating the negative effects of risk. The result contributed by the empirical findings of Onubuogu and Esiobu (2014), and Nto et al., (2011) stating that educated farmer are more informative in adopting technology and increasing farm yield.

Farming experience and experience with risk had positive relationship along with all the risk-coping strategies. The result is in line with the finding of Nto et al., (2014), that expert farmers are more likely to hand-picked various risk coping strategies for effective risk management. Our study result revealed that access to credit and extension work was positive and significantly related to choosing the risk-coping strategies for handling and securing financial returns to the farm.


4. CONCLUSION

In this study, we used risk behavioral model, and logistic regression analysis to examine the apple grower preferences toward risk and its determinants on a district level. The study revealed that majority of farmers in the study area are risk-averse and most of the farmers have severely experienced risk in the apple production. Moreover, result of the regression analysis found that production, age, education level, experience in farming, experience with risk, off-farm income and access to extension services are the main determinants of farmers’ risk attitudes. Also, marketing, political, environmental and currency exchange risks are the main sources of risk from farmers’ perspectives. The result of multinomial logit model, showed that the strategies used to combat the negative effects of risk include intercropping, off-farm employment, decrease in expenditures, participation in cooperative union, post-harvest management, and financial reserve. Risk and uncertainty in the apples production is highly associated with limited access to fair inputs and outputs markets, complicated and expensive financial services, inadequate access to valid information sources, and limited access to extension work. Therefore, the study has policy implications, it can be humbly suggested to the ministry of agriculture, irrigation and livestock on subsidizing farmers to improve their participation in the national and regional markets; furthermore, enhancement in the financial, information and extension services can assist farmers to lessen the negative effects of risk on the expected output; eventually it all could lead to proper implementation of the rural development programs and livelihood prosperity of farming families.

5. REFERENCES


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A Conflict between Manliness and Motherliness: A Study on Robert Frost’s “Home Burial”

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I. INTRODUCTION

Creating new knowledge from renowned pieces of literature has always been challenging since they are researched with various individual perspectives by every passing second. Given the consideration of Robert Frost’s Home Burial, it is not an exaggeration to mention that it has also no exception with regards to the above claim. But still, it is quite clear that the poem could sail more longer as it has not been much viewed from the viewpoint that this paper addresses; a conflict between manliness and motherliness. These two have been a topic of academic debate in the history of literary studies in which each was separately taken into consideration within one piece of literature. For instance, this can be minutely examined in the poem of “Refugee Mother and Child” by Chinua Achebe for which motherliness has been the base. Home Burial is promising and appealing as both manliness and motherliness meet on one platform in which two seems to be contradictorily fighting each other.

II. MOTHERLINESS IN HOME BURIAL

Unbearable life long pain of a mother at her child’s death has been depicted all over the poem through a careful choice of words that indeed serves the poet’s intention. Evidence could be observed to point out that the poet has thought of the deepness of motherliness in creating the diction.

Blind creature; and awhile he didn’t see.

Above is one of the finest examples to witness how appropriately Frost has used the diction to convey the theme of motherliness. The sixteenth line of the poem starts with an unexpected application of a couple of words especially in a context where the relationship between husband and wife is emphasized. No husband in the universe would have ever thought that he would be called as ‘Blind creature’ by her wife. No wife in the universe would have ever meant to call her husband as ‘Blind creature’. It is the mother’s love that desperately made this woman to speak her husband in a such way since she is almost collapsed (into dust) as the death of her child. After a full comprehensive reading of the poem, one could sense that this mother is on a wrong judgment in which her husband doesn’t feel the pain of the loss of their child rather he is back to normalcy. The word ‘creature’ suggests more of the meaning of insane or animal. For her, the husband is animal as he has not noticed the burial through the window frame until the moment she shows it to him. She considers it as complete blindness which is not accepted by any means as a mother. Her point of view, in this case, is that if she has been seeing it throughout why he has not been able to do so all these days. Therefore it is evident that motherliness comes above all here even above fatherliness by bringing out the term ‘Blind creature.’ As a punishment for not noticing the burial of their beloved child, she being annoyed uses the above term. The harshness of the term symbolizes how much she loves her lost child and it is up to the readers to understand that she doesn’t have any other sort of anger with her husband. The same concept elaborated in this paragraph can be evident in the following lines of the poem as well.

➢ Can’t a man speak of his own child he’s lost?
➢ ‘Not you! Oh, where’s my hat? Oh, I don’t need it!’
➢ ‘You can’t because you don’t know how to speak.

III. OPERATION OF MANLINESS AND FAMILY LIFE IN HOME BURIAL

The world is a beautiful place because of its inequality. Even though there is a universal notion that many things are equal, the survival of the world and its splendor is driven by inequality. This inequality can be found out everywhere. Since the concept of inequality is everywhere, there have been long rivalries among human beings to defeat one another on many occasions. In the human case, the major physical and biological inequality is sex. From their birth itself, they have the deference of man and woman, and gender-wise it is considered as male and female. Under this fundamental division, interpreting the lifestyle of human beings is a complex task. The difference between man and woman appears in human society by various kinds of forms. Among those, boy and girl, boyfriend and girlfriend, brother and sister, mother and father are some major forms of the inequality of man and woman. The relationship between husband and wife takes a prominent place in society among these human relationships. It is very important to understand how the factor of man and woman is being operated by the characters of husband and wife under the context of the home.

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Robert Frost, one of the great American poets, has considered this human obligation in his poem “Home Burial”. Even though they are human beings, biologically and psychologically they have the deference of man and woman and when it comes to the topic of home, they are husband and wife. Two different human beings have got together under one home. Then the rivalry creates ceaselessly. Most probably this is a psychological one and sometimes it may be physical. When husband psychologically outmaneuvers wife, she doesn’t bear it and when wife psychologically outmaneuvers husband, he doesn’t tolerate it. So, the rivalry happens between husband and wife. Robert Frost has realized this reality and readers are given a psychological analysis for that by the poem of Home Burial. Not only he has enjoyed the poem but also he has drawn a superb picture of how the husband and wife relationship should be maintained in the context of the home. The poet expects a home to be a place where mutual understanding is shared by the husband and wife by the name of emotional bounds. Mutual understanding of husband and wife is all about an emotional understanding because human beings are the beings who are having emotions and feelings rather than any other animal in the universe. Understanding the emotions and feelings of these two is the best pathway to better marriage life.

Henceforth, Robert Frost’s Home Burial is a business of human emotions and it is maintained in the home. Frost touches the core sense of the poem very beautifully by its title itself. Home and Burial are two contrast words and they have extremely two different meanings. Though they have two separate meanings, the poet has put them together and then he has tried to generate new meaning for those two words by summarizing the full poem into two words. The word home is totally different from the word house. It’s because a house is a structure of materials like bricks, sand, cement, etc. It is just a building. Once it is filled with emotions it will become a home. Hence in the case of a home, we might definitely have emotions and feelings. That is why people feel free when they are in their homes. Once people lost their emotions in the home it will automatically be a house. Therefore home is nothing but emotions and it is a happy place.

Burial is the place where people are buried after they died. So, the meaning of this word is sad or unhappy. But the topic of the poem is Home Burial. According to the meaning analysis, it would be a place like a house where the emotions have been lost. That is why the poet has given the name for it as a home burial. So, even if it is a home it is a burial. So home must be a place with full of emotions. The poet begins the poem as following, He saw her from the bottom of the stairs

Frost makes the foundation for his intention with a very beautiful image and first of all, HE and SHE or husband and wife appears in the first line of the poem. When the reader reads this from the bottom of the stairs a kind of visualization is created in his mind; a very lavish people, comfortable lives, and a high-class family. Because of word stairs, people tend to think like that. Here the poet says that the husband is at the bottom of the stairs and wife is on the top of the stairs. Physically they are not at the same level. The wife is in an upper position and the husband is in a lower position. Even though Frost has created a physical visualization for this incident it implies a hidden meaning which has a value of thousand words. He expresses the psychological side of this incident and says that even though husband and wife are human beings, they have the inequality of man and woman. So, the way of thinking of husband and wife is different. That is normal and natural. That is the nature of the world. So, mentally or psychologically they have a difference. This difference has been drafted by the phrase from the bottom of the stairs. In this house, there is a gap between husband and wife. It is a problem of emotions. In the case of the house, this gap must be maintained at a lower level because it leads to a better home and a better family life. Though there are always gaps between husband and wife they must negotiate all those things by having talking or discussions. Otherwise definitely home is a house and husband and wife lead to two sides. This conflict has been replicated by this poem.

Negotiation is essential at home. It is because the ego of human beings is different from one another. Once somebody’s ego is in the up, the ego of the other one must be in a lower position. They must be able to negotiate with a particular position. This is the psychological side of the relationship between husband and wife.

Looking back over her shoulder at some fear. She took a doubtful step and then undid it

She is about to put the first step to get down to the stairs. But she looks back with fear. Here, fear is the first emotion. When one has a fear behind him or her, he or she used to go forward or run. But she again looks back towards the fear and even she undid the step which she put. That is also with a doubtful observation. Behind all these scenes her husband is in front of her. So he may be the worst fearful thing to her. But in the home, this should not happen. Husband and wife should not live in fear of each other in a happy relief home. If it is a home emotional bondage should be shared depend on respect and in the heartiest way. It shouldn’t maintain with fear. If the wife respects the husband as the fear that is not a home. In the home always emotional bondage is appreciated in the first place.

He spoke
Advancing toward her: “What is it you see?” From up there always? -- for I want to know.” She turned and sank upon her skirts at that, “I will find out now—you must tell me, dear.”

The concept of male dominance has spread all over human society. It is an ongoing problem in the home also. Man is the power of the home in many countries of the world and everything is under his observation and ruling. He tries to spread his dominance on his wife in the relationship between husband and wife also. Sometimes this scatters their marriage life. The poet above uses the phrases Advancing toward her: “What is it you see?” From up there always? -- for I want to know and “I will find out how—you must tell me, dear.” to implies the male dominance inside the home. He has broken the rule of punctuation marks in From up there always? -- for I want to know” to emphasize the more attention and power on male dominancy. So, the husband must be able to double think about the male dominance in an ideal home and still he shouldn’t be able to think about his own wife as his servant. He must respect her for the sake of an emotional bond. If it is so, that home will be home forever. And of course, once the husband asks something from wife, the wife would be able to give
feedback for that. At least a simple gesture is enough since it is an emotional bond. But this wife does,

*She turned and sank upon her skirts at that,*

She doesn’t care about her husband. If things continue like this, this home will be a hell. The wife also must have a willingness to negotiate. At least listening to her husband is enough. In this stanza, considering the ego of the husband is very important. This kind of ego flexibility is needed for our typical home also. Continuously his wife doesn’t care about him and he doesn’t get angry and his ego is getting lower and lower. It is well expressed in these lines.

*“What is it you see?”*  
*From up there always? -- for I want to know”*  
(two harsh questions)

*“What is it you see?”*  
(One question)

*I will find out now—you must tell me, dear.”*  
(Even though the question is hard, dear is used at the end)

It is clearly observed that his harshness is getting lower and lower. The first one is a couple of tough questions for the wife. Then the second one is another question. But that is not a harder one rather than the earlier one. Then, in the end, he has used dear. Still, emotional bondage between this husband and wife is alive. The husband is ready to negotiate step by step. But the wife doesn’t refuse him any help.

So, the home which is in Frost’s mind is a paradise of ego flexibility. Once the husband gets angry wife should tolerate and once the wife gets angry husband should be able to tolerate it. If both are against them at the same time it will not be a home furthermore. The flexibility is very much needed for a happy home. When the emotions are not balanced inside the home it will become a house.

*“You don’t, she challenged. “Tell me what it is.””*

Earlier he was kept on asking questions from her but she doesn’t give any answer. But when she asks a question, he replies for it. Even she challenged him. How bad she is? This wife doesn’t try to balance her emotions with her husband. Then only the question is solved. The emotional bond of the home is linked together. Here, it is reversed. That is what it was given the name of Home Burial. By the poem Home Burial, Robert Frost expresses the most essential element of a marriage life or a happy home as follows.

*So small the window frames the whole of it.  
Not so much larger than a bedroom, is it?*

Not only in a happy home but also this is the philosophy of life. The nature of the human being is, interpreting the things and events by having only one direction. Life is seen by the people through only one frame. This one angle or direction is equal to a window frame. But the poet says that that is not everything. People might be in trouble when they see all their life through a single-window frame. So, their vision should be broadened. In a happy home also wife must not think about his husbands in negative ways by depending on one or two incidents. That may not be everything (*the window frames the whole of it*). In this poem also such a wrong understanding is seen.

*She saw you from that very window there,*

She suspects his husband on her own child’s burial. Behind this suspicion, she doesn’t have clear evidence that he buried the child’s body. Based on very few minor chances she thinks like that. The husband and wife must think about them with a wide vision. When there are problems and doubts between husband and wife, the best thing is to solve the problems by compromising. Ego flexibility is much needed for compromising.

*“There is something I should like to ask you, dear.”*  
*“You don’t know how to ask it.”*  
*“Help me, then.”*

The husband is always ready to compromise in this home. Ego flexibility is they’re always in his side and from the wife’s side, it doesn’t exist. In a happy and peaceful home, this mustn’t be maintained and once one is ready to compromise at least others must listen to the other. But this wife is not like that. That also happens because of an emotional problem where he is suspected to her own child burial. The husband and wife relationship must be followed by a win-win situation. It is something like a bargaining process. Both of them must be equal in some point and there they might have the compromising. When the compromising is done it is a happy and peaceful home.

*A man must partly give up being a man  
With womenfolk."

Here again, the poet has shown that when the husband deals with his wife he must be a soft-hearted person with a lack of male dominance.

*Two that don’t love can’t live together without them.  
But two that do can’t live together with them.”*

If the husband and wife love each other, their home will be heaven. If it is not they are unable to live together. Love to one another is the basic building block of a happy home. As a fundamental fact, it is very important to mention that the male dominance of the husband will destroy the happiness of family life.

*You won’t go now. You are crying. Close the door.  

*Therefore, this is the problem between husband and wife. The husband always comes first before his wife and he wants control always her life. That is also being done by force. The wife doesn’t tolerate this tendency and it will create more and more quarrels between them. For a happy home, quarrels are not positive.*

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**REFERENCES**


AUTHORS

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Evaluation of Occupational Safety and Health Practices by LPG Cylinder Retailers in Kiambu County, Kenya.

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\url{http://dx.doi.org/10.29322/IJSRP.10.07.2020.p10368}

Abstract- The study aimed at examining the current OSH practices by Lpg cylinder retailers in Kiambu County. Stratified purposive sampling was employed; raw data collected through observation, use of interview schedules, and analyzed using SPSS ver.25. It was established that 71\% of the respondents did not employ safe OSH practices in their operations. The association of cylinder handling and education level of the respondents was statistically significant at 95\% confidence level with $X^2 (df=2) =14.193$, since $p<.001$. It was ascertained that 29.2\% and 46.7\% of the 13kg and 6kg cylinders respectively were non-conforming regarding weight measurements and non-destructive testing. Ignorance and lack of training and sensitization on Lpg safety were key challenges hindering application of good OSH practices. The study recommends routine inspections and compliance monitoring, by EPRA, in all Lpg retail centers. Moreover, engineering breakthroughs should be sought after in Lpg cylinder safety advancement.

Index Terms- Lpg cylinder safety, OSH, Retailers, EPRA

I. INTRODUCTION

Liquefied petroleum gas (Lpg) cylinder retailers face the risk of serious injury or death while undertaking the retailing activities. The risk may also spill over to consumers. There is, therefore, a need for providing simple, practical advice on eliminating /reducing the risks associated with retailing of Lpg in cylinders. For this to be effectuated, the situation on the ground must be well understood. This then necessitated a study on the current occupational safety and health (OSH) practices, and challenges Impeding the application of good OSH practices in this trade, with an overall aim of promoting a positive safety culture.

II. MATERIALS AND METHODS

2.1. Study design

The study employed descriptive and diagnostic research designs. Descriptive research studies are concerned with describing the characteristics of an individual or group: This was employed to capture and describe the various OSH practices by the lpg cylinder retailers at their workplaces. Diagnostic research studies determine the frequency with which something occurs or its association with something else. (Kothari, 2004). This was employed during the lpg cylinder measurements and non-destructive cylinder testing.

2.2. Study area and population

The study area was Kiambu County, one of the 47 counties in the Republic of Kenya. It is in the central region and covers a total area of 2,543.5 Km\textsuperscript{2}. (County Government of Kiambu, 2015). The county has various urban centres namely: Thika, Juja, Ruiru Gatundu, Kiambu, Kikuyu, Karuri, and Limuru towns. (Kiambu County annual development plan, 2017). The study population comprised of 400 Lpg cylinder retailers undertaking the Lpg cylinder retail business, sampled from the selected study sites during the data collection period. (November, 2018 to February, 2019).

2.3 Sampling method

Stratified purposive sampling was employed. Thika, Limuru, and Kiambu towns were purposively selected from the population strata. The study sites were arrived at after taking into consideration the budget, time, personnel, and other resource limitations.

2.4 Sample size determination

Using the population in 2.2 above, the sample size was determined using the Barlett et al. sample size determination table. With the data being categorical, a selected margin of error of 0.05, a standard variate value of 1.96 at 95\% confidence level and a recommended population proportion of 0.50; the sample size determination table gives the sample size to use for the given population of 200 retailers in Thika town, 100 retailers in Kiambu town and 100 retailers in Limuru town to be 132, 80 and 80 respectively. (Bartlett et al., 2001)
2.5. Research instruments
The measurement tools designed to obtain data from the research subjects were observation and interview schedules. Measurements and non-destructive tests were also undertaken where applicable.

2.6. Pilot testing
A pre-test was carried out in Kenyatta Road, to measure the validity and reliability of the research instruments. The pre-test targeted a sample size of 5 respondents in which all of them responded to the research instruments.

2.7. Data processing and analysis
Raw data from the field was coded, classified, checked for errors, and summarised. Thereupon, the data was analyzed using SPSS version 25, and Microsoft excel version 2019. Results of data analysis were organized and presented in the form of tables, pie charts, and bar graphs.

2.8 Ethical consideration
Respondents in the study had detailed information about the aim and objectives of the study. Permission to carry out the study was first sought from the university, then respondents in the select study sites. Confidentiality of the respondents was protected in that no names or personal information was required in the applicable research instrument, and no coercion or undue influence was exercised.

III. RESULTS AND DISCUSSION
3.1 Current Occupational safety and health practices
The observations were made under natural conditions and findings presented below. Details of the cylinder brand owners and respondents were withheld for the protection of the dignity of the subjects, respect for anonymity, and confidentiality.

![Figure 1: Current occupational safety and health practices in LPG cylinder retail business](image-url)
Table 1: Association between respondents' demographics and housekeeping.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>Housekeeping properly done.</th>
<th></th>
<th>Chi-Square</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>Yes</td>
<td>Chi-Square</td>
</tr>
<tr>
<td>Gender</td>
<td>Male</td>
<td>69%</td>
<td>31%</td>
<td>$X^2=3.816 , df=1 , p=.051$</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>55%</td>
<td>45%</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>18-30 years</td>
<td>68%</td>
<td>32%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>31-40 years</td>
<td>71%</td>
<td>29%</td>
<td>$X^2=7.268, df=2, p=.026$</td>
</tr>
<tr>
<td></td>
<td>&gt; 40 years</td>
<td>49%</td>
<td>51%</td>
<td></td>
</tr>
<tr>
<td>Education level</td>
<td>primary</td>
<td>66%</td>
<td>34%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Secondary</td>
<td>63%</td>
<td>37%</td>
<td>$X^2=3.479 , df=2 , p=.176$</td>
</tr>
<tr>
<td></td>
<td>Tertiary</td>
<td>75%</td>
<td>25%</td>
<td></td>
</tr>
<tr>
<td>Lpg retailing experience</td>
<td>&lt; 5 years</td>
<td>74%</td>
<td>26%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6-10 years</td>
<td>59%</td>
<td>41%</td>
<td>$X^2=17.303 , df=2 , p=&lt;.001$</td>
</tr>
<tr>
<td></td>
<td>&gt; 10 years</td>
<td>66%</td>
<td>34%</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Association between respondents' demographics and cylinder storage.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>Cylinder storage in a safe manner</th>
<th></th>
<th>Chi-Square</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>Yes</td>
<td>Chi-Square</td>
</tr>
<tr>
<td>Gender</td>
<td>Male</td>
<td>67%</td>
<td>33%</td>
<td>$X^2=0.107 , df=1 , p=.744$</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>70%</td>
<td>30%</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>18-30 years</td>
<td>64%</td>
<td>36%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>31-40 years</td>
<td>78%</td>
<td>22%</td>
<td>$X^2=16.755 , df=2, p=.001$</td>
</tr>
<tr>
<td></td>
<td>&gt; 40 years</td>
<td>47%</td>
<td>53%</td>
<td></td>
</tr>
<tr>
<td>Education level</td>
<td>primary</td>
<td>66%</td>
<td>34%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Secondary</td>
<td>66%</td>
<td>34%</td>
<td>$X^2=1.543 , df=2 , p=.462$</td>
</tr>
<tr>
<td></td>
<td>Tertiary</td>
<td>74%</td>
<td>26%</td>
<td></td>
</tr>
<tr>
<td>Lpg retailing experience</td>
<td>&lt; 5 years</td>
<td>79%</td>
<td>21%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6-10 years</td>
<td>51%</td>
<td>49%</td>
<td>$X^2=27.110 , df=2 , p=.001$</td>
</tr>
<tr>
<td></td>
<td>&gt; 10 years</td>
<td>48%</td>
<td>52%</td>
<td></td>
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</tbody>
</table>
### Table 3: Association between respondents' demographics and cylinder handling.

<table>
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<tr>
<th>Variable</th>
<th>Category</th>
<th>Cylinder handling in a safe manner</th>
<th>No</th>
<th>Yes</th>
<th>Chi-Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male</td>
<td>69%</td>
<td>31%</td>
<td>X²=7.731 df=1, p=.005</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>88%</td>
<td>12%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>18-30 years</td>
<td>59%</td>
<td>41%</td>
<td>X²=17.471 df=2, p=&lt;.001</td>
<td></td>
</tr>
<tr>
<td></td>
<td>31-40 years</td>
<td>81%</td>
<td>19%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 40 years</td>
<td>84%</td>
<td>16%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education level</td>
<td>primary</td>
<td>58%</td>
<td>42%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Secondary</td>
<td>74%</td>
<td>26%</td>
<td>X²=14.193 df=2, p=.001</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tertiary</td>
<td>86%</td>
<td>14%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lpg retailing experience</td>
<td>&lt; 5 years</td>
<td>81%</td>
<td>19%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6-10 years</td>
<td>56%</td>
<td>44%</td>
<td>X²=19.459 df=2, p=&lt;.001</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 10 years</td>
<td>76%</td>
<td>24%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 4: Association between respondents' demographics and cylinder transportation.

<table>
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<tr>
<th>Variable</th>
<th>Category</th>
<th>Cylinders transported in a safe manner</th>
<th>No</th>
<th>Yes</th>
<th>Chi-Square</th>
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<tr>
<td>Gender</td>
<td>Male</td>
<td>77%</td>
<td>23%</td>
<td>X²=5.465 df=1, p=.019</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>91%</td>
<td>9%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>18-30 years</td>
<td>79%</td>
<td>21%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>31-40 years</td>
<td>80%</td>
<td>20%</td>
<td>X²=0.100 df=2, p=.951</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 40 years</td>
<td>81%</td>
<td>19%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education level</td>
<td>primary</td>
<td>80%</td>
<td>20%</td>
<td></td>
<td></td>
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<td></td>
<td>Secondary</td>
<td>73%</td>
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<td>Tertiary</td>
<td>94%</td>
<td>6%</td>
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<td>Lpg retailing experience</td>
<td>&lt; 5 years</td>
<td>89%</td>
<td>11%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6-10 years</td>
<td>66%</td>
<td>34%</td>
<td>X²=23.685 df=2, p=&lt;.001</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 10 years</td>
<td>67%</td>
<td>33%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3.2 Cylinder Branding

Unbranded Lpg cylinders may be a likely indication of illegal gas filling as no registered brand owner will circulate their gas in the market in an unbranded cylinder.

3.3 EPRA Licensing

Figure 2: Cylinder branding

Figure 3: EPRA Licensing
### 3.4 Lpg cylinder filling and Non-destructive testing

**Table 5: 6Kg cylinder weight measurements and leak test.**

<table>
<thead>
<tr>
<th>Cylinder Code</th>
<th>Site</th>
<th>Tare Weight (Kg)</th>
<th>Measured Gross Weight (Kg)</th>
<th>Lpg Weight (Kg)</th>
<th>Leak</th>
<th>No leak</th>
<th>Conforms</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>6C1</td>
<td>T1</td>
<td>8.6</td>
<td>14.9</td>
<td>6.3</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>OF</td>
</tr>
<tr>
<td>6C2</td>
<td>T2</td>
<td>7.8</td>
<td>14.0</td>
<td>6.2</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>N/A</td>
</tr>
<tr>
<td>6C3</td>
<td>T3</td>
<td>8.0</td>
<td>14.1</td>
<td>6.1</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>N/A</td>
</tr>
<tr>
<td>6C4</td>
<td>T4</td>
<td>8.5</td>
<td>14.8</td>
<td>6.3</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>OF</td>
</tr>
<tr>
<td>6C5</td>
<td>T5</td>
<td>8.0</td>
<td>14.3</td>
<td>6.3</td>
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<td>Yes</td>
<td>No</td>
<td>OF</td>
</tr>
<tr>
<td>6C6</td>
<td>T6</td>
<td>8.4</td>
<td>14.6</td>
<td>6.2</td>
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<td>Yes</td>
<td>Yes</td>
<td>OF</td>
</tr>
<tr>
<td>6C7</td>
<td>T7</td>
<td>8.3</td>
<td>14.7</td>
<td>6.4</td>
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<td>Yes</td>
<td>No</td>
<td>OF</td>
</tr>
<tr>
<td>6C8</td>
<td>T8</td>
<td>8.0</td>
<td>14.1</td>
<td>6.1</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>L</td>
</tr>
<tr>
<td>6C9</td>
<td>T9</td>
<td>8.3</td>
<td>14.1</td>
<td>5.8</td>
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<td>5.8</td>
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<td>No</td>
<td>UF</td>
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<td>T13</td>
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<td>14.6</td>
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<tr>
<td>6C14</td>
<td>T14</td>
<td>9.2</td>
<td>15.4</td>
<td>6.2</td>
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| SD           | 0.33415 | 0.3995 | 0.33235 |
Table 6: 13Kg cylinder weight measurements and leak test.

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<th>Cylinder Code</th>
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<th>Measured Gross Weight (Kg)</th>
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**LEGEND**

N/A Not Applicable
UF Underfilled
L Leakage
OF Overfilled

*Tolerance: +0.2Kg.*
3.5 Overall LPG cylinder conformity Based on Measurements and Non-destructive tests

![Figure 4: Overall LPG cylinder conformity](image)

3.6 Challenges to good occupational safety and health practices

![Figure 5: Challenges to good occupational safety and health practices](image)

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IV. DISCUSSION AND CONCLUSION

The study established that 71% of the Lpg cylinder retailers do not employ safe occupational safety and health practices in their Lpg retail operations—very worrying indeed. At the same time, 16.7% of the 6Kg cylinders were found to be leaking from the valve. Leaks from the valve area maybe a likely indication of tampering with the valves during illegal gas refilling. 40% of the 6Kg cylinders were not conforming with regards to cylinder filling. Additionally, 8.3% of the 13Kg cylinders were as well found to be leaking from the valve. Similarly, 12.5% of the 13Kg cylinders were not conforming with respect to cylinder filling.

Overfilling of cylinders is unlikely to be done deliberately and a likely indication of faulty or poorly calibrated filling equipment. Underfilling of Lpg cylinders is most probably a deliberate act, which is disadvantageous to consumers as they don’t get value for their money. In line with the consumer protection act of 2012, the customer should receive all the product purchased (World LPG Association, 2015)

The main challenges that hindered compliance with occupational safety and health requirements were ignorance, lack of awareness on the importance of safety in the lpg retail business, lack of pieces of training and sensitization on lpg safety, and the high costs associated with lpg safety enhancement.

The researcher recommends that the Energy and Petroleum Regulatory Authority (EPRA) should keep an up to date online register of licensed Lpg retailers, that is accessible to the public. The authority should also undertake routine inspections and compliance monitoring in all lpg retail centers. Lpg retailers should develop clear and simple safety policy guidelines, by consulting approved persons by the Directorate of Occupational Safety and Health Services (DOSHs), that will help ease the understanding of the safety requirements and consequently improve compliance. Besides, engineering breakthroughs should be sought after Lpg cylinder safety advancement.

REFERENCES


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Biodiversity Disruption

Ali Farag Alznad

Phd, Candidate

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Abstract - Human impact on the environment has multiple effects most of them are unpredictable. All problems of the disturbed environment are by their nature predominantly ecological and, in essence, they represent a violation of the ecological paradigm of the functioning of life on Earth. Man on Earth today can cause a biological catastrophe at any moment, it can lead to the extinction of organic species. The demographic explosion of populations from the end of the 20th century, accompanied by an enormous increase in resource consumption, gave human destructiveness a completely new dimension.

Index Terms - Human, Environment, Biological, Ecological.

I. INTRODUCTION

Species extinction is, from an evolutionary and biological point of view, a normal process. However, what we will face in the coming years are not such natural evolutionary changes in the composition of the living world, but the mass and irreversible destruction of the living world by man. This alarming rate of extinction of organic species becoming the main global or biological problem. The destruction of an increasing number of organic species is directly related to the destruction of their habitats.

Organic species are carriers of a specific combination of genes (each species is an original and unique form of life) and specific functions in certain ecosystems, and their anthropogenically conditioned extinction or endangerment actually represents the most direct reduction of the total biodiversity of the Earth.

II. IMPORTANCE OF BIODIVERSITY

We discover the importance of biodiversity in the fact that the totality of all life forms on Earth is a much more complex phenomenon than the total sum of individual organic species. Biodiversity as a phenomenon includes the diversity of ecological interactions. The diversity of ecological relationships have been established between different species over many years and form the basis of existence, complexity, stability, and functioning of each individual ecosystem, biome or biosphere as a whole, as well as the survival, future and evolution of every organic species, including the species Homo sapiens. Without biodiversity there are no biogeochemical cycles and oxygen production, no ecosystem functioning, no photosynthesis or decomposition of organic matter.

Preserved biodiversity contributes to climate regulation, reduces the effect of greenhouse gases, maintains air and water quality, acts as a drought and flood controller ... Biodiversity provides us with life support systems, and the entire evolution of Homo sapiens species, and thus human civilization in general, is related to the use of a wide range of biological resources. Biodiversity increases the resistance of physical and biological systems to changing conditions environment and climate change, because genetically rich populations and ecosystems are rich species have a greater potential for adaptation. Ecosystem builds resilience on bases of following characteristics: the ability to resist change (ecosystem stability) and the ability to adapt to changes (ecosystem elasticity) in a way that still retains the same structural and functional characteristics, or to reorganize and establish a new structural and functional status.

III. ECOSYSTEM DIVERSITY

Ecosystem diversity represents the total diversity of habitats (biotopes) and living communities (biocenoses) connected into a higher order - ecosystem (geoecocenosis), as well as all complex ecological processes that achieve the unity and functionality of biotopes and biocenoses integrated into ecosystems.

On Earth today, we recognize numerous and diverse ecosystems of lakes, bogs, swamps, rivers, streams, seas, coral reefs, deserts, steppes, savannas, meadows, pastures, thickets, deciduous and coniferous forests, mountain ridges, etc. Some ecosystems, such as tropical rainforests, are very complex and include a large number of species connected by multiple existential ties. Some other ecosystems, such as the African deserts or the Arctic tundra, have a much smaller number of species, are less complex, but are equally important because they...
represent an unbreakable link in the chain of the Earth’s biogeochemical cycle.

In general, the division of biological diversity into genetic, species and ecosystem diversity, primarily allows an analytical approach in the study and practical approach to a particular problem. However, the separation of these three levels of biological diversity should be understood as extremely conditional, because the basic feature of biological diversity is the interconnectedness and conditionality of all three levels of life forms and manifestations. Namely, all genetic informations are found in individuals and their populations within certain organic species, and at the same time, each individual, population and species belongs to certain ecosystems whose habitat conditions have adapted during long-term organic evolution. The process of adaptation is very long and leads to a high degree of organization which can be seen primarily through food chains, the circulation of matter and the flow of energy. Therefore, the survival of organisms, the functioning of their communities and the overall biosphere can be observed only through the unity, interconnectedness and conditionality of all life processes and changes in the environment.3

Different types of ecosystems are grouped in nature into larger spatial-functional units - biomes or large communities. Terrestrial biomes are mainly associated with certain climatic zones, so as biomes can be distinguished icy polar deserts, tundra, taiga, steppes, temperate deciduous forests, Mediterranean hardwood vegetation, deserts, savannas, deciduous tropical forests, evergreen tropical forests, high mountains, oceans and inland waters. Just as ecosystems unite into biomes, so do biomes unite into even larger spatial-functional units. These larger units are biocycles. There are three biocycles on Earth - the saltwater biocycle (seas and oceans), the freshwater biocycle (releases, springs, streams, rivers, lakes, ponds, swamps, marshes) and the land biocycle. All three biocycles build a superb, unique ecosystem of the Earth that is referred to as the biosphere. The biosphere means the entire area of the Earth inhabited by living world and its derivatives (organisms, pollen, spores, seeds, etc.).

This area or sphere includes the soil cover (pedosphere), the surface part of the lithosphere to a depth of 3 km, the entire hydrosphere to a depth of over 11 km and part of the atmosphere to a height of 12 km. The biosphere is the basic energy transformer on Earth, thanks to the green pigment chlorophyll, with which plants in the process of photosynthesis bind the electromagnetic energy of the Sun and convert it into the energy of chemical bonds. The functioning of the biosphere is reflected in the interconnectedness of its various ecosystems on the principle of the circulation of matter and the one-way flow of energy. This path of rotation of the basic elements, triggered by the action of solar energy, represents the biogeochemical cycles of matter on Earth.

IV. BIODIVERSITY DISRUPTION FACTORS

Biological diversity is very rapidly and rapidly reduced under the direct or indirect influence of man, his activity and the constant increase in the number of the human population. In the period from the appearance of anatomically modern man about 200,000 years ago, to about 10,000 years ago, i.e. until the beginning of the development of agriculture and animal husbandry, it is estimated that the planet was inhabited by about 10 million people. In the period until about 2000 years ago, the population increased to 200 million, and in 1836 it reached 1 billion. Today, the human population numbers more than 7 billion people. It is inevitable that all people have to live and eat somewhere.

Thus, due to the settlement of people in new environments, it caused negative changes in the biosphere, from the disappearance of a large number of biological species, through the introduction of species into new habitats, habitat destruction to the final reduction of biodiversity. It is believed that if the current pace of habitat destruction and biodiversity loss continues, the new century will be a period of the sixth mass extinction caused by the activity of one species, Homo sapiens. It has been determined that over 50% of recent vertebrate species and 12.5% of plant species are endangered.4

According to the IUCN (1996),5 endangered species categories are defined: extinct, critically endangered, endangered, vulnerable, and species with a low risk of extinction. The alarming situation is most pronounced in the island populations of animals, while in the framework of vascular plants, a much higher percentage are bare-seeded (32%) compared to hidden-seeded (9%). By applying different methods in estimating the rate of species extinction, a consensus was reached on the indicator of rapid rate increase, which is an increase of 1000 times in relation to the usual background rate of species extinction. Species extinction is one of the most important phenomena to explain the radiation of life forms throughout Earth’s history. The extinction of species can be caused by the action of various factors, but it is first necessary to distinguish between the so-called, pseudo-extinction or phyletic evolution and extinction of species. Namely, phyletic evolution represents a series of continuous evolutionary changes in one evolutionary line that over time leads to the emergence of a new biological entity and / or the division of a line or species into two or more (speciations).6

Pollution, overfishing, and overhunting have caused a drop in biodiversity. Global climate change—the latest rise in the average temperature around the globe, linked to human activity—is also a factor. Warmer ocean temperatures damage fragile ecosystems such as coral reefs. A single coral reef can shelter 3,000 species of fish and other sea creatures such as clams and sea stars.


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Biodiversity can also be harmed by introduced species. When people introduce species from one part of the world to another, they often have no natural predators. These non-native species thrive in their new habitat, often destroying native species in the process.

The main reasons for the loss of biodiversity today can be represented by the acronym HIPPO:

- **H** = habitat alteration - the largest number of species is lost today because man has disturbed their habitats with his activity. The protection of a species is worthless if its habitat is not protected (a complex of biotic and abiotic factors). When a habitat is lost, the return of the species is very difficult and the success of the reintroduction depends on how well the habitat and the conditions that prevail on it have been preserved. The most common type of habitat disturbance is its fragmentation (dams, agricultural areas, urbanization, infrastructure ...). In the original habitat, openings are made, cavities, the unique habitat is divided into individual parts. The cavities expand, the original habitat becomes smaller and smaller, the parts become more and more isolated, gene flow is lost and inbreeding and genetic loads occur. The gene corridor is very important in the concept of protection in order to enable the exchange of genetic material. In Canada, they build entire forest complexes for bears via highways.

- **I** = invasive species (invasive, introduced, non-native species) - the problem with these species is that there is no control over them (they are not in the complex of biotic relations with organisms that are within the living communities in which they are introduced, they have no natural enemies will regulate their number) and create big problems in relation to the autochthonous flora and fauna. Examples are the rabbit in Australia, the leper in America, and the potato beetle in Europe.

- **P** = polution (pollution) - a specific type of habitat disturbance. Due to its extremely high intensity, it deserves to be recognized as a special reason. It represents the addition of energy and certain substances to the media of the environment, which cannot be decomposed, that is, enter biogeochemical cycles. Example of Pollution: On March 24, 1989, the Exxon Valdez tanker ran aground on the shores of the west coast of Alaska. On that occasion, 42 million liters of crude oil spilled into the Pacific. This accident is considered the largest of its kind in the history of the United States. Oil covered 2,100 km of the coast of Alaska (the size of the entire Adriatic). On that occasion, 100,000-400,000 birds died; 2600-5500 sea otters; 500-800 seals and countless fish.

- **O** = overexploitation - excessive exploitation of natural resources, which directly results from the exponential growth of the human population. Biological resources are renewable, but the level of their reproducibility is often much lower than the level of exploitation, the level of exploitation is often higher in relation to the reproductive potential of the species. The history of the human race is the history of man's relationship to biological resources. The resources themselves are a physical manifestation of biological diversity. They can include genes and species and ecosystems. An example of the misuse of biological resources is the hunting of white sharks because of the belief in the aphrodisiac properties of the dorsal fin or rhino because of the belief in the same properties of their horn.

### V. Biodiversity Protection

In response to the increasing fragmentation of habitats caused by the expansion of agricultural land, infrastructure, urban and industrial centers, the concept of ecological networks began to develop during the 1970s. Ecological networks represent a modern approach to nature protection with the basic goal of connecting fragmented habitats and parts of ecosystems into functional ecological systems.

The basic characteristics of ecological networks are:

- conservation of biological diversity at the level of landscapes, ecosystems or regions
- emphasis on preserving and improving the ecological integrity and functionality of ecosystems
- improved connectivity within the target area
- existence of zones to ensure connectivity and protection of central areas promotion of revitalization of degraded habitats where possible
- promotion of sustainable use of resources in areas important for the conservation of biological diversity.

In order to ensure the functionality of ecological networks, they are planned as a set of individual elements, each of which has a specific function in the network. The basic spatial elements of ecological networks are:

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7 Tschakert Petra et al., (2019), Threats to Biodiversity, available at https://www.e-education.psu.edu/geog30/node/394


• central areas as areas of the greatest importance for biodiversity conservation. They cover protected areas and habitats based on different criteria for designation such as protected areas according to IUCN categories, Natura 2000 areas, Ramsar sites, IBA, IPA, PBA.

• corridors, which connect the central areas into an ecologically functional network. Corridors can be of the linear type, mosaics of different habitats connected into one whole, or they can represent physically separate areas that serve the migration of species. Corridors are the most complex parts of ecological networks because they are most often located outside protected areas in resource-managed areas where the application of protection measures is more complex.

• protection area is defined in order to protect the central areas and corridors from negative external influences. The use of resources in the protected area should be compatible with the central areas around which it is established.11

Ecological network management means the management of individual ecologically significant areas and ecological corridors, in order to maintain and improve the functional integrity of the ecological network. Involving the local population is crucial for defining any ecological network, especially in areas outside protected areas that are, to a greater or lesser extent, managed in order to use resources.12 Awareness of nature protection and its goals is set as one of the first conditions in this process. Involvement of the local population is of crucial importance because these are the users of the space who are expected to apply nature protection measures, which, on the other hand, in some cases result in decreasing in income from activities such as agriculture, forestry, etc.

VI. CONCLUSION

Through all his activities, man very often unnecessarily, recklessly, ignorantly, arrogant and above all greedy, destroys many habitats and species in order to obtain enormous material profit, not to meet basic existential needs. So we came to the situation that man has changed the appearance of the Earth with his activity and significantly damaged the biosphere. On the huge areas of the planet are completely destroyed natural ecosystems (forests, steppes, swamps) or have been replaced by artificial ones (plantations, farms, settlements). That little bit of nature, which still exists as untouched, is slowly disappearing under the pressure of man.

Protection and preservation of biological diversity has become one of the most important issues of humanity, and the science of biological diversity has been promoted into one of the most important sciences in the new millennium. There are many threats to biodiversity today. The biggest ones can be remembered by using the acronym H.I.P.P.O.: Habitat Loss, Invasive Species, Pollution, Human Population, and Overharvesting.

To preserve biodiversity we need to carry out actions and pass laws on nature protection environment at world conventions but also at the state level. It is especially important to raise people’s awareness about environmental protection.

Ecological network models are useful and quality tool for quantifying how ecosystems work. Analysis of ecological network can provide precise metrics that quantify community structure and models for analyzing ecosystem resiliency and stability in a habitual and extreme conditions. Quantifying and testing all possible ecological network characteristics may yield crucial information about impact and vulnerability to multiple stressors not only for the parts, but for the whole ecosystem.

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AUTHORS

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A Study of Surgical Site Infections (SSI) In Emergency Surgeries in A Tertiary Care Hospital

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Abstract- Background : Surgical site infections are one of the most commonly reported nosocomial infections and are responsible for increasing morbidity, cost, rarely mortality related to operative procedures. The SSI rates reportedly range from 2.5% to 41.9% globally. Present study was conducted to study the prevalence of SSI in patients undergoing Emergency surgeries, to know the common causative organisms with their antibiotic susceptibility patterns.

Methods: Samples of purulent discharge received from the post-operative patients were processed for culture & sensitivity. Identification of isolates & Antibiotic susceptibility was done as per SOP.

Results: 106 (22.08%) out of 490 emergency surgeries were having SSI. The SSI rate from emergency LSCS was 18.8%, abdominal surgeries 26.3, orthopedic surgeries 28.7%. The most common isolate from obstetrics surgeries was Staphylococcus aureus (33.3%) & E.Coli (21.1%). The most common isolate from abdominal surgeries was E.Coli 42.8% & Pseudomonas aeruginosa (17.2%). E.coli isolates were susceptible to Carbapenems & Amikacin. Staphylococcal isolates were susceptible to Linezolid & Vancomycin.

Conclusion: Prevalence of SSI in Emergency surgeries was found to be 22.08%. E.Coli being the most common organism in abdominal surgeries & MRSA was the most common isolate from LSCS & orthopedic surgeries. Carbapenems and Amikacin were the most effective antimicrobials for enterobacteriaceae isolates, whereas Linezolid & Vancomycin were effective for MRSA isolates.

Index Terms- Surgical site Infections, Emergency surgery

I. INTRODUCTION & LITERATURE SURVEY

Surgical Site Infections (SSI) are defined as the infections occurring at the incision sites within 30-90 days or one year (if implant is placed) after operative procedure. They are responsible for high morbidity & rarely mortality since centuries. Joseph Lister in 1860 introduced antiseptic surgery resulting in remarkable reduction in morbidity. Recent SSI prevalence reported range from 2.5% to 41.9% globally.1,2

CDC has developed National Nosocomial Infection surveillance system13,14, which classifies Surgical site infection into three types. Superficial incisional SSI, Deep incisional SSI, Organ/Space SSI

Superficial incisional SSI are defined as the infections occurring within 30 days of operative procedure involving skin & subcutaneous tissue & having purulent drainage or culture positive discharge, pain or tenderness or swelling at the site.

Deep incisional SSI are defined as infections occurring within 30 days or 90 days of operative procedure involving deep soft tissue, having purulent drainage from deep incision or fever and localized pain, tenderness or abscess formation or other evidence of infection.

Organ/space SSI is defined as infection occurring within 30 days or 90 days or 1 year (in case of implants) after the operative procedure, Involving any part of anatomy other than incisional site, purulent drainage from drain or stab wound into organ or positive culture of aspirate from organ/space & other evidence of infection of organ/space.

Wound class is an assessment of the likelihood and degree of contamination of a surgical wound at the time of the operation. It should be assigned by a person directly involved in performing the operation or rarely by the inspecting physician.
**Wound Class** | **Examples**  
---|---  
Clean | Mastectomy, vascular hernias  
Clean contaminated | Gastrectomy, Hysterectomy  
Contaminated | Rupture appendectomy, Bowel resection  
Dirty | Traumatic wounds, Intestinal fistula resection

**Emergency operative procedure** is defined as non-elective, unscheduled operative procedure which does not allow for standard immediate preoperative preparation normally done within the facility of scheduled operation like skin preparation.

Recently it has been defined as a procedure that is documented as per the facility’s protocol to be an Emergency or Urgent procedure.14

**Sources of SSI** can be endogenous from patient’s own flora or exogenous from Hospital environment. Certain organisms are being excluded from SSI criteria like Blastomyces, Histoplasma, Coccidioides, Paracoccidioides, Cryptococcus, Pneumocystis or Organisms associated with latent infections.

**Factors influencing SSI rate** – There are various factors which affect the SSI rate, like extremes of age, preexisting illness, type of wound, duration of surgery, pre & post operative stay, category of surgery i.e. elective or emergency. Various studies4,5,6,7 have shown the prevalence of SSI varying from 15.2-25.8% in emergency surgeries to 4.76 to 7.4 % in elective surgeries.

**AIM & OBJECTIVES** of the study were as follows.
1. To study the prevalence of SSI in post-operative patients with emergency surgeries.
2. To study the microorganisms associated with SSI and their antimicrobial susceptibility pattern.
3. To compare prevalence of SSI in surgical, obstetric and orthopedic emergency surgeries.

**II. MATERIAL & METHODS**

This cross sectional study was conducted in the Department of Microbiology Dr. P. D.M.M.H. Research centre Amravati from January 2018 to Dec. 2018. Patients who underwent Emergency surgeries in the departments of Surgery, Obstetrics & Orthopedic were included in the study. The study was approved by Institutional Ethical committee.

**Inclusion & Exclusion criteria**-
Samples received from patients with elective surgeries were excluded.
Samples obtained during surgical procedure were excluded.
Samples from incision site, aspirates from the post operative wounds from emergency surgery patients were included in the study.

**III. PROCEDURE**:

Purulent discharge swabs, Aspirates from the incision sites received in the Department of Microbiology were processed & identification of isolates was done as per Standard Operative Procedures. Isolates were identified by performing different biochemical tests and confirmatory tests as per standard operative procedures.15 Antibiotic Susceptibility testing was carried out as per CLSI guidelines 2017 by Kirby-Bauer disc diffusion method16

**IV. RESULTS & DISCUSSION**:

490 patients who underwent surgical, obstetrics & orthopedic emergency surgeries were included in the present study. 106 (22.08%) patients were suspected as having SSI.
The different types of surgeries were appendectomy, laprotomy for intestinal obstruction, intestinal perforation (148), emergency LSCS (276), orthopedic surgeries for fractures, mainly multiple fractures (56) (Table 1).

### Table 1: Numbers of Different Types of Emergency Surgeries

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Type of Surgery</th>
<th>Number</th>
<th>Suspected SSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Appendectomy</td>
<td>85</td>
<td>28</td>
</tr>
<tr>
<td>2.</td>
<td>Intestinal Perforation</td>
<td>63</td>
<td>19</td>
</tr>
<tr>
<td>3.</td>
<td>LSCS</td>
<td>276</td>
<td>51</td>
</tr>
<tr>
<td>4.</td>
<td>Multiple Fractures</td>
<td>56</td>
<td>16</td>
</tr>
</tbody>
</table>

Out of 106, 92 cases (87.6%) were Culture positive. Overall prevalence of SSI in emergency surgeries in this study was found to be 22.08%. (Table 2)

Some Indian studies have reported the SSI prevalence in emergency studies ranging from 7.9 to 52.1%.

In our study, prevalence of SSI in emergency LSCS was 18.8%. Some other studies it ranges from 6.03% to 23.08%.

Devjani De etal reported SSI in Emergency LSCS as 23.08%, R.K Talukdar et al 6.03%, K.Vijaya A Padma reported 9.18%.

### Table 2: Distribution of Culture positive Samples received from different types of Surgeries

<table>
<thead>
<tr>
<th>Type of Surgery</th>
<th>No. of Samples received</th>
<th>No. Of Culture Positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obstetrics (LSCS)</td>
<td>51</td>
<td>46</td>
</tr>
<tr>
<td>Surgical Appendectomy</td>
<td>39</td>
<td>35</td>
</tr>
<tr>
<td>Int. obstruction</td>
<td>16</td>
<td>11</td>
</tr>
<tr>
<td>Orthopedic</td>
<td>106</td>
<td>92</td>
</tr>
</tbody>
</table>

In present study SSI prevalence from surgery was 26.3%, compatible with study by M.K Maheshwari from Meerut 23.8% and 24.14% as per study by Patel Sachin M. from Ahmadabad. Other studies with abdominal surgeries showed variations in SSI from 7.9% to 52.1%. The study from Aurangabad by Shahane V. et al have reported 7.9%, Barnali Kakati et al reported it to be 15.2%. Maximum of 52.1% SSI was reported by Santosh M Patil from Sangareddy Telangana.

In orthopedic surgeries our study showed the prevalence of SSI was found to be 26.7%, the type surgeries were mostly trauma surgeries e.g. multiple fractures. Other studies showed SSI prevalence ranging from 3.7 to 25.8.

The commonest isolate from abdominal surgeries was Escherichia coli 30.3%. Some other studies also E. coli as a common isolate 38.4% -- Santosh Patil et al in 2016, 35.7% Patel Sachin et al in 2012, 31.2% -- Varsha Shahane et al in 2012, 34.8% -- Gamal A Khairy et al in 2011, Pankaj Kumar Verma et al have reported maximum of 71.05% E. coli isolates, where the SSI rate was also very high 66% in abdominal surgeries e.g. Exploratory laprotomy with peritoneal lavage. Higher rate of isolation of E. coli from abdominal surgeries may be because the type of surgeries were mostly appendectomy or laprotomy for intestinal obstruction in which cases these wounds may be classified as contaminated causing endogenous infections. Which is like other studies, where E. coli or Klebsiella are the common infecting agents. Other studies where the common isolates from abdominal surgeries were E. Coli & Klebsiella are Barnali Kakati et al 41.17%, Gamal Khairy et al 35% (Table 4).
Other isolates were Staphylococcus aureus (21.7%), Enterococcus species (7.06%), Pseudomonas aeruginosa (7.06%), Klebsiella pneumoniae, Acinetobacter bawmanii. (Table 3)

In our study the common isolate from LSCS patients was Staphylococcus aureus (21.6%). Other studies showed difference in the common isolates from LSCS surgeries, K.Vijaya et al. 21.7%, Devjani et al 22.7%, R.K.Talukadar et al 37.9%. Devjani et al have reported commonest isolate Acinetobacter bawmanii 32.03%. (Table 5)

Table 3: Organisms isolated in different types of Surgeries

<table>
<thead>
<tr>
<th>Isolate</th>
<th>Type of Surgery</th>
<th>Total no. of Isolate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Abdominal</td>
<td>LSCS</td>
</tr>
<tr>
<td>Escherichia coli</td>
<td>19</td>
<td>9</td>
</tr>
<tr>
<td>Staphylococcus aureus</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>Enterococcus species</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Pseudomonas aeruginosa</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Klebsiella pneumoniae</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Acinetobacter Sp.</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Proteus spp.</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Streptococcus Pyogenes</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 4: Comparison of common isolates in Abdominal Surgeries with other studies

<table>
<thead>
<tr>
<th>Author &amp; year</th>
<th>E. coli</th>
<th>Klebsiella</th>
<th>Enterococcus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present study (2018)</td>
<td>30.3 %</td>
<td>9.61%</td>
<td>7.06 % %</td>
</tr>
<tr>
<td>BarmilbKakati et al (2013)</td>
<td>41.17%</td>
<td>9.80%</td>
<td>7.84 %</td>
</tr>
<tr>
<td>Gamal Khairy et al (2011)</td>
<td>35%</td>
<td>Other common isolate was Pseudomonas 25 %</td>
<td></td>
</tr>
<tr>
<td>Patel Sachin et al, (2012)</td>
<td>35.7%</td>
<td>21.4%</td>
<td>-</td>
</tr>
<tr>
<td>Verma P et al 2017</td>
<td>71.6%</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 5: Comparison of common isolates in Emergency LSCS in other studies

<table>
<thead>
<tr>
<th>Author &amp; year</th>
<th>S.aureus</th>
<th>E.coli</th>
<th>Acinetobacter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present study 2018</td>
<td>21.7%</td>
<td>9.78%</td>
<td>5.43 %</td>
</tr>
<tr>
<td>K. Vijaya et al 2013</td>
<td>21.1%</td>
<td>41.7%</td>
<td>-</td>
</tr>
<tr>
<td>Devjanie De et al 2013</td>
<td>22.7%</td>
<td>-</td>
<td>32.03%</td>
</tr>
<tr>
<td>R.K.Talukadar et al, 2015</td>
<td>37.9%</td>
<td>18.3%</td>
<td>7.9%</td>
</tr>
</tbody>
</table>

Antibiotic susceptibility Pattern:
In our study, for gram-negative isolates, Carbapenems (Imipenem & Meropenem) were the better antimicrobials with 88.8% to 90% susceptibility. Susceptibility of Amikacin 60% to 82.1% Piperacillin-Tazobactam 66% to 80% Cephalosporins have significantly low susceptibility ranging from 22% to 32% (Table 6).

Table 6: Antimicrobial Susceptibility of Gram negative isolates

<table>
<thead>
<tr>
<th>Isolate</th>
<th>No. of isolates susceptible to different Antimicrobials</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Genticmycin</td>
</tr>
<tr>
<td>E.Coli (28)</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>53.5%</td>
</tr>
<tr>
<td>Pseudomonas (10)</td>
<td>06</td>
</tr>
<tr>
<td></td>
<td>60%</td>
</tr>
<tr>
<td>Klebsiella (9)</td>
<td>06</td>
</tr>
<tr>
<td></td>
<td>66.6%</td>
</tr>
</tbody>
</table>

In gram positive isolates, 66.6% of Staphylococcal isolates were MRSA, but all the isolates were susceptible to Vancomycin. Linezolid (93.7%) Amikacin (81.3%) were other better antimicrobial agents. 50% of Enterococci were Vancomycin resistant. (Table 7)

Table 7: Antimicrobial Susceptibility of Gram negative isolates.

<table>
<thead>
<tr>
<th>Isolate</th>
<th>No. of isolates susceptible to different Antimicrobials</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ampicillin</td>
</tr>
<tr>
<td>MRSA (16)</td>
<td>04</td>
</tr>
<tr>
<td></td>
<td>25%</td>
</tr>
<tr>
<td>MSSA (06)</td>
<td>03</td>
</tr>
<tr>
<td></td>
<td>50%</td>
</tr>
<tr>
<td>Enterococcus (10)</td>
<td>03</td>
</tr>
<tr>
<td></td>
<td>30%</td>
</tr>
</tbody>
</table>

Different other also report similar type of antimicrobial susceptibility pattern. Birendra Jain et al, SantoshM.Patil et al reported 50% MRSA Resistance to more than three antimicrobials (MDR) is 33.3% by Birendra Jain et al. Varsha Shahane et al reported concordant results of Carbapenem, Amikacin & Cephalosporin Susceptibility as 100%, 78% & 10% respectively. Barnali Kakati et al also reported more than 66% resistance to all generations of Cephalosporins, but 100% susceptibility to Imipenem (Table 8).

Table 8: Comparison of Antimicrobial susceptibility in different studies

<table>
<thead>
<tr>
<th>Study by Author</th>
<th>Reported resistance/Susceptibility</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MRSA</td>
</tr>
<tr>
<td>Birendra Jain et al</td>
<td>50%</td>
</tr>
<tr>
<td>Devjani De et al</td>
<td>23.8%</td>
</tr>
<tr>
<td>Varsha Shahane et al</td>
<td>-</td>
</tr>
<tr>
<td>SantoshM.Patil</td>
<td>50%</td>
</tr>
<tr>
<td>Barnali Kakati et al</td>
<td>28.7%</td>
</tr>
</tbody>
</table>
V. CONCLUSION

Higher Prevalence of SSI in Emergency surgeries - 22.08 %. E. Coli being the common organism in abdominal surgeries. MRSA being commonly isolated from LSCS & orthopedic surgeries. According to the susceptibility pattern, lessor options for antimicrobial agents for treatment. Therefore active surveillance is needed to target the risk factors which can be minimized by practicing preoperative, Intraoperative & postoperative preventive measures as per WHO guidelines.

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Effect of Addition of Black Cumin Seed Oil (*Nigella sativa*) as a Source of Omega-6 on Cork Albumin Powder (*Channa striata*) for Wound Closure

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Abstract - Albumin powder which is processed through vacuum drying life it does not smell, the storing period is longer, and could be used anytime and anywhere. The formation of albumin in the form of powder is also easily absorbed in the body especially helps in wound care. The addition of black cumin seed oil to albumin powder as a source of omega 6 because black cumin seed oil contains active ingredients thymoquinone, saponins and flavonoids which have anti-microbial, antioxidant and cell regenerating effects. Provision of albumin powder in animals using the sonde method. The results of Phase 1 research showed differences in the concentration of black cumin seed oil affect the quality of albumin powder, namely omega 6, protein content, fat content, ash content, and yield. The best albumin powder was obtained at 12% black cumin seed oil concentration with the following results omega 6 was 1.92%, protein content was 11.25%, fat content was 5.24%, ash content was 0.97%, and yield was 60.37%. The highest fatty acid profile test results showed that Linoleic Acid was 1.92% and the lowest Cis-8,11,14-Eicosatrienoic Acid, C20: 3n6 was 0.002%. Then proceed to Phase 2 of the study, namely the testing of fatty acid profiles, zinc levels and mice try animals obtained observations on day 3, day 5, and day 7 showed the best concentration of albumin powder treatment 12% experienced a process of wound closure. wound character 65% on the 7th day.

Index Terms - albumin powder, black cumin seed oil, wound closure.

I. INTRODUCTION

Cork fish (*Channa striata*) has a high nutritional content and a variety of functions for health one of which can improve the process of wound recovery (Asikin and Kusumaningrum, 2018). Besides albumin, the wound cover on several components, namely the role of collagen, omega 3 fatty acids and omega 6 (Nicodemus et al., 2014). Black cumin seed oil (*Nigella sativa*) as a source of omega 6 contains the active ingredient thymoquinone which has anti-microbial and antioxidant effects that can accelerate wound closure. Giving black cumin seed oil to wounds can increase wound tissue regeneration (Hibono, 2017). The active substances contained in black cumin beside thymoquinone are saponins and flavonoids. In addition to regenerating cells, saponins have the ability to protect wounds, whereas flavonoids can be used as an antiseptic (Puspatasari et al., 2016). Collagen is a key component in the phase of wound management. The collagen characteristics that attach cells to form new connected tissues (Siregar and Suprayitno, 2019). The collagen used is collagen from grouper skin because grouper has the best collagen content (Suprayitno, 2019). Source of omega 3 fatty acids from flaxseed oil (*Linum usitatissimum*).

Cork fish albumin is usually consumed in liquid and fishy form so not everyone likes it. To overcome this problem, a way to dry it is to produce albumin powder extract or albumin powder (Hidayat and Suprayitno, 2019). Albumin powder which is processed through drying can produce a non-fishy taste, a pungent odor, a long shelf life and can be used anytime and anywhere. The formation of albumin which consists of powder is also easily absorbed in the body which is more important in wound care (Firlianty, 2016).

II. MATERIALS AND METHODS

2.1 Material
The research material used consisted of raw materials for the production of albumin extract, namely cork fish, materials for making collagen, namely grouper skin, NaOH, astic acid and aquades. The material for making albumin powder is albumin extract derived from the extraction of cork fish, collagen, black cumin seed oil as a source of omega 6, flaxseed oil as a source of omega 3 and the coating material namely sorbitol and dextrin.

This research method is an experimental method. This research was conducted in two stages, namely stage 1 research and stage 2 research. Research 1 aims to obtain the optimal concentration of black cumin seed oil which is added to the production of albumin powder so that the best powder quality is obtained for the second stage research. While the second phase research aims to see the process of wound closure in animals using albumin powder with the best quality compared to negative control and negative control.

2.1.1 Process Extraction Albumin

The making of albumin extract begins with the preparation of raw materials ie cork fish is turned off by being hit on the head, then the fish is weeded, dipped and then diced and washed with running water. Furthermore, cork fish weighed 250 grams, then put into steam at a temperature of 70°C for 30 minutes. After that the cork fish meat is filtered and the filtrate is taken. Cork fish extract is ready to use.

2.1.2 Process Collagen

Collagen manufacturing is done by preparing grouper skin that has been removed from scales and remaining flesh attached. Grouper skin is cut 1 x 1 cm and then soaked with 0.1 M NaOH for 24 hours with a ratio of skin and solution of 1:10, then grouper skin is neutralized with aquades. Furthermore, soaked with acetic acid in the ratio of 1:10 for 24 hours and then filtered and taken the filtrate. Then the precipitation is done with NaCl 0.9 M for 24 hours. After 24 hours, centrifugation was carried out at 3500 rpm for 20 minutes then dialysis with 0.5 M acetic acid in a ratio of 1:10. Then inserted into the cellophane membrane. After that, the cellophane membrane was immersed in 0.1 M acetic acid solution for 6 hours. Furthermore, soaked with distilled water to neutral pH. After that, collagen is ready to use.

2.1.3 Process Albumin Powder

The making of albumin powder is 180 ml cork fish extract albumin added with 6% sorbitol and 80% dextrin. Then added black cumin seed oil concentrations of 8%, 10%, and 12%. Subsequently added 0.6% collagen, 1.5% flaxseed oil then homogenized with a 2000 rpm homogenizer for 15 minutes. The resulting mixture is poured into a baking dish and dried with vacuum drying. After the sample is dried, blend until smooth and sieved with a 60 mesh sieve. Albumin powder was analyzed in omega 6, protein content, fat content, water content, ash content, yield and organoleptic.

III. RESULT AND DISCUSSION

3.1 Omega 6

Omega 6 albumin powder with different concentrations of black cumin seed oil produces different omega 6 values. At 8% black cumin seed oil concentration of 1.82%, 10% concentration of 1.88%, and 12% concentration of 1.92%. The highest omega 6 value is shown at a concentration of 12% which is equal to 1.92%, while the lowest omega 6 at an concentration of 8% is 1.82%. The omega 6 black cumin seed oil value has decreased due to the heating process when drying albumin powder. According to Sipayung et al. (2015), one cause of damage to fat is oxidation. The oxidation process is not determined by the size of the amount of fat in the material so that even small amounts of fat-containing material are easily subjected to oxidation.
3.2 Protein Content

![Figure 2. The Result of Protein Content](image)

The value of 8% black cumin seed oil concentration produced a protein content of 10.82%, a concentration of 10% at 11.04%, and a concentration of 12% at 11.25%. The highest protein content results in the concentration of black cumin seed oil 12% by 11.25% and the value of the lowest protein content in the concentration of black cumin seed oil 8% is 10.82%. Protein content produced in the manufacture of powder increases with increasing concentration of black cumin seed oil that is given in the manufacture of powder. This is because black cumin seed oil contains high protein which is equal to 22.7%.

3.3 Water Content

![Figure 3. The Result of Water Content](image)

The value of 8% black cumin seed oil concentration produced a moisture content of 7.83%, a concentration of 10% at 8.65%, and a concentration of 12% at 9.02%. The highest value of water content in black cumin seed oil concentration of 12% was 9.02% and the lowest water content value was in the concentration of black cumin seed oil 8% of 7.83%. The water content in the resulting albumin powder showed an increase along with the increased concentration of black cumin seed oil given.

3.4 Fat Content
The fat content of albumin powder at the concentration of black cumin seed oil was 4.69%, the concentration of 10% was 4.99%, and the concentration of 12% was 5.24%. The highest value of fat content in black cumin seed oil concentration is 12% by 5.24%, and the lowest value of fat content in black cumin seed oil concentration is 8% by 4.69%. It can be concluded that the higher the concentration of cumin seed oil, the greater the fat content produced.

3.5 Ash Content

Ash content contained in the concentration of 8% black cumin seed oil produced ash value of 0.85%, 10% concentration of 0.91%, and 12% concentration of 0.97%. The highest ash content value in the concentration of black cumin seed oil is 12% by 0.97%, and the lowest ash content value in the concentration of black cumin seed oil is 8% by 0.85%. The ash content in the albumin powder comes from omega 3 source oil and omega 6 source oil added.

3.6 Yield

The results of the yield at 8% black cumin seed oil yield yields 57.19%, 10% concentration at 58.86%, and 12% concentration at 60.37%. The highest yield at a concentration of 12% was 60.37% and the lowest yield at a concentration of 8% was 57.19%. The higher the concentration of black cumin oil given will increase the volume the higher the yield produced.

3.7 Organoleptic
Organoleptic assessment of albumin powder with different concentrations shows differences. At 8% black cumin seed oil concentration, the value of color parameter shows a value of 3.30, a concentration of 10% at 2.53, and a concentration of 12% at 2.20. Whereas in the treatment of black cumin seed oil concentration with a concentration of 8% the aroma parameter was 4.23, a concentration of 10% was 4.83, and a concentration of 12% was 5.33. In the color parameter, the highest value was obtained from the concentration of black cumin seed oil at 3% by 3.30 and the lowest value from the concentration of black cumin seed oil at a concentration of 12% by 2.20. The highest value in the color parameter indicates that panelists dislike the color produced by albumin powder with the addition of black cumin seed oil because it tends to be too brown. As for the aroma parameter, the highest value was obtained from the concentration of black cumin seed oil at 12% by 5.33 and the lowest value of the concentration of black cumin seed oil at 8% by 4.23. The highest value on the aroma parameter indicates that the panelists liked the color produced from albumin powder with the addition of black cumin seed oil because the resulting aroma was not fishy and pungent.

3.8 Animal Testing

After knowing the optimal concentration of black cumin seed oil for the production of best quality albumin powder, which is 12% concentration which is then tested on animals to find out the effect of albumin powder on wound closure, further tests are analysis of albumin powder fatty acid profile, and zinc content test. Albumin powder with the best concentration of 12% was then compared with negative control and positive control. Mice were injured with a wound length of 2 cm. The process of wound closure was measured for 7 days with observation on the 3rd day of the 5th day and 7th day. Giving albumin powder using the sonde method.

On the 3rd day different treatments showed different results of wound closure. The negative control treatment showed an average wound length of 1.8 cm, a positive control treatment of 1.7 cm, and a 12% albumin concentration powder treatment of 1.6 cm. The fastest wound closure on day 3 was obtained at 12% albumin powder concentration treatment of 1.6 cm, while the longest wound closure was at negative control treatment of 1.8 cm. This can be interpreted that the wound closure process on the treatment on the 3rd day was 30%.
Different treatments show different results of wound closure on the 5th day. The negative control treatment showed an average wound length of 1.5 cm, a positive control treatment of 1.4 cm, and a 12% albumin concentration powder treatment of 1.1 cm. The fastest wound closure on day 5 was obtained by albumin powder treatment with a concentration of 12%, which was 1.1 cm, while the longest wound closure was negative control treatment at 1.5 cm. This can be interpreted that the process of wound closure at the best treatment on the 5th day was 45%.

The negative control treatment showed an average wound length of 1.5 cm, a positive control treatment of 1.1 cm, and a 12% albumin concentration powder treatment of 0.7 cm. The fastest wound closure on day 7 was obtained by a 12% concentration of albumin powder treatment of 0.7 cm, while the longest wound closure was at a negative control treatment of 1.5 cm. This can be interpreted that the process of wound closure at the best treatment on day 7 was 65%.

3.9 Fatty Acid Profile

<table>
<thead>
<tr>
<th>No.</th>
<th>Jenis Asam Lemak</th>
<th>Kadar (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Linoleic Acid, C18:2n6c</td>
<td>1.92</td>
</tr>
<tr>
<td>2.</td>
<td>Linolenic Acid, C18:3n3</td>
<td>0.94</td>
</tr>
<tr>
<td>3.</td>
<td>Oleic Acid, C18:1n9c</td>
<td>0.99</td>
</tr>
<tr>
<td>4.</td>
<td>Heptadecanoic Acid, C17:0</td>
<td>0.006</td>
</tr>
<tr>
<td>5.</td>
<td>Palmitoleic Acid, C16:1</td>
<td>0.02</td>
</tr>
<tr>
<td>6.</td>
<td>Arachidonic Acid, C20:4n6</td>
<td>0.006</td>
</tr>
<tr>
<td>7.</td>
<td>Cis-11,14-Eicosedienoic Acid, C20:2</td>
<td>0.07</td>
</tr>
<tr>
<td>8.</td>
<td>Cis-4,7,10,13,16,19-Docosahexaenoic Acid, C22:6n3</td>
<td>0.01</td>
</tr>
<tr>
<td>9.</td>
<td>γ-Linolenic Acid, C18:3n6</td>
<td>0.94</td>
</tr>
<tr>
<td>10.</td>
<td>Stearic Acid, C18:0</td>
<td>0.18</td>
</tr>
<tr>
<td>11.</td>
<td>Palmitic Acid, C16:0</td>
<td>0.51</td>
</tr>
<tr>
<td>12.</td>
<td>Myristic Acid, C14:0</td>
<td>0.01</td>
</tr>
<tr>
<td>13.</td>
<td>Cis-8,11,14-Eicosatrienoic Acid, C20:3n6</td>
<td>0.002</td>
</tr>
<tr>
<td>14.</td>
<td>Pentadecanoic Acid, C15:0</td>
<td>0.06</td>
</tr>
<tr>
<td>15.</td>
<td>Lauric Acid, C12:0</td>
<td>0.06</td>
</tr>
</tbody>
</table>
The highest content of fatty acids in albumin powder with black cumin seed oil concentration of 12% was Linoleic Acid of 1.92% and the lowest Cis-8,11,14-Eicosatrienoic Acid, C20: 3n6 was 0.002. The high linoleic fatty acid in albumin powder due to the use of black cumin seed oil which contains a lot of linoleic acid or omega 6. High and low fatty acids in the product can be caused by these fatty acids cannot stand the heat during the drying process.

3.10 Zinc Content
The best concentration of Zn in albumin powder was 1.82 mg / 100g. Compounds that accelerate wound healing are zinc minerals (Zn), and unsaturated fatty acids such as omega 3, omega 6 in cork fish albumin powder can accelerate the wound closure process. Omega-6 fatty acids found in black cumin seed oil and mineral and vitamin content are useful as nutrients in healing wound cuts on the backs of mice and stimulating the division of new cells (cell proliferation). So the addition of black cumin seed oil as a source of omega 6 and zinc influences the wound healing process.

IV CONCLUSION
Black cumin seed oil concentration of 12% is the optimal concentration to produce the best albumin powder. include omega 6 values of 1.92%, protein content of 11.25%, fat content of 5.24%, ash content of 0.97%, and yield of 60.37%. The results showed that giving different treatments to wounds had a significant influence on the process of wound closure. At the observations of the 3rd day, 5th day, and 7th day, the process of wound closure was 65% as good as the experimental animals treated with albumin powder on the 7th day.

REFERENCES
Analysis Of Factors To Predict Financial Distress  
(CASE STUDY IN THE CONSTRUCTION SECTOR OF STATE-OWNED ENTERPRISES OF 2009 - 2017)

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Abstract - This research aims to determine the factors that can be used to predict the financial distress potential in the Construction Sector of State-Owned Enterprises by using multiple discriminant analysis. For this study, financial statements of all Construction Sector of State-Owned Enterprises from 2009 to 2017 were used. The research results show that from 21 (twenty one) variables, only debt to equity, return to asset, operating cash flow to net wealth and receivable turnover that can be used to predict the financial distress potential at the Construction Sector of State-Owned Enterprises. There are positive effects from Debt to Equity and Receivable Turnover, as well as negative effects from Return to Assets and Cash Flow Operating to Net Wealth to the financial distress.

Keywords - financial distress, Construction Sector of State-Owned Enterprises, debt to equity, return to asset, operating cash flow to net wealth and receivable turnover.

Introduction

In 2018, the financial condition of State-Owned Enterprises in the Construction Sector has become an interesting issue and discussion. As reported in the Jakarta Globe on March 13, 2018, the Standard & Poor's Global Ratings remind the deterioration of SOEs balance sheet, especially those engaged in the construction sector. This is because the construction sector of SOEs have to meet the Government's plan to build massive infrastructure. The bankruptcy of Carillion, the largest construction company in the UK, becomes one of the major issues in the construction sector. Carillion was declared bankrupt after suffering losses in several large contracts and the accumulation of short-term payment obligations which amounted to billions of pounds to several creditors.

Financial Distress: Overview

According to Ross, Westerfield (2013), financial distress is difficult to define precisely because of the various events that occur in a corporation before experiencing financial difficulties. Several examples of these include reducing dividends, closing factories, firing and resigning of the CEO, and falling stock prices. Financial distress is a situation in which a company's operating cash flow is not enough to meet the current obligations, so the company is forced to take corrective action. Financial distress can lead a company to default.

According to Plat and Plat (2002), companies in Asia have the potential for financial distress if operating leverage is not adequate to support sales volume and obtain sufficient cash flow or operating profit before depreciation. Beaver (1966) is one of the earliest researchers who shows various forms of financial distress, depending on the type of event that occurred. Failing to pay bonds and unpaid dividend preferred stock can reflect the occurrence of financial distress. The same definition is also conveyed by Andrade and Kaplan (1998) by defining financial distress as a crucial time to determine whether a company's financial condition is healthy and unhealthy, so it requires corrective action to resolve the problem.

Denis and Denis (1990) identify financial distress when a company experiences losses (negative pre-tax operating income or net income) for at least 3 years. The results of an empirical analysis of dividend policy during financial distress show that after a
company experiences financial distress, it will affect cash flow and the company is unable to pay dividends. Therefore, a rapid and aggressive reduction in dividends after a loss can be used to determine the financial distress situation.

Bankruptcy of companies in Indonesia is regulated in Law Number 37 of 2004 regarding Bankruptcy and Suspension of Debt Payment Obligations. Bankruptcy is general confiscation of all the bankruptcy Debtor's assets which are managed and authorized by the Curator under the surveillance of the Supervising Judge. A company can be declared bankrupt if it has two or more creditors and does not pay off at least one due date debts which are collectible, declared bankrupt by a court decision either at the company request or at the request of one or more of its creditors.

Conceptual Framework

There were 21 independent variables in this research in the form of financial ratios of SOEs Construction Sector in 2009 to 2017 that would be tested for the relevance and effect on the financial distress potential of SOEs Construction Sector as well as determining the discriminant function. Furthermore, the function would be used to describe the condition of SOEs Construction Sector in 2015 to 2017 whether there was a potential for financial distress or not.

Other Research Review

K. G. M. Nanayakkara and A. A. Azeez (2015) examined companies listed on the Colombo Stock Exchange from 2002 to 2011 covering 20 industrial sectors and 246 companies. The research aims to develop a better financial distress prediction model for Sri Lanka companies using Altman Z-score. The research concludes that the model built consisting of earnings before interest and taxes (EBIT) compared to interest expense, operating cash flow to total debt, retained earnings to total assets, and company size can be used to measure the company's financial distress prediction in Sri Lanka by 85.8% up to 91%.

Mahdi Salehi, Bizhan Abedini (2009) examined the ability of financial ratios in predicting financial distress in companies listed on Tehran Stock Exchange. The results show that accounting data can be used to predict financial distress. Even the occurrence of financial distress can be predicted in the previous 3 (three) years.

Pham Vo Ninh Binh (2017) conducted a financial distress and bankruptcy prediction research on 800 companies listed on Vietnam Stock Exchange from 2003 to 2016. The research concludes that the higher the liquidity, asset productivity, solvency, and the ability of assets to produce sales, the lower the possibility of financial distress.

Chan Kok Thim et al. (2011) in a research on the factors affecting financial distress in public companies on Malaysia Stock Exchange in 2005 – 2009, they concluded that company size has a significant impact and a positive relationship with financial distress. Interest coverage ratio also has a positive relationship with financial distress, while operating profit growth has a negative relationship with financial distress.

Research Objective

This research aims to analyze and test the variables affecting financial distress in the SOEs Construction Sector. In addition, this research is also expected to provide a description of SOEs Construction Sector condition, whether it has the potential to experience financial distress or it has a healthy financial performance. The research results are expected to contribute to the
development of models to predict financial distress conditions, especially in the SOEs Construction Sector. For shareholders and creditors, the research results are expected to be useful as an early warning system and for monitoring the performance of SOEs, especially in the construction sector.

Research Hypothesis
The hypothesis in this research is all the independent variable: Quick Ratio, Current Ratio, Cash Ratio, Debt to Asset, Debt to Equity, Leverage, ROA, ROE, Net Profit Margin, Operating Profit Margin, Gross Margin, Return on Capital Employed, Cash Flow Operating to Net Wealth, Cash Flow Operating to Total Asset, Cash Flow Operating to Total Liability, Receivable Turnover, Working Capital Turnover, Fixed Asset Turnover, Total Asset Turnover, Payable Turnover, and Inventory Turnover affect financial distress in the SOEs Construction Sector.

Research Method and Data
In this research, the dependent variable is the financial distress condition in SOEs in the Construction Sector, which is defined as financial difficulties experienced, so it must be restructured and/or bankruptcy suits by creditors. PT (Persero) Nindya Karya restructuring was performed since 2011, while, PT (Persero) Waskita Karya was restructured at the end of 2009. PT (Persero) Istaka Karya was originally to be restructured, however, prior to the restructuring, PT (Persero) Istaka Karya was sued for bankruptcy by its creditors, but in the end, the creditors and PT (Persero) Istaka Karya agreed to enter into a peace agreement in 2012.

This research use 21 (twenty one) financial ratios as independent variables, using multiple discriminate analysis. Financial statements in the SOEs Construction Sector are collected from Directorate Separated Asset and website of the company, since 2009 to 2017 from all SOEs construction sector, namely PT Hutama Karya (Persero), PT Pembangunan Perumahan Tbk, PT Waskita Karya Tbk., PT Wijaya Karya Tbk., PT Adhi Karya Tbk., PT Brantas Abhipraya (Persero), PT Nindya Karya (Persero), PT Amarta Karya (Persero), Perum Perumnas, and PT Istaka Karya (Persero). The independent variable included Quick Ratio, Current Ratio, Debt to Asset, Debt to Equity, Leverage, ROA, ROE, Net Profit Margin, Operating Profit, Gross Margin, Return on Capital Employed, Cash Flow Operating to Net Wealth, Cash Flow Operating to Total Asset, Cash Flow Operating to Total Liability, Receivable Turnover, Working Capital Turnover, Fixed Asset Turnover, Total Asset Turnover, Payable Turnover, and Inventory Turnover.

Results and Discussions
Assumption Test
From the discriminant assumption test stage, only 7 (seven) variables were included in the discriminant model with significant values less than 0.05 respectively, while the variable of Quick Ratio, Current Ratio, Cash Ratio, Return on Equity, Return on Capital Employee, Net Profit Margin, Operating Profit Margin, Cash Flow Operating to Total Assets, Cash Flow Operating to Total Liability, Working Capital Turnover, Fixed Asset Turnover, Total Asset Turnover, Payable Turnover, and Inventory Turnover could not be included in discriminant model, because those had a Sig value more than 0.05.

Discriminant analysis has the assumption that there are no multicollinearity or a correlation between independent variables which makes it difficult to exert individual effects. According to Ghozali (2016) and Hair Jr. et al. (2007), a figure of 0.9 or more indicates a high correlation. Correlation test results between variables show that some variables have a high correlation. However, 4 variables including Debt to Equity, Return on Assets, Cash Flow Operating to Net Wealth and Receivable Turnover indicate a correlation value less than 0.9.

To determine which variables in the discriminant function, it is necessary to conduct the stepwise analysis method by entering variables one by one into the discriminant model, which allows one or more independent variables to be removed from the model, depending on the significant level of results to be obtained from the test results. Four variables were included in the discriminant model. This stage was performed by looking at the significance value, in which the acceptable significant value and
the variables to be included in the discriminant function had the significant value of <0.05. Cash Ratio, Debt to Asset, and Gross Margin had significant values more than 0.05 so they were not included in the discriminant function.

**Estimation of Discriminant Function Coefficient**

The discriminant function in this research can be written in the following form:

\[ Z = -2.782 + 0.168 \text{ Debt to Equity} - 0.048 \text{ ROA} - 0.012 \text{ Cash Flow Operating to Net Wealth} + 0.295 \text{ Receivable Turnover} \]

To determine the cut-off of financial distress grouping methods or not financial distress can be calculated by the following formula:

\[ Z = \frac{Na.Zb + Nb.Za}{Na + Nb} \]

- \( Z \) = critical numbers, function as cut-off score
- \( Na \) and \( Nb \) = Number of samples from group 1, and 2, in this case financial distress and not financial distress.
- \( Za \) and \( Zb \) = centroid numbers in group 1 and 2.

Centroid numbers of non-financial distress company are -0.806 and centroid numbers of financial distress company are 3.762.

The cut-off classification can be calculated as follows:

\[ Z = \frac{28 \times (3.762) + 6 \times (-0.806)}{28 + 6} = \frac{100.50}{34} = 2.95 \]

The calculation above shows the result of \( Z/cut-off \) by 2.95. So, if the \( Z \) score > 2.95, then it is classified as the financial distress group, and if the \( Z \) score < 2.95 then it is classified as the non-financial distress group.

Canonical Discriminant Function Coefficient Test results show the correlation obtained by 0.874, which is then used as the coefficient of determination (R squared) to see how much the diversity of the dependent variable that can be explained by the independent variable. The value of R squared was 0.874^2 = 0.7632, which showed that the independent variable was able to explain 76.32% of the dependent variable, while 23.68% was explained by other independent variables outside the model.

**Debt to Equity**

Debt to equity shows how a company finance their business, basically in two ways: equity and debt. Instead of equity, companies often use debt to expand their business. But, higher amount of debt could increase company risk. This ratio also can be used to measure the level of company solvency, which is the ability of a company to pay the company's obligations. From the discriminant function above, coefficient of debt to equity is positive 0.168. It means that every increase of one unit value of the debt to equity variable then increases the discriminant score by 0.168. Higher debt to equity indicates lower ability of the company to pay all of its debt or loans and higher risk. Positive number shows every increase in debt to equity will increase potency of financial distress.

**ROA**

ROA shows the percentage of net profits obtained by the company compared to all assets owned. ROA also shows all stakeholder (director, shareholder, creditor) the profitability of the company and how efficient a company using its assets to generate earnings or income. Coefficient of ROA is negative 0.048, which is means every increase of one unit value of ROA variable value reduces the discriminant score by 0.048. Negative number shows that every increase in ROA will reduce potency of financial distress.

**Cash Flow Operating to Net Wealth**

Operational cash flow is cash flow related to the company's operational activities, such as customer cash receipts, account receivable income, debt payments, employee salaries, interest income, tax payments, and other receipts/expenses related to operational activities. Coefficient of Cash Flow Operating to Net Wealth is negative 0.012, which is means every increase in one unit value of the Cash Flow Operating to Net Wealth variable reduces the discriminant score by -0.012 and higher Cash Flow Operating to Net Wealth means lower potency of financial distress.
Receivable Turnover

Receivable Turnover shows the frequency of a company collecting its receivables in a given year. This ratio is obtained based on the relationship of receivable and sales. Coefficient of Receivable Turnover is negative 0.295, which is means every increase one unit value of the Receivable Turnover increases the discriminant score by 0.295. Negative number shows that every increase in Receivable Turnover will reduce potency of financial distress.

Significance of the Discriminant Function Coefficient

Receivable Turnover, Debt to Equity, ROA, and Cash Flow Operating to Net Wealth have a significant effect simultaneously on financial distress, both in the category of “financial distress” or “non-financial distress” with Wilk's lambda value obtained for the four variables of 0.237, chi-square 43.212 with a significant number of 0.000 (<0.05), meaning that there are simultaneously significant effects of these variables on financial distress.

Structure Matrix coefficient from variable Receivable Turnover, Debt to Equity, ROA, and Cash Flow Operating to Net Wealth sequently 0.890, -0.818, -0.421, and 0.818. Structure Matrix shows the importance relatively from each independent variable in distinguishing between financial distress and non-financial distress companies. From the output shows that Debt to Equity has the highest effect to the dependent variable with score 0.890 or 89.0 %, then followed by ROA, Receivable Turnover, Cash Flow to Operating to Net Wealth.

Conclusion

Based on the discussion results, it can be concluded as follows:

1. There are positive effects from Debt to Equity and Receivable Turnover, as well as negative effects from Return to Assets and Cash Flow Operating to Net Wealth to the occurrence of financial distress in the SOEs Construction Sector.

2. This discriminant function can be written as Z = -2.782 + 0.168 Debt to Equity – 0.048 ROA – 0.012 Cash Flow Operating to Net Wealth + 0.295 Receivable Turnover. From the calculation, the cut-off is 2.95. So, if the Z score> 2.95, then it is classified into financial distress group, and if the Z score <2.95 then it is classified into non-financial distress group.

3. Based on the results of research on the discriminant function and financial statements in 2015-2017, the financial condition of SOEs Construction Sector in general is still relatively good. However, increasing Debt to Equity and Receivable Turnover which can increase the potential for experiencing financial distress.

Suggestion

For further research, it is necessary to expand the research time span to include financial ratios in 2008 and the previous years, bearing in mind that the conditions of SOEs Construction Sector also experience financial distress in previous few years. In addition, this research only applies 21 financial ratios as independent variables. Therefore, future research needs to increase the number of financial ratios.

From the managerial aspect, the SOEs Construction Sector stakeholders, especially shareholders and creditors need to be careful with a significant increase in debt, given that debt to equity has a positive effect on financial distress. This means that the greater the Debt to Equity, it will increase the potential for financial distress. The large financing needs to complete infrastructure projects must take into account the profitability of the project and the company's cash flow. Beside Debt to Equity, SOEs Construction Sector stakeholders also should concern with Receivable Turnover, which also positive effect. Hence, management should manage its receivable more prudent.


Law Number 37 of 2004 regarding Bankruptcy and Suspension of Debt Payment Obligations.


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The Calibre of Personnel Influence of Management’s Compliance to Internal Control Systems in Organizations and Institutions

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Abstract: Internal control systems in every institution in the world, determines ways of evaluating staff of the institutions. Though the strategic may differ, purposes are virtually the same. However, this study investigated the Calibre of Personnel Influence of Management’s Compliance to Internal Controls at the level of Organizations and Institutions. The research design employed was characterized and analyzed the purpose of the study. Purposive sampling techniques were used to select the respondents. The sample size for the study was fifty (50) participants and six (6) internal control units of management members, Junior and senior staff, respectively. Questionnaire and interview guide were used to collect data from the respondents which was analyzed to generate frequencies and percentages with the help of Microsoft Excel. The study resulted that the evaluations influence of the internal control systems on managerial tools that can be used to impact the attitudes of employees in institutions and organizations revealed that various constituents of internal control systems in the institutions and possible strategies and mechanism were placed. However, Management area involving their subordinates had a lesser attention insert and internal control systems were not motivating enough. Therefore, process of evaluation was in-effective, which had embarked influence on the Institution, and their subordinates has a lesser attention insert.

Key Words: Internal control; Personnel Influence; Organizations and Institutions; investigation.

1. Introduction

Internal control (IC) systems has been the subject of a series of inquiries today. However, some organization in both government and private sector, legislators and regulators, gave internal control significant attention as a result of Watergate revelation of illegal domestic political contributions and questionable activities. [1] The nature of the organization and other related factors and conditions in the environment will show the type of IC system to be adopted. However in regards to financial control systems, there were incidents of illicit payment to foreign government officials’ by united State (U.S.) Companies. Subsequently, the Foreign corruption practices Act was enacted, followed by a number of private and public sector studies, proposals and recommendations on internal controls . [2] A number of studies have been conducted on IC. One of such studies was conducted by auditing standard and auditor’s performance [3]. The Commission examined the causes of fraudulent financial reporting and provided recommendations to reduce its incidence. One of its recommendations was that organisations should work together to develop a common definition for internal controls and to provide guidance on studying the effectiveness of, and improving, internal controls. This system plays an important role in both internal and external auditing practices of checks and balances [4]. Internal auditing practices appraise the effectiveness of internal control systems. Internal control ensures that opportunities for fraud or malfeasance are minimized. It enables Management to carry out the business of the company in an orderly and efficient manner. The system ensures that management policies are adhered to, assets are safeguarded, and records of the company’s activities are both complete and accurate. [5] Lack of proper IC in public and private Universities has accounted for a number of instances of fraudulent financial reporting and
irregularities in management policies. However, the effectiveness of IC policies and procedures cannot rise above the integrity and ethical values of people who create, administer, and monitor them. Integrity and ethical values are essential elements of the control environment. They affect the design, administration, and monitoring of other components of IC. An entity’s ethical and behavioural standards and the manner in which it communicates and re-in-forces them, determine the entity’s integrity and ethical behaviour. In spite of the IC system established in entities, there are always discrepancies, limitations, and deficits, when it comes to implementation [6]. The introductions of IC systems in many organisations in Ghana have had many benefits. Among them, are assisting management to ensure that policies are adhered to, proper decision is taken to ensure the achievement of the organisation’s objectives and safeguard the various assets of the company? As a result of the benefits that would be derived from establishing internal controls, organizations’ management establishes IC system to ensure that policies are adhered to, and that proper decision is taken by the right person. This is also done in order to ensure University objectives are achieved.

However, the extent to which the system operates, and whether it is effective and efficient depends largely on the kind of caliber of personnel. Interestingly, no matter how elaborate an organisation’s internal control systems are designed or established, it cannot be a guarantee against efficiency and effectiveness of operations. A good internal control system cannot be a proof against fraudulent activities collusions, especially, on the part of those holding position of trust. Moreover, internal control systems which depend largely on segregation of duties can be flawed or relaxed through collusion, while persons in whom authority is vested can also avoid controls. [7] Besides, management in position of trust could also override these controls, which it is expected to administer. Therefore, in order to know the extent to which the system operates, and as to whether it is effectively and efficiently operated, there is the need to evaluate the system.

However, in view of this, the researchers studied and investigated how the caliber of personnel Influence of Management’s Compliance to internal controls at the Organizational and Institutional levels impacted the attitudes of employees to make them more productive and effective. Also characterized and analyzed data results which was put in place as a proper means of internal control system which, if performed at the right time, frequently and purposefully, will help to identify the effectiveness of the staff and the lapses that need to be addressed.

2. Methodology

Research methodology defines the systematic and scientific procedure used to arrive at the results and findings for a study against which claims for knowledge are evaluated. [8] Against this background, it was found that the descriptive research survey design was appropriate and used for the study because it enables researchers to administer a set of questions to a large number of respondents concerning the current status of the issue under study. Furthermore, this study had “learning by participation” as its main objective. It implies that, the researchers and individuals identifies a problem; finding the courses and recommendation, advice for an intervention mechanism to solve that problem. The purpose of this study that necessitated the choice of research to enhance management’s compliance to internal control assessment procedures at the institutional and organizational levels. When the procedures involved in the use of research method were thoroughly examined, it fitted the topic for this study, hence its adoption. In order to solicit information from staff of the organization, the basic instruments used were interview and questionnaire. On the collection of data, a semi-structured interview schedule was arranged with the staff members, during which a lot of information were gathered to get information on review issues that were pertaining within the establishment. A questionnaire was used to further solicit the causes of gaps within the assessment system. The research questions were the basis on which all the data gathered for the study were characterised and analysed. The data analysis was done with the aid of the descriptive statistics approach emphasising mainly on the percentage (%) technique. Other data from the interviews were analysed with the view of Ornamental management’s compliance
4.0 Results and Discussion

4.1 Results

4.1.1 Employees detail

From figure 1, breakdown of total number of respondents selected in the institution, taking into consideration the sex internal control units in the various job categories.

![Figure 1 Breakdown of number of respondents Selected](image)

Five categories of respondents were dealt with. This comprises finance personnel, human resources personnel, audit personnel, transport personnel, and security personnel. Twenty (20) finance personnel comprising twelve (12) males and eight (8) females were selected. At the human resources unit six (6) males and four (4) females were selected. At the audit unit four (4) males were selected. Also eight (8) males were selected from the transport and finally, eight males were selected from security unit. This summed up the respondents to a total of fifty (50).

![Figure 2 Background of the respondents](image)

The results indicates that about 22% of the respondents are between the ages of 20 and 30 years with 33% between the ages of 31 and 40 years, and 16% between 41 years and 50 years whiles 29% are ranging from 51 years to 60 years. The study observed that the elderly that is those between the ages of thirty one (31) years to sixty (60) years in the University, adhere to the control system more that the younger ones, that is those of ages twenty (20) to thirty (30).
Figure 3 Respondents Levels of Education

Figure 3 reveals that 27% of the respondents are HND holders and certificates below that 55% holds first degree, and 18% of them have master’s degree. The study revealed that those with higher levels of education in the University know more about internal controls and as such the need to adhere to the control system established in the University. This is because the get the opportunity to attend seminars and workshops since internal controls are important to good corporate governance, issues on the systems are raised and they learn from that. The lower certificate holders with fewer responsibilities have little knowledge on the controls but also adhere to the controls because their activities are guided by those in authority.

Figure 4 Years of Experience of Respondents

From Figure 5 it is revealed that 23% of the respondents have worked with the College for up to five (5) years, 49% have worked for about six (6) to ten (10) years, and 16% of them have been working there for the past eleven (11) to fifteen (15) years, whiles 12% have worked for more than sixteen (16) years at the College. From the study, it was observed that more experienced people in the University who understand the control system very well try to find their way out. That is they try to some extent to outwit the system to their favour while the in experienced staff who may not know more about the procedures only do what they are asked to do, as such go astray from the appropriate policies.

Figure 5 describes the total number of respondents for the various categories of job with their percentages.
Twenty (20) respondents were selected from Finance representing 40% of the total respondents. Ten (10) were selected from Human Resource Section, representing 20% of the total respondents, four (4) from Audit unit also representing 8% of the total respondents, eight (8) respondents were also selected from the Transport Section representing 16% of the total respondents, and finally eight (8) respondents also representing 16% of the total responses, were selected from Security Unit.

4.1.2 Use of Assets in the Institution

From figure 7, Thirty-six (36) respondents representing 80% of the total responses responded “Yes” as to whether asset handling and management are stipulated in a document. Nine (9) respondents, representing 20% of the responses, however, responded “No”. Therefore, taking the views of the majority to be the general view, it could be said that assets handling and management in the University is stipulated in a document. However, this gives the total response to either in the positive or the negative to the question as to whether there could be unauthorised use of assets in the Institution.
Figure 7 Can there be unauthorised and unapproved use of assets

Again, a total of ten (10) respondents answered “yes” to unauthorised and unapproved use of assets. This represents 22.22% of the responses. On the other hand, thirty-five (35) respondents, representing 77.78% of the total responses answered “no”. To them, an asset cannot be used without an approval given to do so. Considering the views of the majority, unauthorized use of assets is not allowed in the Institution.

Figure 8 gives the respondents to the question whether movement of assets in the Institution are recorded.

Figure 8 Are movements of assets recorded

From figure 8 again, forty (40) respondents, representing 88.89% of the total responses responded “yes”. Meaning movement of assets in the Institution are recorded so that at any point in time any movable assets could be located or traced. Five (5) of the respondents representing 21.11% of the responses responded to the contrary.

Figure 9 gives respondents views as to whether there are proper physical safeguards and facilities to protect cash and other assets.
Figure 9, Are there proper physical safeguards and facilities to protect cash and other assets

The study revealed that cash and other assets of the Institutions are being protected by proper physical safeguards and facilities. This was made known as all the forty-five (45) respondents representing 100% of the total responses answered “yes” to the question that was put forward to them, as there wasn’t any “No” answer to the question.

Figure 10, Are assets applied only in the service of the institution.

Responses presented by figure 10 on whether assets are applied only in the service of the University was that out of the forty-five (45) respondents, thirty-two (35) of them, which represent 71.12% of the responses responded ‘yes’. The remaining thirteen (13), representing 28.88% of the total responses gave negative responses. From the various responses given by the respondents on the question put forward to them to ascertain whether measures are put on the use of the institutional assets, it was realized from the responses, by considering the majority views to be the general views of respondents, that effective measures are put on the use of the University’s assets.

4.1.3 Caliber of Personnel Employed to Improve upon Internal Control System

Responses from respondents on the characteristics of personnel employed in the Institutions to help improve upon the internal control system are presented in figure 11.
Figure 11. Calibre of personnel employed in the University

From figure 11, sixteen (16) respondents which represent 35.56% of the total respondents said that employed are degree holders. Another sixteen of the respondents, which also represents 35.56% of the responses, said personnel being employed are experienced. Four (4) respondents also representing 8.88% of the responses said personnel with good ethical values are those being employed in the University. Nine (9) respondents, representing 20% of the responses said that there are situations where inexperience people are also being employed. However, they said that in such a situation, such people are given some kind of training that would help equip them under-take their jobs as required from them.

From the responses presented by figures 6 to 10, it was found that internal control system at institutions and organizations, with respect to measures put in place on the use of assets, were appropriate. However, there were a few lapses, which could not be inevitable but limited. The reasons being that the system, though in place, cannot operate by itself and therefore need to be effected by people. As a result these people due to human errors, fraud or malfeasance, can manipulate the system for personal gain and bring it to shambles, which the author wish otherwise.

4.2 Discussion

Measures are put on the use of assets to ensure that access to assets, either directly or indirectly, are regulated and also serve as security devices and measures for the safe keeping of the assets. This is to ensure that no one has uncontrolled access to an entity’s assets and to use it for his or her own interest.

According to the key components of internal control from “In Bottom-Line” [9], anyone who has access to company assets would want to misuse them, and that there is the need for effective internal control system to safeguard company assets.

In relation to this, the responses given by respondents, with respect to research question one, majority of the respondents, whose view were taken to be the general views, stated clearly that effective measures are put on the use of the institutional assets to ensure that they are judiciously used and applied in the service of the institution, which in turn helps to safeguard the organization assets and also contributes to the achievement of the institutions’ objectives and goal’s.

According to the report from [10] role of internal control in the public sector: A case study of Edweso government hospital, responses well to the graph in figure 6 which revealed that assets handing and management were stipulated in a document, stating clearly and firmly how the institutions expects its assets to be handled and managed. Confirmation was made from the thirty-six (36) out of the total of forty-five (45) respondents, which represents 80% of the responses from figure 6, respectively.

From figure 7, 77.78% of the respondents which was majority views stated that assets of the University could not be made use of without first being authorized or approved to be used. They further explained that before anyone could have a use of the University’s assets for the execution of business in the interest of the institution, there must be someone in authority to approve that,
and that no one was allowed to use the organization assets for personal benefit. 88.89% of the respondents said that before any asset would be allowed to be moved, it must first be recorded so as to ensure that its movement is monitored. These were the responses given by respondents from figure 8. In figure 9 all the respondents, representing 100% of the total responses agreed that there were proper physical safeguards and facilities to protect cash and other assets. That is cash is locked in cash safes, data on computers protected by passwords, vehicles packed and locked at the institutions premises and watched over by security personnel, etc. It was also found from 71.12% of the respondents in figure10 that assets of the internal control units are applied in the service of the institution. The various responses from respondents with respect to research question one and interview conducted revealed clearly some of the measure put on the use of assets at Institution which are being adhered to, and as a result has helped in the effective and efficient operations towards the achievement of the Institution. As noted from the literature, internal control is only as effective as the integrity and competence of the people who develop, administer, and monitor the controls. Respondents’ responses on the characteristics of personnel employed at Institutions revealed that both experienced and inexperienced people could be employed by the organization to take up operating activities. It was also found that most of the operating staff are not highly qualified people and in addition the ethical values of personnel are mostly not taken into account during employment. In view of this there seems to be influences of the caliber of personnel and internal control system of the Institutions.

Conclusion

Internal control systems has been the subject of a series of explorations since generations, however, some originally in both government and private sector legislators and regulators gave internal control significant attention as a result of Watergate relation of illegal domestic political contributions. The study sought to enhance and investigated the caliber of personnel Influence of Management’s Compliance to internal control at the Organizations and Institutions levels. There was a critical characteristics and analysis that revealed the following as pertaining in an organisation;

1. The work output is not encouraging.
2. The study revealed the actual establishment of internal control system prevailing at institutional and organizational levels, which has contributed, to a large extent, the achievement of the organization objective.
3. Various constituents of internal control systems in the institutions, all possible strategies and mechanism that are in place and those needed to be implemented to make the institutional internal control system more effective and efficient, were unearthed and addressed accordingly to help improve upon the system.
4. Management area, involving their subordinates, has a lesser attention pull-out and internal control systems are not motivating to work well.

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Retrieved 12 February 2020

Typical and Atypical Manifestations and Characteristics of the covid-19 Chest CT Scanner: Retrospective study of 28 patients

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Abstract-

Objective: The aim of our work was to describe the typical and atypical aspects in our retrospective study of 28 patients.

Methods: Scanning examinations were carried out on two scanners type 16 and 64 Bars with thin sections (1.5mm). Data collection was done retrospectively from a reading made on the PACS system by two radiologists and helped by reports on the department's RIS system.

Results: The predominant typical damage found was a combination of central and peripheral bilateral ground glass opacity with consolidation associated with a high percentage of traction bronchiectasis and sub segmental vascular dilation. Atypical nodular, lymph node, and pleural injuries were very low in our series.

Conclusion: Atypical attacks are rare compared to typical known attacks. Typical disease may often be associated with crazy paving, bronchiectasis, and sub-segmental vascular dilations indicating signs of inflammatory disease severity.

Keys points:

1- Chest CT revealed mixed involvement (consolidation and ground glass opacity) predominant and crazy paving, with bilateral lung localization predominant in the lower right lobe.
2- Atypical damage (nodule, lymphadenopathy, and pleural damage) was very low at 4%.
3- Bronchectasia was found at 32% and subsegmental vascular dilatation was found at 61%, showing the seriousness of the lung involvement.

Index Terms: Lung- Radiology- Infection- Coronavirus

I. INTRODUCTION

The coronavirus was first declared in Wuhan on December 31, 2019 and declared as much as a global pandemic on March 11, 2020 by the World Health Organization (WHO). Its clinical presentation is similar to that of viral pneumonia and causes severe acute respiratory syndrome (SARS). The reference exam for its diagnosis is the real-time reverse transcription polymerase chain reaction (RT-PCR) method performed on samples from the respiratory tract. However, due to intrinsic limitations (i.e. collection and transportation of samples and diagnostic kit performance), sensitivity of RT-PCR at initial presentation ranges between 60% and 71% [1-2]. Because of the primary involvement of the respiratory system, chest CT is strongly recommended in suspected COVID-19 cases, for both initial evaluation and follow-up [3]. The CT sensitivity is 98% [4].

The aim of our study was to study the typical and atypical characteristics of CT lesions the 28 patients who have been diagnosed positive covid in our hospital and to illustrate the different manifestations found.

II. RESEARCH ELABORATION

This study was approved by the Ethics Committee of our institution. Signed informed consent was obtained.

1. Type of study:
This is a retrospective study on the characterization of lesions on chest scanners of patients confirmed at Covid-19. The study spanned between April 1 and May 26, 2020.

2. Data collection and analysis:
Data collection was done retrospectively from a reading made on the PACS system by two radiologists and helped by reports on the department's RIS system. It was based on the different morphological characteristics of the lesions (ground glass opacity, consolidation, mixed, crazy paving, reversed halo sign, pleural and lymph node involvement) and their lobar localizations. All scanners were produced without injection by a 16 and 64 bars scanner with thin sections (1.5mm).

Hygiene and disinfection measures were established after each examination. Exclusion criteria are scanners with breathing motion artifacts, normal scanners in Covid positive patients and scanners without positive PCR.

3. Data analysis:
Statistical analysis of all variables has been described through the use of descriptive statistics tools. Qualitative variables have been described in terms of percentage. The coding and the processing of the data were carried out on Excel Software.
III. RESULTS AND FINDINGS

Number of patients: 28
Average age: 57 ranging from 19 to 81
Patient gender: 19 men (67%) / 9 women (32%)

Imaging results:
The most common lesions are consolisdation with ground glass opacity at 57%, followed by ground glass opacity alone and crazy paving at 43%. [Table I]
Bronchiectasis and sub-segmental vascular dilation were found at 32% and 61%. Nodule, pleurisy and lymphadenopathy were found in few patients (4%). [Table I]

Table 1: The different characteristics with the number and percentage translation of patients reached.

<table>
<thead>
<tr>
<th>Lesion</th>
<th>Number (n=28)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>GGO (Groud glass opacity)</td>
<td>12</td>
<td>43%</td>
</tr>
<tr>
<td>Consolidation</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>GGO+Conso</td>
<td>16</td>
<td>57%</td>
</tr>
<tr>
<td>Inetrolobar septal thickening 6</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Reticular pattern</td>
<td>10</td>
<td>36%</td>
</tr>
<tr>
<td>Crazy paving</td>
<td>12</td>
<td>43%</td>
</tr>
<tr>
<td>Nodule</td>
<td>1</td>
<td>4%</td>
</tr>
<tr>
<td>Bronchiectasis</td>
<td>9</td>
<td>32%</td>
</tr>
<tr>
<td>Pleural effusion</td>
<td>1</td>
<td>4%</td>
</tr>
<tr>
<td>Reversed halo sign</td>
<td>1</td>
<td>4%</td>
</tr>
<tr>
<td>Lymphadenopathy</td>
<td>1</td>
<td>4%</td>
</tr>
<tr>
<td>Sub-segmental Vascular dilatation</td>
<td>17</td>
<td>61%</td>
</tr>
</tbody>
</table>

For the localization; we found bilateral lung localization predominant in the lower right lobe at 82%. [Table II]

Table II: Number and percentage of lesion localization.

<table>
<thead>
<tr>
<th>Lesion localization</th>
<th>Number (n=28)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centrale or peripheral localization</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peripheral zone</td>
<td>12</td>
<td>43%</td>
</tr>
<tr>
<td>Central zone</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Central + Peripheral zone</td>
<td>16</td>
<td>57%</td>
</tr>
<tr>
<td>Chest localization</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right</td>
<td>6</td>
<td>21%</td>
</tr>
<tr>
<td>Left</td>
<td>1</td>
<td>4%</td>
</tr>
<tr>
<td>R+L</td>
<td>21</td>
<td>68%</td>
</tr>
<tr>
<td>Lobe Localization</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right upper lobe</td>
<td>8</td>
<td>29%</td>
</tr>
<tr>
<td>Right middle</td>
<td>9</td>
<td>32%</td>
</tr>
<tr>
<td>Right lower</td>
<td>23</td>
<td>82%</td>
</tr>
<tr>
<td>Left upper</td>
<td>8</td>
<td>29%</td>
</tr>
<tr>
<td>Left lower</td>
<td>20</td>
<td>71%</td>
</tr>
<tr>
<td>Number of lobe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Lobe</td>
<td>7</td>
<td>25%</td>
</tr>
<tr>
<td>2 Lobes</td>
<td>9</td>
<td>32%</td>
</tr>
</tbody>
</table>

Figure 1: 46 year old presented cough with fever progressing for 10 days.
Axial CT showed ground glass opacity with condensation, bilateral peripheral with traction bronchiectasis.

Figure 2: 62 years old, presented with fever and myalgia.
Axial CT scan showed; unilateral peripheral and central ground glass opacity.

Figure 3: 62 years old, presented with fever, cough and abdominal pain.
Axial CT scan showed; unilateral Crazy paving with subsegmental vascular dilation.
Figure 4: 60 years old, presented febrile cough with impaired general condition. Axial CT scan showed reversed halo sign located on the lower left lobe (Arrow).

Figure 5: 50 years old, febrile dyspnea. Axial CT scan showed ground glass opacity extended with two bilateral nodular lesions (Arrow).

Figure 6: Patient is 65 years old, presented with severe respiratory distress with fever. Axial CT scan showed an extensive right consolidation with traction bronchiectasis (Arrow) and homolateral pleurisy.

IV. RESULTS AND FINDINGS

Coronavirus is an infectious disease presented in the form of a global health crisis. Various studies on covid 19 imaging have been performed. In our establishment in Casablanca, Morocco, we conducted a study on the lesion characteristics of this pathology on the chest scanner of confirmed positive Covid patients. The most common typical scan injuries were peripheral ground glass opacity with consolidation associated with significant presence of Crazy paving, traction bronchiectasis and sub-segmental vascular dilatation attests to the seriousness of the pulmonary attack in our patients. The atypical scan aspect was nodule, lymphadenopathy, and pleurisy.

The average age of our patients was 57 compatible with that of the study by chung et al [5] with a predominant number of men at 19 (67%) and a number of women at 9 (32%) unlike the studies of Bernheim et al [6], Wu et al. [7] and Pan et al. [8] where the difference in gender is very small.

For the morphology of the various pulmonary lesions, our patient series revealed results slightly superior to the study by Bernheim et al [6] in ground glass opacity 43% vs 34%. Mixed ground glass opacity and consolidation were found at a very high rate of 57% vs 41% found in Bernheim et al [6] and 29% found in chung et al [5]. On the other hand, the presence of consolidation alone was not found in our series and differed from the two studies by Bernheim et al [6] at 2% and Chung et al [5] at 29%. We also noted that the presence of crazy paving is high by 43% vs 36% in li et al [9]; a percentage that exceeds the results of most studies. Nodule was described in one patient, 4% vs 13%, which is the highest percentage found by the pan et al [10].

The presence of bronchiectasis at 32% far exceeds the studies of chung et al [5] and Bernheim et al [6] which not found this type of lesion. Pathogenesis can be the inflammatory damage of the bronchial wall and the bronchial obstruction, resulting in the destruction of bronchial wall structure, proliferation of fibrous tissue, fibrosis, and tractive bronchiectasis [11].

Sub-segmental vascular dilatation was significantly found in 61% compared to 89% in Damiano Caruso’s study [12]. Ye et al suggested vascular enlargement may be due to pro-inflammatory factors [13].

Pleurisy and lymphadenopathies were found in one patient, which is very rare and consistent with the results of the literature found.

For the lesion site; our results are comparable to those of the study by K. Wang et al. [14]; Most of the lesions were peripheral and central at 57% vs. 56% and 43% peripheral vs. 43%, with no central involvement only.

Bilateral involvement of both lobes was predominant and was found to be 68% vs 76% in Chung et al [5]. Damage to the right lower lobe was found to be well over 82%, which is in line with the results of the majority of the literature.

The main limitation of our study is the number of patients, which is barely 28 patients during one month of collection, thus allowing a study on a small sample.
V. CONCLUSION
The atypical impairment are rare (nodule, lymphadepathy, and pleurisy), in contrast to the typical damage caused by the combination of peripheral and central basal ground glass opacity and consolidation. The high presence of crazy paving, traction bronchiectasis and sub-segmental vascular dilatation attests to advanced pulmonary inflammatory disease affecting patient management and prognosis.

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Teachers’ and Students’ Perspectives On Using Authentic Materials in Teaching English at Hanoi University of Home Affairs

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Abstract- Teaching materials play an important role in teaching and learning process. Authentic materials have proved useful in fulfilling the goal of communication of learning foreign languages and the needs of the learners. In addition, these materials facilitate and support the teaching and learning process. The purpose of this study is to (1) investigate teachers’ and students’ perceptions towards the advantages and challenges of authentic materials used in teaching English, and (2) explore the differences between teachers and learners’ perspectives on authentic materials. Findings from the descriptive statistics were analyzed based on the questionnaire and semi-structure interviews. The results of the study suggested that general perspectives of the participants on authentic materials used in teaching English at Hanoi University of Home Affairs were positive.

Index Terms- perspective; authentic; material; language teaching; teaching materials

I. INTRODUCTION

1.1 Background of the study

One of the most important and essential tools in foreign language teaching and learning is the material used during the lessons. The materials can have a significant effect on the language learners’ motivation, learning process and desire to learn more. For this reason, the materials should be created from the learners’ point of view since they are the ones who benefit the most from the materials. However, it must be pointed out that it is impossible to create materials that can meet the needs of language learners since the students are at different levels. As a result, a variety of different materials are used in foreign language teaching.

It is believed that using authentic materials correspond the mastery of four skills, enable students to function the language effectively in appropriate context and society. Epstein and Ormiston (2007) believe that a teaching material is a tangible factor that a teacher can use to deliver instruction and assist students in learning and acquiring a language.

McNeil (1994) and Kilickaya (2004) indicate that the use of authentic text is now considered to be one way for increasing students’ motivation for learning since they give the learners the feeling that he/she is learning the real language – the target language as it is used by the community that speaks it. It is true that when planning the materials for learning a foreign language, the opinions and thoughts of both teachers and students should naturally be taken into account since they know what the best way to teach and learn is. The teachers and students are the ones who use the materials on a daily basis and know what works and what does not. In this study, the author took into account teachers’ and students’ perspectives and pointed out the differences between them to draw a reliable conclusion on the use of authentic materials in the foreign language classrooms.

1.2 Aims of the study

The study aims at investigating teachers’ and students’ perceptions towards the advantages and challenges of authentic materials used in teaching English, and exploring the differences between teachers and learners’ perspectives on authentic materials.

1.3 Research questions

From the above mentioned aims, the study attempts to answer the following questions:

- What do teachers think of the benefits and challenges of authentic materials to students’ learning?
- What do students think of the benefits and challenges of authentic materials to their learning?
- Is there a gap between teachers’ and students’ perspectives on authentic materials? What does the gap imply for classroom use of authentic materials?

II. A REVIEW OF RELATED LITERATURE

2.1 Definitions of authentic materials

According to Grave (2000), using materials is identified as one of the most important aspects in designing a language course. For this reason, teachers have variety of choices in choosing materials to support their teaching and students’ learning. Through the teaching and researching experience, many researchers have provided different definitions on authentic materials.

Nunan (1989) as cited in Adams (1995) believe that authentic materials as any materials that has not been specifically produced for the purpose of language teaching. Harmer (2001) stresses on the reality of certain materials by stating that authentic materials are those written for native speakers of the
language with the real purpose. Similarly, Bacon and Finnemann (1990) define authentic materials as text produced by native speakers for non-pedagogical purposes. Gardner and Miller (1999) explain that authentic materials mean any texts (printed or digital) or tape which is produced for a purpose other than teaching the target language.

2.2 Advantages of using authentic materials in teaching English

Authentic materials are also interesting and motivating. By using authentic materials, learners can develop survival language skills and learn tolerance for regarding things they do not understand. Authentic materials are basically not produced for teaching or learning but give an exposure to language used in real life and when these materials are used in the classroom they motivate the learners to participate in a real conversation and thereby facilitate language learning.

It is evident that the uses of authentic text like newspapers helps the learner develop their communication skills and stimulate their interest in engaging them with the classroom activities through which they develop confidence and enjoy learning. Besides, learners are more comfortable when the input is provided from their own culture and customs in order to relate the context to the real life. Peacock (1997) and Brinton (1991) consider authentic materials as a bridge between the classroom and the real world, and offer the language learners a valuable source of authentic language input.

Moreover, this type of materials can also have an obvious effect on enhancing learners' motivation, arouse their interests and increase their active participation in learning activities. Tomlinson (2012) advocates that authentic materials can motivate learners and help them develop a range of communicative competencies and enhance positive attitudes towards the learning of a language. Similarly, Do (2011) finds that using authentic materials is an effectively way to enhance university students’ motivation in foreign language courses. This idea is also true for teachers who have high motivation, and would like to implement new ideas in their classrooms. Teachers should be aware of their context and try to adapt things to meet students’ needs.

2.3 Challenges of using authentic materials in teaching English

It cannot be denied that the advantages that authentic materials can bring is significant in getting learners exposed to the real use of the language, however there are still so many issues to consider.

Authentic input has long been perceived as too difficult for students at all levels. Martinez (2002) mentions that authentic materials may be too culturally biased and difficult to understand outside the language community. Learners may experience frustration “when confronted by an authentic text, especially lower level students as found by McNeil (1994). Schmidt (1994) argues that authentic discourse may panic learners who find themselves faced with the speech of delivery coupled with a mixture of known and unknown vocabulary and structures; instead, he prefers using simplified texts that have communicative value rather than using authentic input. Furthermore, grammar and vocabulary in authentic materials are used for communicating and informing in the society, thus the content of the text sometimes is not appropriate for students.
Table 1: Students’ perspectives on the benefits, the challenges of using authentic materials and how to use authentic materials

As can be seen from Table 1, the majority of the students (92.4%) strongly agreed that authentic materials help them understand how English is used in the real life.

Similarly, in item 2, most of the students (87.1%) believed that using authentic materials help them be aware of the differences between English in the textbook and English in the real life.

For item 3, more than two thirds of the students (78.3%) agreed that the contents of authentic materials are motivating.

In the next item, 82.8% of the students said that the cultural content in authentic materials is interesting while 17.2% of them felt that the materials are not interesting.

The responses to item 5 spread all over the four choices with different percentages. The biggest number of the students (53.8%) disagree, and 9.7% of the students strongly agree that there are so many unknown words in authentic materials.

In terms of item 6, nearly all the participants (88.2%) found it difficult to understand the language in authentic materials, whereas 9.7% did not think it was too difficult to understand. Only 2.2% strongly disagree with this statement.

For item 7, less than half of the students (48.4%) agreed that authentic materials are only good for students whose English is good. Meanwhile, 51.6% of the students had different points of view.

For the next item, item 8, 77.4% of the respondents indicated that authentic materials are only good if teachers know how to design appropriate tasks.

In addition, in item 9, the majority of the students (98.9%) did not believe that authentic materials are not necessary because there is no time for students to use them.

For item 10, most of the students (81%) felt that they should be encouraged to bring authentic materials into the classroom to share with other classmates.

4.2 Results from teachers’ interviews

The use of follow-up interview provided a more comprehensive picture of the participants’ perspectives on authentic materials. The findings from the analysis are presented below.

- Reasons for using authentic materials
The results of the interviews indicated that four out of five teachers said that they used authentic materials for their own teaching purpose while one teacher replied that she did not use this kind of materials in her classes.

- **Frequency of the use of authentic materials**
  Concerning about the frequency of the use of authentic materials, one teacher has reported before that she never uses authentic materials, the remaining four teachers ranged between ‘Always’ as indicated by two teachers, ‘Often’ by two teachers and ‘Sometimes’ by one.

- **Benefits of authentic materials in English language teaching**
  It is obvious that all of the teachers perceived the advantages of authentic materials whether they

- **Challenges of using authentic materials in the classroom**
  All of teachers indicated that they have difficulties in using authentic materials in terms of time, the curriculum, the facilities for teaching, learners’ background and attitude.

- **How to use authentic materials effectively**
  Three out of five teachers said that they asked students collect and bring authentic materials that they like to class, so it was easy for teachers to engage students take part in activities in class. Two teachers shared that they selected the materials according to students’ level, needs and interests.

**V. CONCLUSIONS**

The findings from the survey reveal that most of the teachers and students indicate positive attitudes toward providing authentic materials in their classes. Based on the responses in the students’ questionnaire and teachers’ semi-structured interview, it can be concluded that positive attitudes were grounded on many advantages of authentic materials in improving and developing language skills. Moreover, authentic materials have both positive effects on learners’ motivation and bridge the gap between classroom setting and the everyday life language in the real world. Additionally, authentic materials provide learners authentic cultural information and support teachers a creative approach to teaching.

For better applications of authentic materials, English teachers should put more emphasis on the pedagogical purpose when selecting teaching resources. Appropriate authentic materials chosen can suit the students’ language proficiency, and meet their interests and background. Besides, the government, through the Ministry of Education, should make a clear policy on the integration of media in education to provide an available access to authentic materials. Both students and teachers have chances to exploit the media for the use of authentic materials for teaching and learning language. As a result, universities have to be equipped with good facilities that support and provide teachers and students sources of authentic teaching and learning materials.

**REFERENCES**


**AUTHORS**

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APPENDIX 1

STUDENTS QUESTIONNAIRE

Authentic materials are texts produced by native speakers for non-teaching purposes. These materials reflect the real world. Such materials include TV commercial, news items, weather forecast, radio talks, interviews, articles, train timetables, advertisements, brochures, and application forms.

Please put a tick (✓) in the column that best shows your level of agreement and disagreement.

<table>
<thead>
<tr>
<th>No.</th>
<th>Statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Using authentic materials help students understand how English is used in real life.</td>
</tr>
<tr>
<td>2</td>
<td>Using authentic materials help students be aware of the differences between English in the textbook and English in the real life.</td>
</tr>
<tr>
<td>3</td>
<td>The content of authentic materials motivates students.</td>
</tr>
<tr>
<td>4</td>
<td>The cultural content in authentic materials is interesting.</td>
</tr>
<tr>
<td>5</td>
<td>There are so many unknown words in authentic materials.</td>
</tr>
<tr>
<td>6</td>
<td>The language in authentic materials is too difficult for students to understand.</td>
</tr>
<tr>
<td>7</td>
<td>Authentic materials are good for students whose English is good.</td>
</tr>
<tr>
<td>8</td>
<td>Authentic materials are good only if teachers know how to design appropriate tasks.</td>
</tr>
<tr>
<td>9</td>
<td>Authentic materials are not necessary because there is no time for students to use them.</td>
</tr>
<tr>
<td>10</td>
<td>Students should be encouraged to bring authentic materials into the classroom to share with other classmates.</td>
</tr>
</tbody>
</table>

Thank you!

APPENDIX 2

QUESTIONS FOR TEACHERS’ INTERVIEW
1. What are the reasons for your using or not using authentic materials? How often do you use authentic materials?

2. In your opinion, what kinds of materials are considered as authentic materials? Give some examples.

3. If you have used authentic materials in your teaching, what do you think are the benefits to the students? Give examples.

4. What are the challenges of using authentic materials in the classroom? Give examples.

5. Can you give some suggestions to use authentic materials effectively?
The Role of Leadership and Strategic Implementation in Humanitarian Agencies in Rwanda: Case of American Refugee Committee

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Abstract: The general objective of this study was to assess the role of leadership and strategic implementation in humanitarian agencies in Rwanda. Cross-sectional and descriptive research designs were used. The total population was 247 from which 153 respondents were selected as sample using stratified random sampling technique. Data collection methods involved questionnaire, documentation analysis and interview. Analysis of data was done through SPSS, version 20. As indicated, research findings. The findings revealed that the four models tested using ANOVA for competence of staff, communication of strategic implementation, the amount of resources deployed and the number of people attending training were statistically significant with leadership as measured by inspiring trust, vision creation, in executing strategies and in coaching potentials. The research recommended the use of leadership style which allows for interaction and transformation for strategic implementation.

Key Words: Leadership, Leader, Strategy, Implementation, Strategic Implementation, Humanitarian Agency

1 INTRODUCTION

Leadership is recognized as important key driver for strategic implementation and acts as major barrier to effect implementation of strategy if it lacks among top leadership of institution. Without effective strategic leadership, the capability of institution to achieve or to sustain the competitive advantage therefore superior performance is greatly constrained (Elenkov, Judge & Wright, 2005).

According to Mwongela (2013), the concept of strategic implementation is a long process geared towards organization achievements and is time consuming for organizations. The strategic implementation is more costly in terms of time, human efforts and resources to achieve strategic development. According to Hornsby (2000), the concept of leadership is important aspect to achieve strategic implementation if it is well designed. Good leadership within working organization facilitates achievement of vision and mission more effectively. Therefore the management of any organization needs to perform leadership roles like bringing innovation, strategic experts, team members who are committed to bring changes and good decision making as well as effective collaboration in risks taking (Thompson, Strickland & Gamble, 2010).

This study was carried out in ARC-Rwanda Program. ARC (American Refugee Committee) is a non-profit, non-sectarian, international humanitarian organization providing primary health care, nutrition, WASH, SGBV Protection other related services to vulnerable people uprooted by war and civil conflict. ARC provides assistance to more than one million refugees, displaced persons from Burundi and DRC. These refugees are based in Mahama, Gihembe, Nyabiheke, Kiziba, Kigeme and Mugombwa. All of the refugee camps are occupied by Congolese refugees except for Mahama which is occupied by Burundian refugees. Most of the ARC-Rwanda beneficiaries are men, women and children. ARC-Rwanda receives support from individuals, corporations and foundations, and grants from the US government- BPRM and United Nations agencies such as UNHCR, WFPA, and WFP. ARC- Rwanda started working in Rwanda in 1994 right after the end of the Genocide against the Tutsis in Rwanda. It was helping Rwandan returnees to settle back in their country by giving emergency relief such as shelter and health.

ARC believes that lasting solutions to the world’s refugee problems require the direct participation of the local populations in the country affected by crises. ARC links emergency health care assistance with self-help training, enabling refugees to become more self-reliant so they may educate others. Training in basic primary health care helps curb the tremendous number of deaths due to unclean water, poor sanitation, and preventable diseases for which immunizations or other preventive methods exist. ARC’s methodology is to work on both sides of a border or situation as early as possible to help rehabilitate the community of return and link the level of care and services to those which can be taught/learned/practiced in the home communities. ARC services displaced persons for the long term and helps them voluntarily return home with
ARC programs that link into longer-term development/sustainable projects. The general objective of the study was to assess the role of leadership to achieve strategic implementation in humanitarian agencies in Rwanda, a case of American refugee committee.

The specific objectives of the study were as follow:

i. To examine how a leader inspires trust among employees in order to contribute to strategic implementation in ARC

ii. To find out how a leader uses vision creation to achieve strategic implementation in ARC.

iii. To assess the extent to which a leader implement strategies with and through employees of ARC.

2 REVIEW OF RELATED LITERATURE

Organization leadership presents an important contribution in strategic management process as this determines the organization vision and mission. Within nonprofit making organizations, leadership assists in strategic execution of the stated vision as this is based on the set of behavior to inspire people in formulating organization goals. Leaders play an important role in structuring good leadership through effective leadership to achieve success (Ndunge, 2014).

According to Sami, qamar and Khalid (2011), organization leadership applies to the realization of strategic implementation and achieving strategic plan based on management approach of the organization. Therefore, strategic implementation is driven on the way leaders participate in decision making. To achieve good leadership, the top management contributes in strategic planning, strategic implementation and sometimes initiates towards vision creation, shaping organization vision, setting clear direction and working towards organizational goals and objectives (Hitt, Ireland, & Hoskisson, 2007).

2.1 Inspires trust

According to Quigley and James(2007), the concept of trust consists of dainty property of human relationship and indicates the state of power among people and is guided by good conducts in terms of works, speech, achievement and other behavioral aspects of people within social working environment. Being trustful takes time to be happen and it can easily be abolished for some instance. Inspiring of trust among organization employees consists of aspects of clarity, compassion, characters, contribution as well as consistency. In so many organization, inspiring of trust constitute the significance for people and is applied to assess the individuals beliefs, ability, consistency and integrity (Thompson & Strickland, 2010; Aosa, 2008).

2.1.2 Creating the vision

The concept of vision applies to the anticipated future of organization and is different from organization slogan or mission. Indeed, it describes what the organization intends to achieve at some point (Hsieh & Yik, 2005). According to (Taylor, 2007) the concept of vision indicates the image of organization or individual measured in terms of core activities and systematic application. Creating the vision goes through development of strategies to achieve the intended goals and bring the best results. The best way to reach there is to encourage employees through motivation and letting them be the important resources.

According to Robbins and Coulter (2010), vision is about getting from here to there from what is going on today to what must happen tomorrow. A powerful vision is one which challenges the employees to give their best efforts and therefore that vision need to transcend in bottom line because employees are willing and eager to commit to something true, worthwhile and that makes life better for all.

2.1.3 Strategic execution

According to Northouse (2013), strategy execution is about transformation of vision, mission and core competences in strategies for an organization excellence. Executing the strategy ensures that leaders use several tools to turn strategy into action. Therefore new strategy must be resourced properly, understood and implemented. Leaders are responsible for making decisions about changes in structure, systems and policies to support their organization’s strategic direction. The execution of the strategy is based on facts, rational analysis, intuition, personal experience and imagination. Therefore, executing the strategy is about consistently achieving results with and through others using disciplined processes (Burnes, 2007).

Executing the strategy requires the maximization of organizational potential and ultimately the results by accelerating the alignment of the strategic organizational models and people. Executing the strategy requires that employees be in the right profile and motivation and also be in an environment that is conducive to flawless execution (DFID, 2000).

2.1.4 Coach potential

According to Galek (2015), effective leaders develop the leadership potential in others and improve performance through consistent feedback and coaching. The coach possesses a unique standing in organization that is often accompanied by respect and popularity. However, the leader needs to be successful model and coach in many fields of endeavor. The leader as coach potential establishes the customary leadership model by leading from the bottom-up. Leader as coach potential empowers others in the process of transferring a portion of power that is often reserved for the top rung of traditional leadership. However, the very essence of coaching is an exchange of knowledge between the mentor and the mentee (Russell & Stone, 2002).

2.1.5 Theoretical literature on strategic implementation

According to Thompson, Strickland and Gamble (2010), strategic implementation within business
organization needs to be projected by top management through designing proper plans of organization activities to achieve a desired outcome. The concept of strategic implementation applies to the organization policies and strategies undertaken based on available budgets to achieve an intended development or programs. Strategic implementation is a continuous process based on proper planning and effective resource allocation (Wheelen & Hunger, 2008). The implementation of strategies is accomplished through the core competencies among organization staffs which is measured based on traits, capabilities, attributes and skills of staffs which significantly contribute to the organization performance (Aaltonen & Ikavalko, 2001). Extent of communication within the organization is key pointer to implementation of strategies (Karani, 2009; Wiggill, 2011). In addition, proper utilization of resources is an issue related to effective strategy implementation (Okumus, 2003). The last indicator of strategy implementation is the number of staff who attend trainings (Galek, 2015).

2.2 Empirical literature review

The study conducted by Taylor (2007) in London to assess how strategic leadership contribute to the changes within organization and improvement of organization activities. A study done by Pearce and Robinson (2007) in USA about strategic management implementation and organization control revealed that there is a big problem in strategic implementation related to poor coordination of both material, human and capital resources. The field survey done by Sterling (2003), in USA to assess the strategic implementation showed that most of strategies undertaken to achieve organization activities fail due to market fluctuation, poor organization support, problem related to competition and inappropriate application of organization resources. Abubakar (2011), revealed that most problems hindering strategic implementation process result from unclear structures within an organization. An assessment done by Ahmadi, Salamzade and Daraei (2012), to show the impact of organization culture during the strategic implementation of project in Iranian commercial banks revealed that any type of organization culture influences the implementation of projects. The field survey done by Mbaka and Mugambi (2014), in Kenya to assess the strategy of project implementation more specifically in water sector revealed that the strategic implementation of water project is affected by project management, inappropriate project resource, limited technology and poor technical skills. The study findings also showed that type of leadership style and poor communication skills constitute significant effects on strategic implementation of some projects.

Another study done by Luftans (2012), at Kellogg about transformation of organizations, transformational leadership is very important on strategy implementation. It puts more emphasis on organizational leaders to provide resources, share the vision, show commitment, and ensure employee involvement in strategy implementation as well as welcoming new ideas. The theories discussed in this study include; contingency theory and implementation theory.

2.3.1 Contingency Theory (CT)

This theory was advanced by House (1996) and focuses on contingency approach within the management organization. This theory assumes that there is no specific way of managing, planning, organizing, leading, and controlling organizations. In this theory, the only strategy to be used within organization must be tailored to the specific circumstance faced by an organization. The theory point out the argument related to the managerial decision making which must be applied based on situation and market condition. A strategic leader takes suitable actions based on the aspects that are most important to the current situation. The implication of this theory to the current study is that leaders need to include staff members in sharing decision and take strategic policies to achieve strategic objectives. Within ARC, there is need for coordination, participation and teamwork to allow the organization to implement strategies.

2.3.2 Implementation theory (IT)

The implementation theory is the theory first advanced by Jackson (1991) to show how organization implement strategies through systematic design of techniques, exchange of information, allocation of resources and proper decision making to achieve the performance. This theory is of great importance as it indicates the relevance of designing effective strategies and how the strategies match with organization needs. Hence, customers’ satisfaction is achieved. The implication of implementation theory is that the achievements within organization are reached through cooperation between organization top management and employees as ingredient to achieve the success.

2.4 Conceptual framework

The main variable of interest in this study consists of independent variable which is role of leadership as it is measured by inspire trust, creation of the vision, execution of strategy and coach potential. However, strategic implementation in ARC as dependent variable and it is determined by the level of competence of staff members, extent of communication process, and amount of capital resource and number of people who attended trainings.
3.1 Research Design and Population

A cross section and descriptive research design was used as this remain effective in bringing clear description of the situation as it exist naturally. The study was conducted in Rwanda, in six refugee camps within five districts (Mahama refugee camp-Kirehe, Nyabikere refugee camp-Gatsibo, Gihembe refugee camp-Gatsibo, Gihembe refugee camp-Gatsibo, Kiziba refugee camp-Karongi, Kigeme and Mugombwa refugee camp-Huye) and Kigali city in Gasabo district at ARC Country Head Office. Data related to the role of leadership in strategic implementation in humanitarian agencies covered the period from 2016 to 2018.

The target population of this study was the top level management team who were given interview while officials of ARC in senior management section, finance, leadership team and Programs department who were given questionnaire. In total, the target population was 247.

3.2 Sampling Design

Yamane (1967) formulae was used to determine the sample size as follow:

\[ n = \frac{N}{1 + Ne^2} = \frac{247}{1 + \frac{247 \times 0.05^2}{247}} \approx 153 \]

Where, \( n \) = sample size, \( N \) = is the total population, \( e \) = Sampling error which is 5%. Therefore, the sample size is computed as 153 respondents. Stratified random sampling was used to select sample elements.

Table 1: Population and Sample Size

<table>
<thead>
<tr>
<th>Category of population</th>
<th>Population</th>
<th>Proportion</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top level management team</td>
<td>6</td>
<td>0.024</td>
<td>4</td>
</tr>
<tr>
<td>Officials of ARC in senior management</td>
<td>18</td>
<td>0.073</td>
<td>11</td>
</tr>
<tr>
<td>Officials of finance department</td>
<td>9</td>
<td>0.036</td>
<td>6</td>
</tr>
<tr>
<td>Leadership teams</td>
<td>23</td>
<td>0.931</td>
<td>14</td>
</tr>
<tr>
<td>Officials in program department</td>
<td>191</td>
<td>0.773</td>
<td>118</td>
</tr>
<tr>
<td>Totals</td>
<td>247</td>
<td></td>
<td>153</td>
</tr>
</tbody>
</table>

Source: Field data, 2020

3.3 Data Collection and analysis

In conducting this research, face to face interview was conducted for the top level management of American Refugee Committee. A structured questionnaire with closed-ended questions was administered to other staff in ARC.

The completed questionnaire was edited for completeness and consistency. Questionnaires were checked for errors and omissions. Data presentation and analysis was done using SPSS (Statistical Package for Social Science) version 20. Qualitative data were analyzed using content analysis to generate qualitative reports which were presented in a continuous meaning.

4 RESEARCH FINDINGS AND DISCUSSION

4.1 Demographic characteristic of respondents

Majority of respondents 85(55.6%) were male while 68(44.4%) were female. In terms of age group, research findings showed that 77(50.4%) of respondents were aged between 31-40 years; 38 (24.8%) aged between 41-50 years; 26 (17.0%) aged between 18-30 years while 12(7.8%) aged between 51-60 years.

In terms of education level, research findings showed that 85(55.6%) have completed diploma and 56(36.6%) have completed bachelor’s degree while 12(7.8%) have completed masters’ degree. Based on working experience, information collected from ARC revealed that 112(73.2%) of surveyed respondents have been working at ARC for the period between 3-5 years. Another 17(11.1%) for the period between 1-2 years, 15(9.8%) worked at ARC less than one year.
while 9 (5.9%) have working at ARC more than five years.

4.2 Presentation of findings

Table 2: Respondents’ views on Leadership

<table>
<thead>
<tr>
<th>The statement</th>
<th>Yes n</th>
<th>%</th>
<th>No n</th>
<th>%</th>
<th>PNS n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you have trust in ARC Leadership</td>
<td>13</td>
<td>87.</td>
<td>1</td>
<td>7.</td>
<td>4</td>
<td>4.</td>
</tr>
<tr>
<td>ARC leadership leads the employees towards the organization’s Vision</td>
<td>14</td>
<td>96.</td>
<td>1</td>
<td>7.</td>
<td>3</td>
<td>3.</td>
</tr>
<tr>
<td>Strategies in ARC were executed as a result of effective leadership</td>
<td>14</td>
<td>96.</td>
<td>1</td>
<td>7.</td>
<td>3</td>
<td>3.</td>
</tr>
<tr>
<td>ARC-Leadership hires the rightful people to fill strategic positions</td>
<td>9</td>
<td>4</td>
<td>1</td>
<td>7.</td>
<td>2</td>
<td>2.</td>
</tr>
<tr>
<td>ARC leadership coached your potential to implement the organization strategies</td>
<td>14</td>
<td>93.</td>
<td>1</td>
<td>7.</td>
<td>3</td>
<td>3.</td>
</tr>
<tr>
<td>ARC leadership helps you to achieve ARC’s vision as its employee</td>
<td>14</td>
<td>96.</td>
<td>1</td>
<td>7.</td>
<td>3</td>
<td>3.</td>
</tr>
</tbody>
</table>

PNS=prefer not to say

Source: Field data, 2020

As shown in Table 2, different responses were obtained from the respondents in regard to trust, vision, strategic execution, hiring and coaching. The majority of the respondents indicated by 87.6%, indicated they have trust in ARC leadership with only 7.8% say they do not have trust with the leadership. On whether ARC leadership leads the employees towards the organization’s vision, 96.1% of the respondents indicated yes and 3.9% said no. Similar results were obtained with majority of respondents indicating yes when asked whether strategies in ARC were executed as a result of effective leadership (96.1%), on whether ARC hires the right people (97.4%), on whether ARC leadership coach potential (93.5%) and lastly, on whether ARC leadership helps you to achieve ARC’s vision (96.1%).

Table 3: Ways in which leadership inspire trust

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Valid Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strong Human Resources</td>
<td>21</td>
<td>13.7</td>
</tr>
<tr>
<td>Introducing workers’ union</td>
<td>38</td>
<td>24.8</td>
</tr>
<tr>
<td>Social interaction with lower staff</td>
<td>94</td>
<td>61.4</td>
</tr>
<tr>
<td>Total</td>
<td>153</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: Field data, 2020

As indicated in Table 3, social interaction by leaders was the main contributing factor to inspiring trust. Such findings were in line with what Lufthans (2012) emphasized that leaders should be able interact with the juniors and ensure their participation. Results displayed in Table 4 below echo similar results by Lufthans (2012) who pointed out the need for visionary leaders in implementing strategic goals of an organization. The discussion by Hsieh and Yik (2005) revealed that leaders are supposed to provide vision at all times to their followers. Hence, there is need for more visionary leaders towards strategic implementations. Similarly, Robbins and Coulter (2010) pointed this out that leaders without an objective will have no motivation to perform and will mislead the employees and the organization at large.

Table 4: Respondents’ views on role of leadership on organization’s vision

<table>
<thead>
<tr>
<th>The statement</th>
<th>SA n</th>
<th>%</th>
<th>A n</th>
<th>%</th>
<th>D n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic goals by leaders of ARC lead the employees towards the organization’s vision</td>
<td>12</td>
<td>83.</td>
<td>13</td>
<td>18.3</td>
<td>3</td>
<td>3.</td>
</tr>
<tr>
<td>Policies by leaders lead the employees towards the organization’s vision</td>
<td>28</td>
<td>3</td>
<td>8</td>
<td>6</td>
<td>9</td>
<td>9</td>
</tr>
</tbody>
</table>
Clear objectives set by leaders lead the employees towards the organization’s vision. SA=strongly agree, A=agree, D=disagree

**Source: Field data, 2020**

The respondents were requested to indicate the level of agreement on various statements on the role of leadership on organization vision and the results are shown in Table 4. It is clear from the table that only a few of the respondents disagreed with the three statements with only 3.3%, 3.9% and 2% of the respondents respectively.

**Table 4:** Model Summary between Role of Leadership and Level of Competence of Staff

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.905a</td>
<td>.819</td>
<td>.814</td>
<td>.1821</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Coaching, Trust, Vision, Executing

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>22.093</td>
<td>4</td>
<td>5.523</td>
<td>167.370</td>
<td>.000p</td>
</tr>
<tr>
<td>Residual</td>
<td>4.884</td>
<td>148</td>
<td>.033</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>26.977</td>
<td>152</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent Variable: Competence
b. Predictors: (Constant), Coaching, Trust, Vision, Executing

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td></td>
<td>Beta</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trust</td>
<td>.400</td>
<td>.458</td>
<td>4.998</td>
<td>.000</td>
</tr>
<tr>
<td>Vision</td>
<td>.082</td>
<td>.266</td>
<td>-6.00</td>
<td>.008</td>
</tr>
<tr>
<td>Executing</td>
<td>.610</td>
<td>.147</td>
<td>4.074</td>
<td>.000</td>
</tr>
<tr>
<td>Coaching</td>
<td>-.103</td>
<td>-.641</td>
<td>.523</td>
<td></td>
</tr>
</tbody>
</table>

As shown in Table 5, the AnR-squared is 0.814 which shows that 81.4% of the changes in the competence of staff is influenced by the role of leadership in inspiring trust, vision creation, in executing strategies and in coaching potentials. According to Table 4.24, the model between role of leadership and competence of staff was found to be significant since the p<0.05. Only coaching of potential was found not to be significant with p-value= 0.523 greater than the threshold 5%. Similar results by Robbins and Coulter (2010) had found that visionary leaders have a significant effect on the competence of the staff they manage. Boyatzis (2012) found that there is need for competence among the staff members, which is significantly influenced by coaching and training, offered towards their career development.
Table 6: Model Summary between Role of Leadership and Extent of Communication

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>.950a</td>
<td>.903</td>
<td>.900</td>
<td>.1119</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Coaching, Trust, Vision, Executing

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>17.241</td>
<td>4</td>
<td>4.310</td>
<td>344.078</td>
<td>.000a</td>
</tr>
<tr>
<td>2</td>
<td>1.854</td>
<td>148</td>
<td>.013</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>19.095</td>
<td>152</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent Variable: Communication
b. Predictors: (Constant), Coaching, Trust, Vision, Executing

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>(Constant)</td>
<td>.490</td>
<td>.050</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>.036</td>
<td>.049</td>
<td>.135</td>
<td>.720</td>
</tr>
<tr>
<td></td>
<td>.364</td>
<td>.084</td>
<td>.223</td>
<td>3.031</td>
</tr>
<tr>
<td>2</td>
<td>Executing</td>
<td>.092</td>
<td>.905</td>
<td>6.555</td>
</tr>
<tr>
<td></td>
<td>Coaching</td>
<td>.999</td>
<td>-.231</td>
<td>3.577</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Communication

Source: Field data, 2020

Table 6 shows that the ANR-squared was found to be 0.900 showing that 90% of the communication of strategic implementation in the humanitarian agencies are influenced by the role that the leaders play. Muhoro (2011) found strong correlation exist between leadership role and the effective flow of communication within an organization setting. The ANOVA results showed that the significance value is 0.000, which is less than 0.05. Therefore, the model is statistically significant in predicting how the role of leadership in inspiring trust, vision creation, executing strategies and coaching potentials influence communication of the strategies. Ahmadi, Salamzade and Daraci (2012) suggested the need to put an organizational culture that promotes effective communication in the implementation of strategies.
Table 7: Model Summary between Role of Leadership and Resources Deployed

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>.911*</td>
<td>.829</td>
<td>.825</td>
<td>.1926</td>
</tr>
<tr>
<td>a. Predictors: (Constant), Coaching, Trust, Vision, Executing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>Regression Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Residual</td>
<td>5.476</td>
<td>148</td>
<td>.037</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>32.108</td>
<td>152</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Dependent Variable: Resources</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Predictors: (Constant), Coaching, Trust, Vision, Executing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>.119</td>
<td>.085</td>
<td>1.393</td>
<td>.169</td>
</tr>
<tr>
<td>Trust</td>
<td>.581</td>
<td>.085</td>
<td>6.852</td>
<td>.000</td>
</tr>
<tr>
<td>Vision</td>
<td>.063</td>
<td>.145</td>
<td>.434</td>
<td>.665</td>
</tr>
<tr>
<td>Executing</td>
<td>.853</td>
<td>.159</td>
<td>5.377</td>
<td>.000</td>
</tr>
<tr>
<td>Coaching</td>
<td>-.499</td>
<td>.170</td>
<td>-.640</td>
<td>.004</td>
</tr>
<tr>
<td>a. Dependent Variable: Resources</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4.8: Model Summary between Role of Leadership and Training

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>.851*</td>
<td>.724</td>
<td>.717</td>
<td>.2465</td>
</tr>
<tr>
<td>a. Predictors: (Constant), Coaching, Trust, Vision, Executing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>Regression Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Residual</td>
<td>8.996</td>
<td>148</td>
<td>.061</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>32.595</td>
<td>152</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Dependent Variable: Training</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Predictors: (Constant), Coaching, Trust, Vision, Executing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The third dependent variable of interest in this research was to investigate whether the amount of resources deployed do affect the strategic implementation. Table 7 reveal the AnR-squared between the role of leadership and the amount of resources deployed was found to be 0.825. This implied that 82.5% of the amount of resources deployed are influenced by the role of leadership in ARC. Similar results were obtained by Pearce and Robinson (2007) who found that resource coordination is highly influenced by the leadership effectiveness. Mbaka and Mugambe (2014) also found significant relationship between the leadership and resource availability in an organization.

Source: Field data, 2020
<table>
<thead>
<tr>
<th></th>
<th>Vision</th>
<th>Executing</th>
<th>Coaching</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.096</td>
<td>.246</td>
<td>-.541</td>
</tr>
<tr>
<td></td>
<td>.186</td>
<td>.203</td>
<td>.217</td>
</tr>
<tr>
<td></td>
<td>.483</td>
<td>.441</td>
<td>-.901</td>
</tr>
<tr>
<td></td>
<td>.518</td>
<td>1.209</td>
<td>-2.399</td>
</tr>
<tr>
<td></td>
<td>.605</td>
<td>.228</td>
<td>.018</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Training
The last variable of interest in this research in relation to dependent variable was the number of people attending training. As shown in Table 4.8, the AnR-squared that was obtained was 0.717. This showed that 71.7% of the number of people attending training was influenced by the role of leadership. Galek (2015) found that leadership style has a great significance to the training opportunities provided to employees in an organization.

As shown by the ANOVA analysis, the role played by the leadership in ARC has significant influence on the number of people attending training (p<0.05). According to the results, vision creation (p= 0.605) and executing strategies (p= 0.228) were found to have no significant influence on the number of people attending training since their p-values were more that 5%. However, inspiring trust has a positive and significant influence (p<0.05) while coaching of potential has a negative and significant influence (p<0.05) on the number of people attending training. Mbaka and Mugambi (2014) found out that coaching has a positive and significant influence on training. In addition, Luftans (2012) found that trusted leadership provide ground for training of employees.

4.3 Thematic presentation of the study findings
4.3.1 The style of leadership used in implementation of strategy in ARC

As indicated by one of management team, ARC uses democratic style of leadership and participative style of leadership which assist the institution in achieving or implementing its strategies. Taylor (2007) in his research when assessing the strategic leadership and how this contribute to organization changes within working environment, showed that committed leaders ensure organization change is important and is measured in terms of improvement in organization activities. To achieve strategic implementation, organization leaders need to apply effective communication both internally and externally to its employees by using an open style of management so that they build the development of corporate culture among employees.

4.3.2 The challenges faced by leaders in strategic implementation

When assessing the challenges faced by leaders in strategic implementation, one of the team members said that leaders encounter problem related to monitoring, evaluation practices and inefficiency of internal audit to achieve strategic implementation. Insufficient of link between strategy, structure, management information communication system as well as failure in leadership skills constitute the negative impact on strategic implementation. Most organizations are currently challenged with ineffective strategic formulation to achieve the implementations, to allocate resources and undertake the match between strategies, structure and relationship. Pearce and Robinson (2007) study in USA showed that most management organizations are challenged with lack of effective coordination and support from strong management team as lack of resistance from low level of the management and then poor planning.

4.3.3 Way to overcome challenges to ensure appropriate strategic implementation of activities

The research findings from the management of ARC showed that, the management is trying to motivate managers towards role performance and participation in internal check and control of organization activities which may bring about implementation of strategies.

5 CONCLUSION AND RECOMMENDATIONS

Based on research findings, the leadership which is reliable, leadership which is determined by good listeners and understanding and leadership which encourages approachability may ideally lead to strategic implementation in humanitarian agencies. As indicated, and institution having strong human resources with skills and experience, is more likely to achieve strategic implementation, introduction of workers’ union may lead to work performance and implementation of strategies. The findings showed that encouraging social interaction with lower staff is more helpful for institution to achieve strategic goals and objectives.

The observation in this research is that if leaders set policies which assist the employees achieve organization goals, it can result into strategic implementation. The general conclusion is that hiring the right people to fill strategic position may bring about strategic implementation. The recommendation regards to the commitment towards strategy implementation by senior management team is a vital ways of achieving organization goals and objectives. Researcher recommend the management of ARC to provide more efforts and loyalty to achieve strategic implementation. However, they need to influence organization employees towards having ideas for strategic implementation. At ARC, It is important to regularly track the level of strategic implementation, work towards changes to achieve strategic implementation. In addition, ARC, need to apply the approach of rewards among its employees to achieve the desired performance and incorporate high rank of employees in strategic design and implementation.

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Thermal conductivity and Heat generation parameter analysis on micropolar nanofluid flows.

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Abstract: In this paper, it deals that the numerical study of variable thermal conductivity and radiation on the flow and heat transfer of an electrically conducting micropolar nanofluid over a continuously stretching surface with varying temperature in the presence of a magnetic field and heat source/sink. The governing conservation equations of Angular momentum, energy, momentum and mass are converted into a system of non-linear ordinary differential equations by means of similarity transformation. The resulting coupled system non-linear ordinary differential equations are solved by implicit finite difference method along with the Thomas algorithm. The results are analyzed for the effect of different physical parameters on velocity, angular velocity, temperature and concentration fields are presented through graphs. Physical quantities such as \( f''(0), \theta'(0), \phi'(0) \) are also computed and are shown in table.

Keywords: MHD, microrotation parameter, radiation parameter, Eckert number, thermal conductivity parameter, Thermophoresis parameter, heat source/sink.

1. Introduction: The nanofluid is changed with the thermal conductivity has attracted the interest of many scientists and researchers. The survey of convective heat transfer in nanofluid by Buongiorno[1]. He showed that the fluid characteristics are changed with the nanoparticles because thermal conductivity of these particles was higher than convectional fluids. Nanoparticles are of great scientific interest as they are effectively a bridge between bulk materials and atomic or molecular structures. Micropolar fluids are subset of the micromorphic fluid theory introduced in a pioneering paper by Eringen[2]. Micropolar fluids are those fluids consisting of randomly oriented particles suspended in a viscous medium, which can undergo a rotation that can affect the hydrodynamics of the flow, making it a distinctly non-Newtonian fluid. They constitute an important branch of non-Newtonian fluid dynamics where microrotation effects as well as microinertia are exhibited. Eringen's theory has provided a good model for studying a number of complicated fluids, such as colloidal fluids, polymeric fluids and blood. Srinivas Maripala and Kishan Naikoti[3] studied the MHD mixed convective heat and mass transfer through a Stratified nanofluid flow over a thermal radiative stretching cylinder.

The heat source/sink effects in thermal convection, are significant where there may exist a high temperature differences between the surface (e.g. space craft body) and the ambient fluid. Heat Generation is also important in the context of exothermic or endothermic chemical reaction. Sparrow and Cess [4] provided one of the earliest studies using a similarity approach for stagnation point flow with heat source/sink which vary in time. Pop and Soundalgekar [5] studied unsteady free convection flow past an infinite plate with constant suction and heat source. Srinivas Maripala and Kishan Naikoti [6] studied, MHD convection slip flow of a thermosolutal nanofluid in a saturated porous media over a radiating stretching sheet with heat source/sink. Rahman and Sattar [7] studied magnetohydrodynamic convective flow of a micropolar fluid past a vertical porous plate in the presence of heat generation/absorption. Lin et al. [8] studied the marangoni convection flow and heat transfer in pseudoplastic non-newtonian nanofluids with radiation effects and heat generation or absorption effects. Recently, Srinivas Maripala and Kishan Naikoti[13] MHD effects on micropolar nanofluid flow over a radiative stretching surface with thermal conductivity absence of heat source/sink.

2. Basic equations:
A transverse magnetic field over a steady two-dimensional micropolar nanofluid over a semi-infinite stretching plate of an incompressible, electrically conducting flow with variable temperature in the presence of radiation. The X-axis is directed along the continuous stretching plate and points in the direction of motion. The X-axis and Y-axis are perpendicular to each other and to the direction of the slot (the Z-axis), so the continuous stretching plate issues. The induced magnetic field and the Joule heating are neglected as assumed. It is assumed that the fluid properties are constant, except for the fluid thermal conductivity which is taken as a linear function of temperature profiles. Then the governing equations under the usual boundary layer approximations for the problem can be written as follows [9]:

\[
\frac{\partial \Pi}{\partial x} + \frac{\partial \tau}{\partial y} = 0 \tag{1}
\]

\[
\frac{\partial \Pi}{\partial x} + \frac{\partial \tau}{\partial y} = \bar{\Pi} \frac{\partial^2 \Pi}{\partial y^2} + K_1 \frac{\partial \tau}{\partial y} - \frac{\sigma B^2}{\rho} \bar{\Pi} \tag{2}
\]

\[
G_t \frac{\partial^2 \sigma}{\partial y^2} - 2\sigma - \frac{\partial \pi}{\partial y} = 0 \tag{3}
\]

\[
\rho c_p \left( \bar{\Pi} \frac{\partial \Pi}{\partial x} + \bar{\Pi} \frac{\partial \tau}{\partial y} \right) = \frac{\partial}{\partial y} \left( k \frac{\partial \Pi}{\partial y} \right) + \mu \left( \frac{\partial \Pi}{\partial y} \right)^2 - \frac{\partial \varphi}{\partial y} + \tau \left[ D_B \frac{\partial C}{\partial y} + \frac{\partial C}{\partial y} + \frac{\partial C}{\partial y} \right] + \frac{Q_0}{\left( \rho C \right)_f} \left( T - T_w \right) \tag{4}
\]

\[
\frac{\partial C}{\partial x} + \frac{\partial c}{\partial x} + \bar{\Pi} \frac{\partial C}{\partial y} = D_B \frac{\partial^2 C}{\partial y^2} + \frac{\partial r}{\partial y} \frac{\partial^2 r}{\partial y^2} \tag{5}
\]

where \( \bar{\Pi} = (\mu + S)/\rho \) (kinematic viscosity), \( \mu \) (dynamic viscosity), \( \sigma \) (microrotation component), \( K_1 = S/\rho(>0) \) (coupling constant), \( G_t (>0) \) (microrotation constant), \( \rho \) (fluid density), \( u \) is the velocity along \( x \)-axis and \( v \) is along \( y \)-axis. \( T, T_w, T_\infty \) are the temperature of the fluid in the boundary layer, far away from the plate, and plate, respectively. \( k \) – (thermal conductivity), \( c_p \) (specific heat), \( \sigma_0 \) (electric conductivity), \( B_0 \) (magnetic field), \( q_r \) (radiative heat flux), \( D_B \) – (Brownian diffusion coefficient), \( D_T \) - (thermophoresis coefficient) , \( Q_0 \) (heat generation/absorption), \( \left( \rho C \right)_p \) - (heat capacitance of the base fluid), and \( \tau = (\rho C)_p/(\rho C)_f \) is the ratio between the effective heat capacity of the nanoparticles material and heat capacity of the fluid. Boundary conditions of the problem are given by

\[
y = 0, \quad \bar{\Pi} = \infty, \bar{\Pi} = 0, T = T_w(x), \quad \sigma = 0 \tag{6}
\]

\[
y \to \infty, \quad \bar{\Pi} \to 0, \quad T \to T_\infty, \quad \sigma \to 0 \tag{7}
\]

Here the temperature of the wall is changing along the plate.

\[
\frac{k - k_\infty}{b[\bar{T} - T_\infty]} = k_\infty \text{ is the lineer function of temperature of thermal conductivity in the fluid} \tag{8}
\]

where \( k_\infty \) (ambient thermal conductivity).

Using Rosseland approximation [11] there is

\[
q_r = (-4\sigma^*/3k^*) \frac{\partial T^4}{\partial y} \tag{9}
\]

where \( \sigma^* \) (Stefan Boltzmann constant) and \( k^* \) (mean absorption coefficient). Here, consider the temperature differences within the flow are sufficiently small. Expanding \( T^4 \) in a Taylor series about \( T_\infty \) and neglecting higher order terms [10], we have

\[
T^4 \equiv 4 T_w^3 T - 3 T_\infty^4 \tag{10}
\]

Using Eq.(8), Eq.(4) becomes

\[
\rho c_p \left( \bar{\Pi} \frac{\partial \Pi}{\partial x} + \bar{\Pi} \frac{\partial \tau}{\partial y} \right) = \frac{\partial}{\partial y} \left( k \frac{\partial \Pi}{\partial y} \right) + \mu \left( \frac{\partial \Pi}{\partial y} \right)^2 + \frac{16\sigma^* T_\infty}{3k^*} \frac{\partial T^4}{\partial y^2} + \tau \left[ D_B \frac{\partial C}{\partial y} + \frac{\partial C}{\partial y} + \frac{\partial C}{\partial y} \right] + Q \theta \tag{11}
\]

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http://dx.doi.org/10.29322/IJSRP.10.07.2020.p10377

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The following transformations are used to

\[
\eta = \sqrt{\left(\alpha \nu \right)} y, \quad \psi = \sqrt{\left(\alpha \nu \right)} x f(\eta),
\]

\[
\bar{u} = \frac{\partial \psi}{\partial y}, \quad \bar{v} = -\frac{\partial \psi}{\partial x}, \quad \sigma = \left(\alpha^3 \nu\right)^{1/2} x g(\eta), \quad \theta(\eta) = \frac{T-T_\infty}{T_\infty-T_\infty}, \quad k = k_0(1 + S\theta)
\]  

(12)

Equation (12) substitute into equations (1)-(3) and (10), then

\[
\frac{1}{\sigma^2} \left[ f''' + Mf' - f' - Mf' = -g' \right]
\]

(13)

\[
g'' - \left(\frac{2}{G}\right) g = \left(\frac{1}{G}\right) f''
\]

(14)

\[
\left(\frac{1}{Pr}\right) \left\{ \left[ 4 + 3F(1 + S\theta) \right] \theta'' + Q\theta \right\} = 3F[f\theta' - \gamma f' \theta + E\left( f''\right)^2 + 3FS(\theta'\theta)^2 + \left[ Nb \theta' \varphi' + Nt \theta'^2 \right]
\]

(15)

\[
\left(\frac{1}{Le}\right) \varphi'' - \left(\frac{1}{Le}\right) Nb \theta''
\]

(16)

And boundary conditions are transformed to

\[
f(0) = f'(0) = g(0) = g(\infty) = \theta(0) = 0, \quad f'(0) = \theta(0) = 1,
\]

(17)

Where, \( M \) (magnetic parameter), \( G_1 \) – (coupling constant), \( Pr \) – (Prandtl number) \( F \) (Radiation parameter), \( E \) (Eckert number), \( S \) (thermal conductivity parameter), \( Nt \) (Thermophoresis parameter), \( Le \) (Lewies number), \( \gamma \) (Surface temperature parameter).

From the velocity field we can study the wall shear stress, \( \tau_w \) as given by [12]:

\[
\text{At } y=0, \tau_w = -| \left( \mu + S \right) \frac{du}{dy} + S\sigma | \quad \text{and } c_f = -2R_{ex}^{-1/2} f''(0)
\]

(18)

where \( R_{ex} = ax/v \) is the local Reynolds number. Eq. (20) shows the skin friction coefficient does not contain the microrotation term in an explicitly way.

\[
\text{at } y = 0, \quad q_w = -k \left( \frac{\partial T}{\partial y} \right) \text{at } y = 0 \quad \text{(rate of heat transfer)}
\]

(20)

\[
(\bar{T}_w - T_\infty) h(x) = q_w, \quad N_{ux} = -R_{ex}^{2} \theta'(0), \quad m_w = R_{ex} \left( \frac{G_1 a}{x} \right) g'(0)
\]

(21)

3. Results and discussion:

The governing equations (13) to (16) under the boundary conditions (17) are solved numerically using the implicit finite difference scheme of Crank-Nickolson type has been employed. The computations have been carried out for various flow parameters on the velocity, angular velocity, temperature and concentration fields are presented through graphs.

Figure 1(a)-1(d), it is observed that an increase in magnetic parameter \( M \) leads to a decrease in velocity profiles and angular velocity. It is observed from the Fig.1(c), that an increase in magnetic parameter causes the temperature to increase for both the cases \( S \) is present and absent. Similarly, from Fig.1 (d), when the magnetic parameter is increased, the concentration of the fluid also increases. The effect of Brownian motion parameter \( Nb \) on velocity, temperature and concentration profiles are shown in figures 2(a) - 2(c). From the Fig.2(a), the Brownian motion parameter \( Nb \) which is often neglected causes a rise in velocity of the fluid. The velocity near the wall rises rapidly and descends gradually to zero as its distance from the plate increases. From Figure 2(b), it is observed that the increase in the Brownion motion parameter \( Nb \) increases the temperature. From the figure2(c) it is clear that Brownian motion serves to warm the boundary layer and simultaneously increases particle displacement away from the fluid regime, thereby accounting for the reduced concentration magnitudes. The larger values of Brownian motion parameter \( Nb \), it reduces the nanoparticle concentration. Figures 3(a)-3(c), it is observed that an increase in the thermophoretic parameter \( Nt \) leads to increase in fluid temperature, nanoparticle concentrations and velocity profiles. Velocity and angular velocity profiles are explained for various values of microrotation parameter \( G \) in Fig.4(a) and Fig.4(b) respectively. From these, angular velocity distribution profiles are increased.
when microrotation parameter $G$ increases and from Fig.4(b), reverse phenomena is observed. Figures 5(a) and 5(b) depict temperature profile $\theta$ and concentration profile $\varphi$, for different values of Prandtl number $Pr$, temperature of nanofluid particles ($\theta$) and concentration profiles ($\varphi$) decreases with the increase in $Pr$. The thermal conductivity parameter ($S$) are shown in Fig.6, on the temperature profiles, it is noticed that the temperature profiles are decreased with the increasing of $S$. Fig.7 and Fig.8 explain the temperature profiles for different values of radiation parameter $F$ and surface temperature parameter $\gamma$. It is observed that, temperature profiles are increased with the increase of radiation parameter $F$ and $\theta$ decreases with the increase of surface temperature parameter $\gamma$. Figure 9 illustrates that concentration profile decrease with the increase of Lewis number $Le$. Figures 10 illustrate the temperature and concentration profiles for different values of heat source/sink parameter $Q$. From figure 10, it reveal that with the effect of heat source/sink parameter ($Q<0$), the temperature profiles decreases and the temperature profiles increase with heat source ($Q>0$) and the effect of heat source/sink parameter $Q$, on concentration profiles. The concentration profiles increase in case of heat source/sink $Q<0$, while the concentration profiles decreases with heat source/sink parameter $Q>0$.

4. Graphs:

![Graph](image1.png)

![Graph](image2.png)

![Graph](image3.png)
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http://dx.doi.org/10.29322/IJSRP.10.07.2020.p10377
www.ijsrp.org
4(b). Angular velocity distribution for various values of $G$

5(a). Temperature distribution for various values of $Pr$

5(b). Concentration distribution for various values of $Pr$

6). Temperature distribution for various values of $S$
Temperature distribution for various values of $F$.

Temperature distribution for various values of $Y$.

Concentration distribution for various values of $Le$.

Temperature and Concentration distribution for various values of $Q$. 

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http://dx.doi.org/10.29322/IJSRP.10.07.2020.p10377

www.ijsrp.org
Table 1: Skin friction coefficient $-f''(0)$, couple stress $g'(0)$, Local Nusselet number $-\theta'(0)$ values with $G = 0.1$, $Q=0.1$, $Pr$ 0.72, Ec=0.5, $Le=0.1$, $Nb=0.1$, $Nt=0.1$.

<table>
<thead>
<tr>
<th>$F$</th>
<th>$\gamma$</th>
<th>$S$</th>
<th>$-f''(0)$</th>
<th>$g'(0)$</th>
<th>$-\theta'(0)$</th>
<th>$-\varphi'(0)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2</td>
<td>0.15</td>
<td>0.21</td>
<td>1.1128</td>
<td>0.22615</td>
<td>0.336984</td>
<td>0.33529</td>
</tr>
<tr>
<td>0.2</td>
<td>0.15</td>
<td>0.21</td>
<td>1.5529</td>
<td>0.229412</td>
<td>0.29214</td>
<td>0.229124</td>
</tr>
<tr>
<td>0.2</td>
<td>0.15</td>
<td>0.21</td>
<td>2.3301</td>
<td>0.335169</td>
<td>0.224311</td>
<td>0.2243</td>
</tr>
</tbody>
</table>

From the above table, for fixed $Q, F, \gamma, S$ are increase the $-f''(0)$, and $-g'(0)$ and at the same time decreases the local nusselet number $\theta'(0)$ and Sherwood parameter $\varphi'(0)$.

5. Conclusion:
In this effort, the effect of heat source/sink and thermal conductivity on the micropolar nanofluid flow and heat transfer over a continuously stretching surface is studied. The numerical values are carried out by the implicit finite difference scheme. Magnetic parameter $M$ leads to a decrease in velocity and angular velocity profiles. The increase in the Brownian motion parameter and thermophoresis parameter guides to the escalation the thermal boundary layer thickness. Angular velocity profiles are increased when micro-rotation parameter $G$ increases.

6. References:
Effect of Habbul Ghar and Maul Asal in Primary Dysmenorrhea- A Randomized standard controlled clinical study.

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‡Prof, HOD, Dept of Ilmul Qabalat wa Amraze Niswan, NIUM, RGUHS, Bangalore, India.  
³Assistant prof, Dept of Ilmul Atfal Glocal university Saharanpur.

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http://dx.doi.org/10.29322/IJSRP.10.07.2020.p10378

Abstract: It is characterized by severe uterine pain during menstruation. It is a very common complaint, experienced by 45-95% of reproductive age group women. Prostaglandins are known to increase myometrial contraction and constrict small endometrial blood vessels to produce ischemia and pain, the aim of the study is to evaluate the Effect of Habbul Ghar and Maul Asal in Primary Dysmenorrhea

Method: This is single blind randomized standard controlled study. Inclusion Criteria-Patients with regular menstrual cycle and painful menstruation and exclusion criteria are intra uterine contraceptive devices, organic pelvic pathology, systemic illness, allergic /sensitive to NSAIDs. 4.5gms Habbul ghar is powdered and mixed with qand to form pills, 2 pills TID along with Maul Asal 20ml from first day of menses up to 5 days. Primary and secondary outcome was assessed. Visual Analogue scale (VAS) Score and Verbal Multidimensional scoring system (VMSS).

Result: Marked improvement in dysmenorrhea was observed in both the groups. VAS mean score before and after treatment is 7.67±1.4 vs 5.70±1.26 in test group and in control group it is 7.43±1.28 vs 5.97±1.16 with a p value of (p<0.001 **). In VMSS mean score before and after treatment is 2.47±0.68 vs 1.73±0.45 in the test group and in control group it is 2.40±0.50 vs 2.00±0.26 with a p value (p<0.001 **). Significant improvement is found in subjective and objective parameters of both the groups.

Interpretation and conclusion: This data suggests that both drugs were safe, effective in improving and relieving symptoms of dysmenorrhea, and test drug is equally effective as control drug. Further, research is certified in larger sample size for longer duration is recommended.

Index Terms: Habbul ghar; dysmenorrhea; Maul Asal; VAS; VMSS.

Introduction:

It is a medical condition characterized by severe uterine pain during menstruation.² According to ACOG pain associated with menstruation is called as dysmenorrhea. The major cause of absenteeism from work amongst young women thus decreasing efficiency and quality of life among affected women.¹ The incidence of primary dysmenorrhea of sufficient magnitude with incapacitation is about 15-20%.³ It is a very common complaint, experienced by 45-95% of women of reproductive age group. The term primary dysmenorrhea is described as cyclic menstrual pain without any identifiable associated pathology, whereas secondary dysmenorrhea frequently complicate endometriosis, of the uterus leading to uterine hypoxia and ischemia, which are believed to cause pain and cramps in primary dysmenorrhea.⁶

In classical unani literature, usr-i-tamth has been described as dard al-rahim or auja’ al rahim. The pain usually occurs in the uterus and spreads to the surrounding areas. It has been mentioned that any obstruction to the flow of menstrual blood alters the temperament (sī’-i-mızāj) resulting in difficult or leiomyomas, PID, adenomyosis, endometrial polyp and menstrual outlet obstruction.⁴ Primary dysmenorrhea’s characteristic symptom is cramps, colicky spasms of pain in the suprapubic area, occurring within 8–72 hours of menstruation and peaking within the first few days as menstrual flow increases. In addition to painful cramps, many women with primary dysmenorrhea experience other menstrual-related symptoms, including back and thigh pain, headaches, diarhhea, nausea and vomiting.⁵ Excess production and release of prostaglandins during menstruation by the endometrium cause hyper contractility painful menstruation. Habbul Ghar possesses musakkine aujaa, muhallile warm, mudire haiz properties.⁵,⁷ It helps in easy flow of menstruation and relieve the pain. The aim is to validate scientifically the effect of Habbul Ghar in dard al-rahim.

Materials and Methods:

Study design: Single blind randomized standard controlled study, was carried out from January 2018 to December 2018 in Dept. of OBG National Institute of
Unani Medicine hospital, Bengaluru. Ethical clearance was obtained from institutional ethical committee vide no. IEC-No.-NIUM/ICE/2016-2017/013/ANQ/05) approved this study, and CTRI/2018/03/012646.

Sample size calculation: Sample size was calculated by using formula

\[ n = \frac{2 \times (Z_{\alpha/2} + Z_{1-\beta})^2 \sigma^2}{d^2} \]

where:
- \( n \) = sample size required
- \( d \) = Expected clinical significant difference in vomiting (mean difference) = 9
- \( \sigma \) = Pooled standard deviation = 18.3
- \( Z_{\alpha/2} = 1.96 \) for \( P < 0.05 \)
- \( Z_{1-\beta} = 0.84 \)
- \( r = 1 \) (ratio= 1:1)

The sample size calculated was 62.72.

Selection criteria: Patients with age group of 18-35 years.
Patients with regular menstrual cycle and painful menstruation.

Exclusion criteria: Intra uterine contraceptive devices.
Organic pelvic pathology.
Systemic illness.
Allergic /sensitive to NSAIDs.

Participants: 60 patients were allocated by computer generated randomization chart into 2 blocks. 30 patients in the test (group A) and 30 patients in the control (group B) were included.

Investigations: Following investigations were carried out in each case to exclude the patients with pathological conditions mentioned under exclusion criteria and to assess the safety of test drug.

For exclusion: Haemoglobin, RBS, USG - Pelvis.
Safety profile: LFT (SGOT, SGPT, Alkaline Phosphatase) and RFT (Blood Urea, Serum creatinine).

Intervention: Control group: Mefenamic acid 500 mg BD from first day of menses to 5 days.
Test group: Pills form as per standard preparation.

Dosage and duration: 4.5 gms Habbul-ghar is powdered and mixed with qand to form pills, 2 pills TID along with Maul Asal 20 ml from first day of menses up to 5 days.

Subjective parameters: Painful menstruation associated with nausea

Study procedure: Patients complaining of dysmenorrhea symptoms like uterine cramping, nausea, vomiting, backache, diarrhoea, giddiness, syncope and fainting.

Patients were clinically examined and required haematological and biochemical investigations were done. The patients fulfilling the inclusion criteria were given informed consent form and written consent taken and included in the study.

Treatment outcome: Based on primary outcome out of 60 patients changed found in all 30 patients (18 in test group and 12 in control group) and patients were categorized into complete relief, partial relief and no relief in subjective parameters before and after treatment as follows:

<table>
<thead>
<tr>
<th>Feature</th>
<th>Test group n=30</th>
<th>Control group n=30</th>
<th>Total</th>
<th>P value &amp; Test used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in years</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;20</td>
<td>9(30%)</td>
<td>8(26.7%)</td>
<td>17(28.3%)</td>
<td>P=0.294 Student t test</td>
</tr>
<tr>
<td>20-30</td>
<td>13(43.3%)</td>
<td>12(40%)</td>
<td>25(41.7%)</td>
<td></td>
</tr>
<tr>
<td>31-40</td>
<td>8(26.7%)</td>
<td>10(33.3%)</td>
<td>18(30%)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>30(100%)</td>
<td>30(100%)</td>
<td>60(100%)</td>
<td></td>
</tr>
<tr>
<td>Mean ± SD</td>
<td>24.33±6.61</td>
<td>26.13±6.56</td>
<td>25.23±6.59</td>
<td></td>
</tr>
</tbody>
</table>

significant (p<0.001) in both the groups. In test group mean score of VMSS before treatment was 2.47±0.68 and after treatment it was 1.73±0.45 where as in the control group mean score of VMSS before treatment it was 2.40±0.50 and after treatment it was 2.00±0.26 which was statistically strongly significant (p<0.001) in both groups

Results:

Objective parameters:
Visual Analogue scale (VAS) Score.
Verbal Multidimensional scoring system (VMSS).

Based on secondary outcome out of 60 patients changed was found in 30 test group mean score of VMSS before treatment was 2.47±0.68 and after treatment it was 1.73±0.45 where as in the control group mean score of VMSS before treatment it was 2.40±0.50 and after treatment it was 2.00±0.26 which was statistically strongly significant (p<0.001) in both groups.
### Socio economic status

<table>
<thead>
<tr>
<th></th>
<th>Test group</th>
<th>Control group</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower Middle</td>
<td>11(36.7%)</td>
<td>7(23.3%)</td>
<td>18(30%)</td>
</tr>
<tr>
<td>Upper</td>
<td>4(13.3%)</td>
<td>3(10%)</td>
<td>7(11.7%)</td>
</tr>
<tr>
<td>Upper Lower</td>
<td>4(13.3%)</td>
<td>14(46.7%)</td>
<td>18(30%)</td>
</tr>
<tr>
<td>Upper Middle</td>
<td>11(36.7%)</td>
<td>6(20%)</td>
<td>17(28.3%)</td>
</tr>
<tr>
<td>Total</td>
<td>30(100%)</td>
<td>30(100%)</td>
<td>60(100%)</td>
</tr>
</tbody>
</table>

P=0.046*, Fisher Exact Test

### Education

<table>
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<tr>
<th></th>
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<tr>
<td>Illiterate</td>
<td>2(6.7%)</td>
<td>2(6.7%)</td>
<td>4(6.7%)</td>
</tr>
<tr>
<td>Primary</td>
<td>2(6.7%)</td>
<td>2(6.7%)</td>
<td>4(6.7%)</td>
</tr>
<tr>
<td>Secondary</td>
<td>7(23.3%)</td>
<td>12(40%)</td>
<td>19(31.7%)</td>
</tr>
<tr>
<td>High School</td>
<td>4(13.3%)</td>
<td>7(23.3%)</td>
<td>13(21.7%)</td>
</tr>
<tr>
<td>Graduation</td>
<td>12(40%)</td>
<td>4(13.3%)</td>
<td>16(26.7%)</td>
</tr>
<tr>
<td>Post-Graduation</td>
<td>3(10%)</td>
<td>3(10%)</td>
<td>6(10%)</td>
</tr>
<tr>
<td>Total</td>
<td>30(100%)</td>
<td>30(100%)</td>
<td>60(100%)</td>
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</table>

P=0.271 Fisher Exact Test

### Habitat

<table>
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<tr>
<th></th>
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<tbody>
<tr>
<td>Rural</td>
<td>1(3.3%)</td>
<td>1(3.3%)</td>
<td>2(3.3%)</td>
</tr>
<tr>
<td>Urban</td>
<td>29(96.7%)</td>
<td>29(96.7%)</td>
<td>58(96.7%)</td>
</tr>
<tr>
<td>Total</td>
<td>30(100%)</td>
<td>30(100%)</td>
<td>60(100%)</td>
</tr>
</tbody>
</table>

P=1.000, Fisher Exact Test

### Diet

<table>
<thead>
<tr>
<th></th>
<th>Test group</th>
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<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixed</td>
<td>21(70%)</td>
<td>17(56.7%)</td>
<td>38(63.3%)</td>
</tr>
<tr>
<td>Veg</td>
<td>9(30%)</td>
<td>13(43.3%)</td>
<td>22(36.7%)</td>
</tr>
<tr>
<td>Total</td>
<td>30(100%)</td>
<td>30(100%)</td>
<td>60(100%)</td>
</tr>
</tbody>
</table>

P=0.284 Chi-Square Test

### Religion

<table>
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<tr>
<th></th>
<th>Test group</th>
<th>Control group</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Muslim</td>
<td>19(63.3%)</td>
<td>17(56.7%)</td>
<td>36(60%)</td>
</tr>
<tr>
<td>Non-Muslim</td>
<td>11(36.7%)</td>
<td>13(43.3%)</td>
<td>24(40%)</td>
</tr>
<tr>
<td>Total</td>
<td>30(100%)</td>
<td>30(100%)</td>
<td>60(100%)</td>
</tr>
</tbody>
</table>

P=0.598, not significant, chi-square test

### Table 3: Age at menarche in test and control groups in Dysmenorrhea patients.

<table>
<thead>
<tr>
<th>Age at menarche</th>
<th>Test group</th>
<th>Control group</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>4(13.3%)</td>
<td>5(16.7%)</td>
<td>9(15%)</td>
</tr>
<tr>
<td>12</td>
<td>17(56.7%)</td>
<td>9(30%)</td>
<td>26(43.3%)</td>
</tr>
<tr>
<td>13</td>
<td>7(23.3%)</td>
<td>15(50%)</td>
<td>22(36.7%)</td>
</tr>
<tr>
<td>14</td>
<td>0(0%)</td>
<td>1(3.3%)</td>
<td>1(1.7%)</td>
</tr>
<tr>
<td>15</td>
<td>2(6.7%)</td>
<td>0(0%)</td>
<td>2(3.3%)</td>
</tr>
<tr>
<td>Total</td>
<td>30(100%)</td>
<td>30(100%)</td>
<td>60(100%)</td>
</tr>
</tbody>
</table>

Mean ± SD 12.30±0.95 12.40±0.81 12.35±0.88

P=0.664, Not Significant, Student t test

**Mizaj** distribution in test and control groups of dysmenorrhea patients.

<table>
<thead>
<tr>
<th>Mizaj</th>
<th>Test group n=30</th>
<th>Control group n=30</th>
<th>Total</th>
<th>P value &amp; test used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Damwi</td>
<td>10(33.3%)</td>
<td>11(36.7%)</td>
<td>21(35%)</td>
<td>P=0.284</td>
</tr>
</tbody>
</table>

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Visual analogue scale - a comparative assessment in test and control groups of dysmenorrhea patients.

<table>
<thead>
<tr>
<th>Visual analogue scale</th>
<th>Test group</th>
<th>Control group</th>
<th>Total</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before treatment</td>
<td>7.67±1.4</td>
<td>7.43±1.28</td>
<td>7.55±1.33</td>
<td>0.503</td>
</tr>
<tr>
<td>After treatment</td>
<td>5.70±1.26</td>
<td>5.97±1.16</td>
<td>5.83±1.21</td>
<td>0.398</td>
</tr>
<tr>
<td>Difference</td>
<td>1.967</td>
<td>1.467</td>
<td>1.717</td>
<td>-</td>
</tr>
<tr>
<td>t value</td>
<td>13.320</td>
<td>10.351</td>
<td>16.113</td>
<td>-</td>
</tr>
<tr>
<td>p value</td>
<td>&lt;0.001**</td>
<td>&lt;0.001**</td>
<td>&lt;0.001**</td>
<td>-</td>
</tr>
</tbody>
</table>

Verbal multidimensional scoring system - a comparative assessment in test and control groups of dysmenorrhea patients

<table>
<thead>
<tr>
<th>Verbal multidimensional scoring system</th>
<th>Test group</th>
<th>Control group</th>
<th>Total</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before treatment</td>
<td>2.47±0.68</td>
<td>2.40±0.50</td>
<td>2.43±0.59</td>
<td>0.667</td>
</tr>
<tr>
<td>After treatment</td>
<td>1.73±0.45</td>
<td>2.00±0.26</td>
<td>1.87±0.39</td>
<td>0.007**</td>
</tr>
<tr>
<td>Difference</td>
<td>0.732</td>
<td>0.400</td>
<td>0.567</td>
<td>-</td>
</tr>
<tr>
<td>t value</td>
<td>6.886</td>
<td>4.397</td>
<td>7.790</td>
<td>-</td>
</tr>
<tr>
<td>p value</td>
<td>&lt;0.001**</td>
<td>&lt;0.001**</td>
<td>&lt;0.001**</td>
<td>-</td>
</tr>
</tbody>
</table>

Safety parameters - a comparative assessment at different study time points in two groups studied

<table>
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<tr>
<th>Variables</th>
<th>Test group n=30</th>
<th>Control group n=30</th>
<th>Total</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SGOT (IU/L)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Before treatment</td>
<td>21.85±7.32</td>
<td>23.50±7.53</td>
<td>22.68±7.41</td>
<td>0.393</td>
</tr>
<tr>
<td>• After treatment</td>
<td>19.87±6.54</td>
<td>21.50±8.85</td>
<td>20.68±7.76</td>
<td>0.420</td>
</tr>
<tr>
<td>SGPT (IU/L)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Before treatment</td>
<td>22.62±15.20</td>
<td>21.90±10.34</td>
<td>22.26±12.89</td>
<td>0.830</td>
</tr>
<tr>
<td>• After treatment</td>
<td>19.33±6.73</td>
<td>19.50±6.32</td>
<td>19.42±6.47</td>
<td>0.922</td>
</tr>
<tr>
<td>Alkaline phosphate (IU/L)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Before treatment</td>
<td>201.03±49.83</td>
<td>205.40±51.1</td>
<td>203.22±50.09</td>
<td>0.739</td>
</tr>
<tr>
<td>• After treatment</td>
<td>197.18±40.4</td>
<td>191.07±42.41</td>
<td>194.13±41.18</td>
<td>0.570</td>
</tr>
<tr>
<td>Blood urea (mg/dl)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Before treatment</td>
<td>21.67±5.01</td>
<td>24.10±7.16</td>
<td>22.88±6.25</td>
<td>0.133</td>
</tr>
<tr>
<td>• After treatment</td>
<td>28.72±5.54</td>
<td>28.47±7.47</td>
<td>28.6±6.52</td>
<td>0.880</td>
</tr>
<tr>
<td>Serum creatinine (mg/dl)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Before treatment</td>
<td>0.70±0.12</td>
<td>0.70±0.12</td>
<td>0.70±0.11</td>
<td>1.000</td>
</tr>
</tbody>
</table>
After treatment | 0.79±0.11 | 0.77±0.12 | 0.78±0.12 | 0.579

Outcome measures assessed in Dysmenorrhea patients.

<table>
<thead>
<tr>
<th>Outcome measure</th>
<th>Test group n=30</th>
<th>Control group n=30</th>
<th>Total</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary outcome</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change absent</td>
<td>12(40%)</td>
<td>18(60%)</td>
<td>30(50%)</td>
<td>P=0.121 Chi-Square Test</td>
</tr>
<tr>
<td>Change present</td>
<td>18(60%)</td>
<td>12(40%)</td>
<td>30(50%)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>30(100%)</td>
<td>30(100%)</td>
<td>60(100%)</td>
<td></td>
</tr>
</tbody>
</table>

Secondary outcome

<table>
<thead>
<tr>
<th>Outcome measure</th>
<th>Test group n=30</th>
<th>Control group n=30</th>
<th>Total</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change absent</td>
<td>0(0%)</td>
<td>2(6.7%)</td>
<td>2(3.3%)</td>
<td>P=0.492 Fisher Exact Test</td>
</tr>
<tr>
<td>Change present</td>
<td>30(100%)</td>
<td>28(93.3%)</td>
<td>58(96.7%)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>30(100%)</td>
<td>30(100%)</td>
<td>60(100%)</td>
<td></td>
</tr>
</tbody>
</table>

Table 16: Therapeutic outcome of Dysmenorrhea patients studied.

<table>
<thead>
<tr>
<th>Therapeutic outcome</th>
<th>Test group</th>
<th>Control group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BT</td>
<td>AT</td>
</tr>
<tr>
<td>VAS</td>
<td>7.67±1.4</td>
<td>5.70±1.26</td>
</tr>
<tr>
<td>VMSS</td>
<td>2.47±0.68</td>
<td>1.73±0.45</td>
</tr>
</tbody>
</table>

Discussion: The study entitled “Effect of Habbal Ghar and Maul Asal in Primary Dysmenorrhea- A Randomized standard controlled clinical study” was conducted in the Dept. of Ilmul Qabalat wa Amraze Niswan, National Institute of Unani Medicine Hospital Bengaluru during 2016-2017. Patients (n=100) of dysmenorrhea were assessed for eligibility, among which 10 patients denied to participate in study, 100 patients were accepted for enrollment. Out of 100, 30 patients were excluded, 60 patients who fulfilled the inclusion criteria were randomly allocated in two groups; 30 in test and 30 in control and assessed for subjective and objective parameters of dysmenorrhea. The study design was single blind, randomized controlled study. Efficacy assessment was based on VAS and VMSS.

Age:
Dysmenorrhea is the most common disorder in women of reproductive age. The Mean±SD of age of the participants included in the present study were 24.33±6.61 and 26.13±6.56. maximum number of patients belongs to age group 20-30 years i.e. 25(41.7%). Followed by 31-40 years i.e. 18(30%), <20 years i.e. 17(28.3%) with a p value P=0.294, which is not significant in the test and control group respectively (table 2). This study results are consistent to studies conducted by kural MR et al., the average age of the participants was 20.4±1.8 years, ranging from 17-25 years. our result similar to the results of Habibi N et al., who reported mean age of the participants was ranged from 18-27 years mean (20.69 ± 1.59). our result similar to the study result of Najifi et al., who reported mean age of the participant in the study was 22.2±2.18 years (range 19-30 years). Primary dysmenorrhea is defined as menstrual pain in the absence of any organic pathology, and is most common in women under the age of 25.

Socioeconomic status:
In present study 18(30%) patients belong to Lower Middle class, 18(30%) patients belong to upper lower class, 17(28.3%) patients belong to upper middle and 7(11.7%) patients belong to upper class with a p value of 0.046*. Which is significant among test group and control group respectively (table 2). This study results consistent with Omidvar S et al., who reported dysmenorrhea present in 27.3% lower socioeconomic status, 60.9% in middle class patients and 11.8% in higher socioeconomic status patients. This study shows that it was common in patients with upper middle and lower middle socio economic status and it is a fact that

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patients attending the NIUM OPD are from upper middle income group.

**Education:**
In our study 4(6.7%) patients were illiterate, 4(6.7%) patients studied up to primary education, 6(10%) patients had post-graduation degree, 13(21.7%) had high school education, 16(26.7%) patients had graduation degree, and maximum number of patients belongs to secondary education i.e. 19(31.7%) with a p value 0.271 which is not significant in test and control group (table 2). According to Khodakarami B et al, dysmenorrhea in high school grade students 130 (81.19%), grade one students 130 (92.41%), grade two students 157(86.69%), grade three students 77 (78.71%) and pre university level 494 (85.32%). This results contrary to the present study results because of different setting.

**Habitat:**
In the present study 58(96.7%) patients were from urban area and 2(3.3%) patients were from rural area with a p-value of 1.000, which is not significant in the test and control group respectively (table 2). This study results consistent to study conducted by Avasrala KA et al, who reported dysmenorrhea present in 53% urban population and 44% rural population. Present study results consistent to study conducted by Sinha et al., who reported girls with dysmenorrhea 74.4% in urban schools and 72.7% in rural school. Study conducted by Madhubala C et al, who reported prevalence of dysmenorrhea was 81.5% in rural area, and 76% in urban girls, it was contradictory to the present study, may be due to NIUM hospital is situated in metropolitan city, Bengaluru, that might be the reason behind maximum no. of patients in this study being from urban area.

**Diet:**
In this study 38(63.3%) patients had mixed dietary habit and 22(36.7%) patients were purely vegetarians with a p-value of 0.284, not significant in the test and control group respectively (table 2). High consumption of sugars, salty snacks, sweets and desserts, tea and coffee, is associated with increased risk of dysmenorrhea, study conducted by Barnard et al, who reported that intervention by a low fat vegetarian diet reduces the intensity of dysmenorrhea. As per unani text consumption of ghaleez aghdhyia (heavy diet), increases the viscosity of blood and lead to the formation of sudda, hence blood cannot flow easily through minute blood vessels. So that uterus undergoes forceful contraction with spas nm during menses to expelled out the morbid viscous matter which result in pain.

**Religion:**
In the present study maximum number of patients 36(60%) were belong to Muslim religion and 24(40%) were Hindu religion with a p-value of 0.598 not significant in the test and control group respectively (table 2). Study conducted by Omidvar S et al, who reported majority of patients belonged to Hindu families i.e. 84% while those from Islam, Christianity and other religions varied from 1.3-12.3%. It was contradictory to the present study, this difference may be due to different settings and in NIUM hospital mostly patients come from Muslim community that might be the reason behind maximum no. of patients in this study being Muslims.

**Age at menarche (years):**
In the present study the mean age of menarche was 12.30±0.95 and 12.40±0.81, maximum no. of patients belongs to age group 12 years i.e. 26(43.3%) followed by 13 years i.e. 22(36.7%), 11 years i.e. 9(15%), 15 years i.e. 2(3.3%) and 14 years i.e. 1(1.7%) with a p-value 0.664, not significant in test and control group respectively (table 3). Present results are consistent with Sinha S et al, and Armour M et al, who have reported in their study the mean age at menarche was 12.87 years (SD ± 1.45) and 12.7 (1.5) respectively and found no significant relationship between age of menarche and dysmenorrhea. This study results consistent to the study results conducted by Khodakarami B et al, the age at menarche was found to be 12.92 ±1.05 years. According to unani physicians, menstruation begins in the age of 10 years and the maximum age limit is 14 years.

**Mizaj:**
In the present study the highest prevalence of dysmenorrhea was observed in women with damwῑ mizaj 21(35%), followed by saudāwi mizaj 17(28.3%), balghamī mizaj 15(25%) and safrāwī mizaj 7(11.7%) with a p value of 0.284 which is significant in the test and control group respectively as assessed by temperament scale (table 6). This study results consistent to the study conducted by Zaidi S et al, 40.81% patient were from damwῑ mizaj, 21.76% patients were from balghamī mizaj and 37.41% patients were from safrāwī mizaj. There is no direct evidence showing the type of mizaj found in women affected with dysmenorrhea. A similar larger trial purely based on unani parameters should be conducted with the main objective of assessment of mizaj for further establishment of facts.

**Subjective parameters:**
In this study nausea present in 20.0% patients, vomiting in 43.4%, diarrhea 13.3%, giddiness 36.7% patients and head ache in 53.3% patients. According to the study conducted by Heba A et al, Nausea present in 11.3% patients, vomiting present in 10.9% patients, diarrhea present in 11.7% patients dizziness present in 15.5% patients and head ache present in 18.2% patients, this study results are contradictory to the present study results, which may be due to different settings

**Objective parameters**

**Visual analogue scale:**
In the test group mean score of VAS was 7.67±1.4 before treatment and after treatment it was 5.70±1.26 which was strongly significant (p<0.001*). In control group mean score of VAS before treatment which was 7.43±1.28 and after treatment it was 5.97±1.16 which was statistically strongly significant with a p<0.001* (table 12). In
intergroup comparison results indicated that *Habbul-ghar* was found to be more effective than mefenamic acid.

**Verbal multidimensional scoring system:**
In the test group mean score of VMSS was 2.47±0.68 before treatment and after treatment it was 1.73±0.45 which was strongly significant (<0.001**). In control group mean score of VMSS before treatment which was 2.40±0.50 and after treatment it was 2.00±0.26 which was statistically strongly significant with a p value of <0.001**(table 13). In intergroup comparison results indicated that *Habbul-ghar* was found to be more effective than mefenamic acid.

**Safety profile**
In this study no adverse effects were observed as safety parameters blood urea, serum creatinine, SGOT, SGPT, serum alkaline phosphatase was found to be in the normal range and showed no statistical significance on pre and post-test comparison were within normal limits before and after the study (table 14).

**Adverse effects**
No adverse effects were reported with regard to test and control during consumption; hence in the present study both drugs were safe clinically.

**Outcome measures:** (table 15)

**Primary outcome**
Based on primary outcome out of 60 patients changed found in all 30 patients (18 in test group and 12 in control group) and patients were categorized into complete relief, partial relief and no relief in subjective parameters before and after treatment as follows:

**Nausea:**
In this study, in the control group out of 30 patients, 6 were having nausea, while there were no patients in the test group. In the control group out of 6 patients, 2 patients had complete relief and 4 patients were having mild nausea means that 5 patients were partially relieved from nausea. There were no patients in the test group having nausea.

**Vomiting:**
In this study 6 patients in the control group and 7 patients in test group were having vomiting. Out of 6 patients, 3 patients having mild and 3 patients were having moderate vomiting. In test group out of 7 patients out of which 2 were having mild and 5 were having moderate vomiting, 2 patients had complete relieved in control group while all over 11 patients were partially relieved.

**Giddiness:**
Out of 30 patients in the test group 10 patients were having giddiness in the test group and 2 patients were having giddiness in the control group. 1 patient got complete cure in test group while 9 patients were partially relieved but in control group 2 patients were partially relieved, no one got complete cure.

**Diarrhoea:**
In the present study in test group 1 patient was having diarrhea in the test group while in control group 3 patients were having diarrhea. Both in test group and control group patients were partially got relieved from diarrhea there was no complete cure in both the groups.

**Head ache:**
In the present study in test group out of 30 patients, 11 patients were having head ache where as in the control group 5 patients were having head ache. No patient had complete relieved in both the test and control group, all over patients were partially relieved.

**Secondary outcome.**
Based on secondary outcome out of 60 patients changed was found in 30 patients (18 in the test group and 12 in control group) after treatment in objective parameters i.e. VAS and VMSS in test and control group respectively. VAS in test group mean score was 7.67±1.4 before treatment and after treatment 5.70±1.26 where as in control group mean score before treatment it was 7.43±1.28 and after treatment it was 5.97±1.16 which was statistically strongly significant (p<0.001) in both the groups. In test group mean score of VMSS before treatment was 2.47±0.68 and after treatment it was 1.73±0.45 where as in the control group mean score of VMSS before treatment it was 2.40±0.50 and after treatment it was 2.00±0.26 which was statistically strongly significant (p<0.001) in both groups.

**Therapeutic outcome**
In present study results were analyzed on the basis of VAS and VMSS scoring which was strongly significant (p<0.001) in both the groups (table 16).

**Conclusion:**
In conclusion result of this study validates the claims of unani scholars and it is specific for the treatment of *dard-i-rahim, Habbul-ghar* and *Maul Asal* has a noticeable efficacy and safety in dysmenorrhea. The data suggest that test drug was equally effective as control drug, as it possesses *musakkin-i-auja’a, muhallil-i-waram, mudirr-i-hayd* properties. It helps in easy flow of menstruation and relieve the pain.

**Recommendation:**
As dysmenorrhea is widely prevalent and common complaint with adverse impact on quality of life which sometimes results in activity restriction. Therefore, this complaint should be taken into proper consideration to improve the quality of reproductive health. Moreover, there has been increasing interest of alternative treatment now. Women can use herbal remedies more comfortable in dysmenorrhea. Further, double- blind, randomized controlled trials on larger sample size for longer duration are recommended.

**References:**


The origin of Shang civilization: A brief survey from Neolithic age through the transitioning cultures beside Huang Ho and Yangtze River

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Abstract- Just like Mesopotamia, Egypt or Indus valley of India, Ancient China was also presented a wonderful Bronze Age civilization. It was 1st thought by mainly Eurocentric and diffusions scholar that Chinese civilization was not an indigenous civilization and it was totally influenced by central Asia and India and so on. But recent researches and the excavation work by Academia Sinica since 1920 revealed so many data about its purity and indigenous roots along with few influence from outside. However Neolithic age arrived in China at about 9000 BC and it had 2 origins- a) Millet farming based Neolithic culture beside Huang Ho river b) Rice farming based Neolithic culture beside Yangtze River. The 1st Neolithic Yongshao culture had grown up very near to the Zhokoudien cave where we found the fossils of Peking Man. However the Shang civilization existed from 1800 to 1100 BC. In this paper I mainly give a very brief discussion about the transitioning Neolithic, Chalcolithic and Bronze Age cultures through the passage of time in which I try to find out origin of metallurgy, class stratified society, urban settlement and few traits that is related with a Bronze Age “Civilization”. As an undergraduate student of History, I mainly used few secondary sources like books on this topic written by Indian, Chinese and other great scholars.

Index Terms- Yangtze River, Huang Ho River, Yongshao culture, Hemudu culture, Longshan Culture, Liangchu Culture, Eriltou Culture, Xia Dynasty, Shang Dynasty

I. INTRODUCTION

Just like the south west Asia, Europe, Central Asia, Far east China is also an important place of Neolithic culture. The Bronze Age in china is begun around 1600 BC and with the help of the writing evidence “ORACLE BONE INSCRIPTION” Shang civilization is considered the earliest or the 1st civilization of china. This civilization was existed between 1700 BC to 1000 BC that mainly corresponded the middle of the china’s Bronze Age. Ancient china has 3 big dynasties they are- Xia, Shang, Zhou. In this time the 1st archaic monarchy of china established. There is a controversy that not Shang dynasty but the Xia dynasty was the 1st dynasty of china. Legends talk about the Xia dynasty prior to the Shang but there is no contemporary written records to prove this point even though text written later than the Shang dynasty also mention the existence of Xia dynasty. Apart from the controversy, I will try to discuss very briefly how the civilization formed from a Neolithic settlement and culture through the transitioning cultures.

II. GEOGRAPHICAL EXTENT OF THE SHANG CIVILIZATION:-

Just like the other ancient civilization, ancient Chinese civilization or the Shang civilization was build up beside river of Huang how or “Yellow River” and some part beside Yangtze river. This civilization was situated in the middle south and western part of china. This place mainly holds the now days Hubei, Shandong, Shanxi, Anhui and some part of the Jiangxi province. The Neolithic culture of china mainly flourished especially in this area from which the Shang civilization rises.

III. HOW WE DEFINE THE ORIGIN OF THE CIVILIZATION FROM THE NEOLITHIC SETTLEMENT:-

The ancient Chinese civilization was grown beside the river Huang how and few parts of Yangtze, that I mentioned before. In between 6000-2000 BC, this river changed its direction for so many times. After the extreme cold and dry conditions of the last glacial period, the climate warmed up considerably during 7500-3000 BC. The main Neolithic culture was flourished in this time mainly however another phase of climatic change happen then to cold and dry environment that continues till the modern times. Scholars like D.N. Keighley is also opined the importance of climate and environment behind the background of Neolithic and chalcolithic settlements of China. The fertile river valley of Huang ho and the climate, environment of that time made the stage for the ancient Chinese civilization.

So when we define a civilization, we have to analyse the origin of such civilizational traits through transforming cultures. Here when we looked at the various Neolithic and chalcolithic culture of China, we got a brief idea about origin of a sedentary society to a complex-class stratified society that moved towards a civilization. We have to analyse the culture with the relationship between various traits of a civilization.

IV. EARLY NEOLITHIC CULTURES OF CHINA:-

The Neolithic age arrived in China at around 6500 BC. China has 2 origin of Neolithic culture and they are millet based
Yongshao culture in Huang ho valley and rice based Neolithic culture in Yangtze valley. The 1st one was known as Yongshao culture (5000-3000 BC) excavated by J.G. Anderson in 1927 and the rice based culture was known as Hemudu culture. Those cultures are contemporary but hardly showed any kind of similarity due to its different background of climate and environment. However that culture is not so much important for the origin of Shang but we cannot deny its relevance for the origin of pottery, classic tripod vessels and jade object through Longshan and Liangzhu culture which were an integral part of Shang art and architecture. From that phase we found the origin of civilizational traits in China.

V. LONGSHAN CULTURE IN HUANG HO VALLEY (APP. 2700-2000 BC)  

This culture includes manufacturing of wheel turned pottery, copper, bronze, jade ornaments, possible origin of writing and lastly most important—evidence of town society. Located at the hubs of regional settlement networks’ are large population centres characterized by new archaeological features. The rammed earth walls which indicate a social system that was that was significantly more complex that ‘Yongshao village’. So many townsite excavated in Henan, Sichuan and Shanxi province. The largest town settlement is excavated from Taosi in Shanxi provinces the best site to show up gradation towards an urban civilization in this culture.

Here we find wheel made and well fired pottery and copper made pottery. With the early evidence of metal this is opined by the scholars that the metal vessels were limited for the elites. Many scholars tried to find writing evidence in Yangshao, Cishan pottery decoration but they did not succeed so much. But recent archaeology has turned out a new type of material. K. C. Chang noted that at a large number of prehistoric sites incised marks, apparently of a symbolic character, have been found on pottery vessels or potsherds. These sites show date from early Neolithic Yongshao to just before the historic period and they were found through entire yellow river valley of China. According to Prof. Chang the mark in the pottery is an evidence of the pottery maker’s name, pottery shops or the story of the clans who were made pottery. Even so many Longshan site shows such evidence of writing in pottery shards and it is very similar in contemporary Liangchu culture in Yangtze valley. On the each of the two shreds the graphs from from an internally related sequence of ideas that can only be connected through language. Therefore many scholars suggest the decoration and symbols of pottery as an early specimen of Chinese writing, an essential trait of a civilization that we found in chalcolithic Longshan culture.

The writing yet did not decipher but undoubtedly it was used for spiritual and administrative function. The evidences bring dramatic social changes in Longshan culture and many scholars suggested the probability of “Archaic state”. That is why not only archaeologists found so many evidence of palace, walled city and residence of common people but also found so much evidence of warfare. In Taosi sites, 280 hec. Rammed earth belonged to the elite residents were separated from those of commoners by dividing walls. Violence in the society is also reflected in the finding of skeletons in a dry well in Longshan sites which show the struggle of the then rulers to maintain their position.

Social stratification and class differentiation is also reflected in Longshan burial culture. Excavation in Taosi showed so many burial which were divided in 3 sub divisions-large scale with so many grave goods mainly jade items, medium scale grave with few goods and lastly small sized graves with no grave good. This social stratification is also apparent in contemporary Liangchu culture which I will discuss now.

In Longshan culture we undoubtedly said that this culture gave the birth of early language and highly stratified society that is so important for an ancient urban civilization.

VI. CONTROVERSY REGARDING THE RISE OF CIVILIZATION IN YANGTZE AND HUANG HO VALLEY AND INFLUENCES OF YANGTZE VALLEY IN THE XIA AND SHANG CIVILIZATION:-

Previously I discuss about the rise of complex society and pre-states in Yangtze valley, now I discuss about the rise of a civilization or urban culture in southern china. Recent research breaks the myth regarding the Chinese prehistory that Huang ho valley is the backbone of Chinese civilization. Prof. Xu Chaolong wrote an interesting paper on this topic. Seeing the industrial evaluation and development in south china from 1960, he tried to find out the urban culture of this site in early age. Many scholars research indicate that this place gives birth of a civilization much older than Shang but it is still going on and archaeologists thought that this urban culture had a great influence in urban culture, stratified society of Xia dynasty. Well Liangchu culture is one of the important cultures of this site and special for jade ornaments. In a site 547 artefacts found with a single skeleton. The grave goods are an assemblage of pottery vessels, shark tooth, ivory and jade object. The grave clearly suggests the grave of a political and leader or lineage chief. Such burial reflects the highly stratified society with a clear distinction between rulers and the ruled.

Here I will discuss about the urban cultures of later liangchu culture and the excavation in the upper valley of Yangtze River. There the archaeologist found evidence of rapid increase in population. This period belonged to the Quchiling culture (3200-2600 BC). Each of the settlements was surrounded by a large rammed wall and a wide moat. Inside there was a large production sites located in a different places and an area thought to include palace or temple located in higher tableland in the centre of the site. Here we found high walls that were used almost every urban site. There we found the diverse culture in burial. In the cemetery outside the ‘city wall’ a jade objects were found in tombs of the rich while nothing was found in the burial of the common people or poor. Finding of so many artefact only in the elite graves suggested a highly stratified society. We found a large ‘city’ on the top, several smaller cities having the same configurations. The walled city might have been the result of specialization of production and also some evidence of war that happened frequently on that period. Chaolong said “we can see a developed society with apparent factors of urbanism and civilization”.

The period of 3000-2000 BC is the most prosperous age of Yangtze river valley and maintained its development for so many
years. But archaeology shows a dark period between 2000 to 1050 BC where all development we see in Huang ho valley. Though very few sites provides some artefacts that are contemporary of Shang period.

So with so many excavations, Yangtze valley shows a new civilization that is quite older than “Yellow river civilization”. Though there is no written evidence but still the discovery of such evidence really challenged the “Yellow river civilization” the backbone of ancient china. But my topic did not base on this controversy. Chaolong said around 2200–2000 BC when Yangtze civilization enjoyed the peak of its development, suddenly collapsed and disappeared from the delta region. Thick layer of mud in every Liangchu site proved that earliest civilization of china may have been destroyed by flood. We see the rebirth of this culture in Zhou period.

So if the Shang civilization is the 1st civilization of china so what happened with the Yangtze valley? The main cultural features of Liangchu culture was moved to the middle valley of Huang ho and amalgamated with the mainstream of Chinese civilization. This gives birth of a new culture called ‘Erlitou’ which was raised on the middle valley of Huang ho and flourished the Xia dynasty. Now I will discuss Erlitou culture and Xia dynasty that is the last step towards Shang civilization.

VII. ERPITOU CULTURE AND XIA DYNASTY:-

Neolithic Longshan culture showed rising of chieftoms, states, and this culture is followed by Erlitou culture (1900-1600 BC). This culture named after the findings in the city of Erlitou in the Henan province in 1957 south of Huang ho river. We previously discuss about the Liangchu culture in Yangtze valley that was destroyed at around 2000 BC by devastating flood. So the culture migrated to this part of china and merged with Longshan culture. Similarly like Longshan culture, this culture this culture showed so many up gradations of social structure, town plan, pottery culture and metallurgy. In the later phases a complete pal ace structure excavated surrounded by high walls in all 4 sides. Large palace complex was contrasted by small huts and houses indicating class differentiation. The remains of graves excavated also reflect such a social chasm. Another important feature of this culture is the bronze metallurgy that reached the highest stage of development\textsuperscript{xxv}. Erlitou artisans produced verity of bronze tools with so many bronze weapons like battle axe, dagger, axe etc. All the artefacts were found in either elite groups or near palace area indicating royal control over bronze. All this features raise the question of state formation or early civilization.

Most scholars agree now that after the beginning of 2nd millennium BC, something that can be properly called a state had indeed arisen in China, particularly in western Henan \textsuperscript{xxv}.\textsuperscript{16} Many sites of the relevant culture between 1900-1600 BC supports this fact. So many excavation and research over this culture proved Xia dynasty, the so call 1st dynasty of china is the contemporary part of Erlitou culture. This dynasty has a great influence from the Yangtze valley settlements. The founder of the dynasty Yu the great was also a man who came from that part. He was the 1st ruler who was successfully able to establish flood control measures to protect the valley from inundations. Recent excavation traced his capital in Dengfeng, Henan province which was a large settlement. King Yu and his successor ruled the Xia dynasty for a long time. The dynasty mainly covers the middle and few part of southern china in Huang ho, Yangtze valley. Well it is a matter of controversy that is Xia the 1st civilization of china? Well, we do say so only for the absence of written evidence. Ancient china has 3 dynasties- Xia, Shang, Zhou. Father of Chinese history Sima Qian selected Xia from among many contemporary polities probably because during the earliest part of the Chinese Bronze Age or three dynamic periods Xia was most powerful\textsuperscript{xvii}. So we can say that Xia dynasty and contemporary Erlitou culture succeeded to unify the ancient Chinese province and made the platform for Shang dynasty that arrived at around 1700 BC.

VIII. RISE OF SHANG DYNASTY:-

The period of Shang dynasty (1700-1000 BC) corresponds to the middle of the china’s Bronze Age. Xia dynasty did not have any written evidence that we found in Shang dynasty in oracle bone inscription. The city of Eriltou had fallen in the late 16th century B.C. Recent systematic C-14 dating has fixed the end the last period of the cultural deposit in Eriltou. 1554 BC is suggested as the as the 1st year of the Shang civilization by so many historian. With the establishment of this civilization we enter into the historical period when North china was ruled by royal dynasty whose outline history is testified by the excavated written records in a close match with the received tradition on Shang royal genealogy.\textsuperscript{xviii}

From the Oracle bone inscription we found so many facts regarding the Shang dynasty. This written evidence belongs to the later Shang period that is why we got the names of the kings, capitals, rituals and so many features that is essential for a civilization. According to the legend Cheng Tang founded this dynasty after defeating the ruler of legendary Xia dynasty and their 1st capital was Xibo. Written record showed that not only Xibo but also Shang has 7 capitals in their almost 600 years rule. Archaeological findings indicate that the focal point of the Shang dynasty was a triangular area in the Henan Province covering 5 major cities of Anyang, Luoyang and Zhengzhou. The findings also suggested the high social stratification that we see in the previous culture especially in Anyang. Kings, priests and royal family member was in the upper class- the exclusive users of bronze for rituals and war. Farmer, craftsman comprised the lower strata of Shang society.\textsuperscript{xviii}

Well in that way the 1st ancient civilization of china formed after passing so many Neolithic and chalcolithic culture.

Conclusion:-

There are many problems to reconstruct the of Chinese history. The history is written mainly based on few archaeological findings and mainly on the myths, legends etc. Well still many scholars suggest Xia as the 1st civilization of china but the research still going on. . As K.C. Chang said that Chinese Neolithic culture went through a series of changes as it’s gradually progressed to higher and higher cultural levels and finally the process of evaluation gave the birth of a pristine civilization in china.\textsuperscript{xviii} The changes we see in the Neolithic Yongshao, Longshao, Liangchu, Daxi cultures and finally
Eriltou culture. The evaluation in culture showed social stratification, diverse pottery culture and obviously a state formation the gave a birth of civilization. And at last I will say that Chinese civilization is influenced by other was just a myth of old researches and according to Prof. Chang Chinese culture is indigenous and it’s evaluation from barbarism to civilization follows same recurrent pattern that the we see around the other part of the world.

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Errors in Translating Articles from English into Thai: Translation Process or Grammatical Knowledge

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Abstract- This research aimed to analyze language errors, causes of errors in article translation from English in to Thai and find out the guidance solutions to reduce language errors. The sampling group was 30 students studying in Translation English into Thai course. The data was collected from 60 papers of assignments related to 2 articles with scientific content and arts and cultural content. The research tools were an Analysis Form of Translation Error and Questionnaire about Students’ Translation Processes. The result presented that the main cause of errors was not only the students’ grammatical knowledge but also the translation process. Moreover, back ground knowledge, the length of text and translation period were minor factors. The solutions were suggested in the students’ points of view due to English grammatical review, concentration in process of translation, doing back ground research of source text and time management.

Index Terms- Errors in Translation, Translation English into Thai, Article Translation

I. INTRODUCTION

1.1 A state of significance and research problem

We, at the present, are in the multicultural and multilingual society that effective, efficient, and empathetic communication between languages and cultures are in demands. Therefore, translation plays the prominent roles in communication in all dimensions such as international trading, tourism, academic, and etc. It is a very serious and prominent responsibility of translators to transform the correct message from the source text (ST) to the target text (TT) for avoiding any problems causing from mistakes or discrepancies in communication. [1] The main purpose of Bachelor of Arts in English for International Communication Program revised in 2011 is to enhance the students’ English communication skills with the situations or scenarios that support their learning and practicing English language in all aspects: grammatical knowledge, reading, writing, listening, speaking, translation, culture and applications. [2] Based on the curriculum structure, the students are required to study basic core courses in specific sequence from grammatical foundation to the advanced ones. Translation English into Thai is a compulsory subject in the basic core courses which is focus on an improvement of the students’ multi-skills of communication in both of English and Thai language with the means of translation. An efficient translator can be a matter of the student’s personal preference in their future career. [3]

However, the learning results of our students were revealed in contrast. The possible reason is translation is complicated, the translators have to be skillful in interpreting correct meaning and purpose, maintain mood and style of ST to TT. It was found that the achievements of students enrolled in English into Thai Translation course during the 2015-2017 academic year were quite low and tended to keep lower. 39.32% of them got the grade lower than C ( <60%) especially in 2016 and 2017 academic year, the undesirable result figure raised up to 50%. This reflected that most students were less proficient in translation, could not integrate English knowledge into the translation well. Therefore, it was absolutely necessary for the instructor to find out the causes, identified the students’ weakness, and conveyed the possible solutions which were beneficial in teaching and learning process.

Grammatical knowledge is always being the main errors in translating that presented in the error analysis in translation articles. With various components of error, the instructor has to spot what types of errors are, so the solution can be focused on point. Translation process is also a proper assumption causes the errors in translation. [4] These concepts support the researcher’s observations and experiences leading to do this research to clarify what types of errors that occurred in Translation English into Thai class.

1.2 Objectives

1) analyze language errors in translating articles from English to Thai
2) analyze causes of errors in article translation
3) find out solutions in instruction to reduce language errors in translation

1.3 Research Question

1) What are the characteristics of error in translation articles from English into Thai?
2) What are the causes of error?
3) How can we reduce these errors?

II. LITERATURE REVIEW

2.1 Errors Analysis

The concept of translation had been formerly regarded as an art or a craft, and develop to considered as a science and admitted as a
branch of applied linguistics. [5] The models to classify the translation errors are flexible. Therefore, there are various categories of errors found in researches.

Pojprasat (2007) divided translation errors, from his studies in translation from English to Thai and Thai to English, into three characteristics which are semantic errors, syntactic errors and cultural errors. Semantic errors refer to any mistranslation of words such as a single word, collocations, or idioms. Syntactic errors mean mistakes or faults occurred in sentence structure or grammatical structure translation. Culture errors are the effects of cultural differences. [6]

Suksaeresup and Thep-Ackrapong (2009) researched about the errors found in translating English to Thai and categorized the translation errors into two types with their secondary items as presented in the following.

1. The reading of the English text
   1.1 Misuse
   1.2 The translator’s unclear background knowledge
2. English lexical meaning
   2.1 Errors in propositional meaning
      2.2.1 Wrong alternative meaning of word
      2.2.2 Incorrect part of speech
   2.2 Errors in translating expressive meaning
      2.2.1 Translating idiomatic expressions after their proposition meaning
      2.2.2 Translating term of address after their proposition meaning [7]

Wongranu (2017) divided translation errors in his study into 3 kinds: semantic errors, syntactic errors, and cultural errors. Semantic errors conclude all mistranslation of words: single word, collocations, or idioms. Syntactic errors relate errors in translating sentences, structures or grammar. The cultural error is a mistake in understanding the culture of translators caused by cultural differences. [8]

2.2 Process of Translation
Errors in translation mostly result from non-equivalence between the source text and target text in various points related to words, collocations, idioms, sentence structure, grammars, culture, and etc. The process of translation or the way to transfer from one language in to another language cannot be ignored.

Bathgate (1981) revealed that the process of translation consists of seven important steps:
1. Tuning means getting the feel of the text to be translated. Register depends on field of work in the source text.
2. Analysis means the way that the translator tries to analyze the connection of words and sentence structure in the source text.
3. Understanding, the translator interprets the message on the same tone and emotion of the source text base on his basic knowledge of the subject matter.
4. Terminology is focusing on the important words and phrases in the sentence to make sure that apart from understanding them and feeling what they imply and they are transferred in the target language without misleading, ridiculous or offensive words or sentences.
5. Restructuring means rebuild or revise translated text accordance with good usage in the target language.
6. Checking is to proof and revise the translated text by the translator himself and peer to get rid of language errors or typing errors in the target text
7. Discussion between the translator and the expert on the subject matter for sharing experience and suggestion. [9]

Saibua (1997) stated useful specific steps in the translation process to enhance effective translation as following:
1. Do comprehensive study on the source text in message, content, meaning, tone, flavor, and feeling between the lines.
2. Analyze the source text meaning carefully in order to transfer it as accurately as possible. 3. Transfer the source text into the target language as follows:
   - Step 1: Define the translation purposes and choose the translation approach.
   - Step 2: Analyze the source language sentences and transfer them into the target language.
   - Step 3: Recreate the analyzed sentences to be naturally close to the target language with the similar original meaning, tone and style.
   - Step 4: Check the translated text whether it is equivalent to the original text.
4. Recheck the correctness of the translated text for quality assurance with peer. The aim of this step is to check whether or not the reader responds equivalently to the translation as they do with the source text in meaning, style, register, and tone. [10]

Pinmanee (2012) suggested 3 steps of translation process: understanding, deverbalization, and re-expression. First is a step of understanding. It means that the translator uses all dimensions of the source language to interprets and summarizes the meaning of source text with background knowledge related to the text. A good background knowledge can support the translator understand the intended meaning of the source text well. Second is deverbalization. The translator needs to concentrate on the meaning of the source text without the interference of language structure. It encourages the translator ready to repeat the meaning with the target language. Last is re-expression. The translator compiles language knowledge, experience and background knowledge to retain the meaning of the source text and expresses naturally close to the target text. [11]

The researcher applied these concepts as the framework of data collection tool.

III. METHODOLOGY

3.1 Research Design
This was a quantitative research that focused on the frequency of errors found in translating articles, and inconsequential step occurred in translation process.

3.2 Scope of the Study
This research focused on article translation which was based on the course description. In addition, there were some limitations in terms of time and learners’ experience. The two articles from public resources, which are the authentic material, were selected
for this study. The content was in accordance with learners’ ways of lives and cultural background. That’s why we focused on semantic and syntactic errors not the cultural errors in this research. These two topics were “14 Foods that Cleanse the Liver” [12] which was related to basic scientific knowledge in our daily life, scientific technical terms. Another topic was about arts and culture in Thailand, its title was “What Is Thai Silk Really?”. [13] The vocabulary and structure of sentences in these articles were in level B1-B2 of the Common European Framework of Reference for Languages (CEFR). The different topics could enable learners notice the differences in the translation errors and process.

3.3 Sampling Group
The sampling group was 30 students studying in Translation English into Thai course in the second semester of 2018 academic year. They were the 3rd year students majoring in English for International Communication in Rajamangala University of Technology Suvarnabhumi. They were randomized with the purposive sampling technique and admired to participate in the study. All of them have to passed the pre-requisite course, Basic Translation, so they experienced in translating short excerpt messages and have background of translation.

3.4 DATA COLLECTION
Data collections were divided into 2 parts. The first set was collected from 60 papers of assignments related to 2 articles with scientific content, and arts and cultural content with the Analyzation Form of Translation Error recorded by the researcher. The second one was collected from the sample with the Questionnaire about Students’ Translation Processes to learn about the students’ translating step. The questionnaires were distributed to the students for 2 times after they finished their assignments. Descriptive statistics which are mean, percentage, and describing were used to analyze the collected data.

3.5 Research Tool
This study consisted of 2 types of instruments: experimental tool which were the selected articles, and data collection tools which were checklist and questionnaire. [14] The way to conduct and evaluate their validity and reliability are follows:

1) Experimental tools: the article excerpts
After the first screening by the researcher, these two articles were evaluated by the experts and administered the try-out test before designing as the exercise. This was conducted to measure the validity, reliability, difficulty level which suited of learners’ performance in terms of vocabulary, language use and content. The 10 undergraduates who were non-sampling were asked to take this test. The criteria were that 3 students with excellent performance, 4 students with fair performance, and 3 of them with poor performance. Considering from the reading comprehension score that most of them (80%) got 82.5% it revealed that, these two articles were not too difficult to understand and suitable for the sample. If the expression or the text is to understand even to translators themselves, the function of translation then fail to fulfill. [15]

2) Data collection tools
(1) Analyzation Form of Translation Error: this checklist was used for analyzing the errors in translation in the aspect of semantic and syntactic errors based on the combination of Saibua’s and Pinmanee’s frameworks. It was used to collect the errors found in the students’ assignments.
(2) Questionnaire about Students’ Translation Processes
This questionnaire aimed to find out how the learner’s process their article translations to reflect the translation process in terms of the suitable techniques and the alignment with the theory. It was a combination of the scholars’ idea presented in the literature review.

The steps of constructing these tools were as follows:
1) Studied related documents about analyzing the errors in translation.
2) Identified the objectives of the research instruments used for collecting data.
3) Construct the tools
3.1) Analyzation Form of Translation Error was the checklist that identified 7 errors in translation with additional suggestions or comments provided.
3.2) Questionnaire about Students’ Translation Process required learners to evaluate seven questions about the sequences in process of translation whether they did it or not. An open-ended question was prepared for learners to provide some additional feedback or suggestions.
4) These two data collection instruments were validated by the experts in field in terms of Index of Item-Objective Congruence (IOC). The evaluated results were 0.66-1.00.

IV. RESULTS AND DISCUSSIONS
The findings can be presented in 3 parts as follows: characteristics of errors in translation, causes of error and the solution guidance.

1) The characteristics of error in translation articles from English into Thai

Scientific Article Translation
It was found that syntactic errors were the major issues in translating scientific article. The total number of these errors was higher than semantic errors around 3 times. The remarkable subcategorize errors that found in the target text were Modifier, Dummy Subject and Loan Words consecutively as presented in Table 1.
Table 1: Errors in Translating Scientific Article “14 Foods that Cleanse the Liver”

<table>
<thead>
<tr>
<th>No.</th>
<th>Type of Errors</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Syntactic Errors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Determiner</td>
<td>72</td>
<td>8.79</td>
</tr>
<tr>
<td>2</td>
<td>Dummy Subject</td>
<td>95</td>
<td>11.60*</td>
</tr>
<tr>
<td>3</td>
<td>Gerund</td>
<td>80</td>
<td>9.77</td>
</tr>
<tr>
<td>4</td>
<td>Indefinite pronouns</td>
<td>52</td>
<td>6.35</td>
</tr>
<tr>
<td>5</td>
<td>Modifier</td>
<td>148</td>
<td>18.07*</td>
</tr>
<tr>
<td>6</td>
<td>Relative Clause</td>
<td>65</td>
<td>7.94</td>
</tr>
<tr>
<td>7</td>
<td>Tense</td>
<td>62</td>
<td>7.57</td>
</tr>
<tr>
<td>8</td>
<td>Voice</td>
<td>71</td>
<td>8.67</td>
</tr>
<tr>
<td>B</td>
<td>Semantic Errors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Confusing Word</td>
<td>63</td>
<td>7.69</td>
</tr>
<tr>
<td>10</td>
<td>Connective word</td>
<td>19</td>
<td>2.32</td>
</tr>
<tr>
<td>11</td>
<td>Loanword</td>
<td>85</td>
<td>10.38*</td>
</tr>
<tr>
<td>12</td>
<td>Phrasal Verb</td>
<td>7</td>
<td>0.85</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>819</td>
<td>100.00</td>
</tr>
</tbody>
</table>

The students usually placed the modifiers in wrong places or orders especially the word which was modified with different types of adjectives or extended in the complicated form. The modifiers functioning as adjective in Thai are always placed after the main word or noun, in contrast with the modifiers in English which are placed in front of noun and describes any characteristics. If the students, in translation, did not take any notice of Thai grammar and followed the sequence of words in source text, the errors could be occurred. Moreover, in case of complicated modification, some words might be lost in the target text as shown in Table 2.

Table 2: Sample of Modifier Errors

<table>
<thead>
<tr>
<th>Source Text</th>
<th>Student’s Translation</th>
<th>Correct Translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A small glass of freshly-squeezed grapefruit juice</td>
<td>น้ำแก้วเล็กข้มน้ำเกรปฟรุ๊ทที่คั้นสด</td>
<td>น้ำแก้วเล็กข้มน้ำเกรปฟรุ๊ทที่คั้นสด</td>
</tr>
</tbody>
</table>

Next is the Dummy Subject errors. It is always being the notable errors found in Thai students due to their word-to-word translation, and context ignorance. Moreover, the Thai structure sentence consists of subject, verb, and object, so the dummy subject is never skipped in their target text.

Table 3: Sample of Dummy Subject Errors

<table>
<thead>
<tr>
<th>Source Text</th>
<th>Student’s Translation</th>
<th>Correct Translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>...it’s time to make change.</td>
<td>ยุดำเนินเวลาที่ต้องทำการเปลี่ยนแปลง</td>
<td>ยุดำเนินเวลาที่ต้องปรับเปลี่ยน</td>
</tr>
</tbody>
</table>

The third remarkable error is Loanword. In this scientific article, 14 Foods that Cleanse the Liver, the writer has revealed the beneficial substances contained in fruits and vegetable with the scientific technical terms, transliterating is usually a suitable way. We have to concentrate on the right spellings in Thai and recheck them with the dictionary of the Office of the Royal Society that presents the criteria of foreign word transliteration. However, some foreign words have the meaning written in Thai dictionary and it is used generally, transliteration should not be applied in this case. Some students in this study were sometimes lack of awareness in this issue. The samples are presented in Table 4.

Table 4: Sample of Loanword Errors

<table>
<thead>
<tr>
<th>Source Text</th>
<th>Student’s Translation</th>
<th>Correct Translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enzyme Beta-carotene chlorophyll</td>
<td>เอนไซม์ เบต้า-เคโรทีน คลอโรฟิลล์</td>
<td>เอนไซม์ เบต้า-เคโรทีน คลอโรฟิลล์</td>
</tr>
</tbody>
</table>

The last interesting error that found in the raw data collection, but doesn’t look remarkable is Confusing Word. More than ninety percentage of the target text presenting the word of taxed in the following sentence. “When the liver is taxed, it can’t process toxins and fat in an efficient way.” The word was translated to “an amount of money that you must pay to the government” instead of “to make the liver have to work hard”. From the class discussion, some students accepted that they knew only a meaning of tax as a noun. The other said that they noticed the verb, taxed, in form of passive voice, so “paid the money to the government” was selected without consulting dictionary and context. This point also presents the difference of Thai and English words. A Thai word, in general, has one meaning and one form, in contrast, an English word sometimes has more one meanings and forms. This could mislead the translator into doing a wrong interpretation.
The notable errors found are two items of syntactic errors: modifier and voice; one of semantic errors, confusing word as shown in Table 5.

**Table 5 Errors in Translating Arts and Culture Article “What is Thai silk really?”**

<table>
<thead>
<tr>
<th>No.</th>
<th>Type of Errors</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Syntactic Errors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Determiner</td>
<td>55</td>
<td>7.89</td>
</tr>
<tr>
<td>2</td>
<td>Dummy Subject</td>
<td>17</td>
<td>2.44</td>
</tr>
<tr>
<td>3</td>
<td>Gerund</td>
<td>28</td>
<td>4.02</td>
</tr>
<tr>
<td>4</td>
<td>Indefinite pronouns</td>
<td>46</td>
<td>6.60</td>
</tr>
<tr>
<td>5</td>
<td>Modifier</td>
<td>111</td>
<td>15.93*</td>
</tr>
<tr>
<td>6</td>
<td>Participle</td>
<td>46</td>
<td>6.60</td>
</tr>
<tr>
<td>7</td>
<td>Relative Clause</td>
<td>65</td>
<td>9.33</td>
</tr>
<tr>
<td>8</td>
<td>Tense</td>
<td>61</td>
<td>8.75</td>
</tr>
<tr>
<td>9</td>
<td>Voice</td>
<td>89</td>
<td>12.77*</td>
</tr>
<tr>
<td>B</td>
<td>Semantic Errors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Confusing Word*</td>
<td>103</td>
<td>14.78*</td>
</tr>
<tr>
<td>11</td>
<td>Connective word</td>
<td>61</td>
<td>8.75</td>
</tr>
<tr>
<td>12</td>
<td>Phrasal Verb</td>
<td>15</td>
<td>2.15</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>697</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

Modifier errors were in the highest rank of both articles, due to word order as mentioned above. It is a big problem of Thai students facing to English language influence and their unawareness of the syntactic difference. Adverb of time in Thai could be placed in a more adjustable position than an adjective and other kinds of adverb depending on contexts. When we want to narrate about the past, an adverb of time could be placed at the beginning of the sentence for example “กำลครั้งหนึ่งนำน้าแล้ว ยังมีเด็กผู้หญิงคนหนึ่ง” means “once upon a time, there was a little girl…”. The samples are shown in Table 6

**Table 6 Sample of Modifier Errors**

<table>
<thead>
<tr>
<th>Source Text</th>
<th>Student’s Translation</th>
<th>Correct Translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trul…ner…</td>
<td>ไหมแท้เป็นผ้าที่มีความพิเศษอย่างยิ่ง ถูกท้าชนะด้วยเส้นด้ายแน่นและเส้นด้ายแนวนอน ไหมไทยแท้จะทอด้วยด้ายยืนและด้ายพุ่งคนละสี</td>
<td>Cloth, fabric, and back to the past it was only for the high society and kings.</td>
</tr>
<tr>
<td>Truly it is an exclusive</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Voice errors were the third frequently found among another errors. Passive Voice errors were generally seen in these translated texts without the awareness of Thai structure and meaning. Active voice is always used in Thai except communicating some negative messages such as “He was arrested yesterday.” It’s quite difference that passive voice in English is also used to convey the processes or means of making or doing something as shown in “What is Thai silk really?” The translators, in fact, should aware how to transfer the text with correct structure of active voice in Thai.

**Table 7 Sample of Voice Errors**

<table>
<thead>
<tr>
<th>Source Text</th>
<th>Student’s Translation</th>
<th>Correct Translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pure Thai silk is made</td>
<td>ไหมแท้เป็นผ้าที่มีความพิเศษอย่างยิ่ง ถูกท้าชนะด้วยเส้นด้ายแน่นและเส้นด้ายแนวนอน ไหมไทยแท้จะทอด้วยด้ายยืนและด้ายพุ่งคนละสี</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Confusing Word Errors was still in a high rank. It always occurred when the students translated their daily life words. They were very confident that their translated word was right and fit into the context. As the above mention, the dictionary was not used to determine which meaning of a multiple-meaning word was correct in a sentence alike the example in Table 8. Most students translated the word “found” to “find” or “พบ” instead of the correct meaning “established” or “กระท้ำ”.

Table 8 Sample of Confusing Word Errors

<table>
<thead>
<tr>
<th>Source Text</th>
<th>Student’s Translation</th>
<th>Correct Translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anyone found</td>
<td>ใครก็ตำมที่พบ</td>
<td>ใครก็ตำมที่กระท้ำ</td>
</tr>
</tbody>
</table>

It could be concluded that main factors causing errors in translation were syntactic knowledge in English and Thai; semantic knowledge, particularly in multiple-meaning words and connotation; errors awareness. In this research, the process of translation was studied whether it was a cause of errors. The result is presented in Table 9.

Table 9 Steps in Process of Article Translation

<table>
<thead>
<tr>
<th>Step in Translation Process</th>
<th>Frequency (N=30)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. read and understand the article</td>
<td>23</td>
<td>76.67</td>
</tr>
<tr>
<td>2. translate to the target text, the first draft</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>3. consult dictionary</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>4. do the research on knowledge background related to the article</td>
<td>11</td>
<td>36.67</td>
</tr>
<tr>
<td>5. check and revise the first draft by yourself</td>
<td>7</td>
<td>23.33</td>
</tr>
<tr>
<td>6. discuss and do peer review</td>
<td>3</td>
<td>10.00</td>
</tr>
<tr>
<td>7. do the final revise before submitting</td>
<td>2</td>
<td>6.67</td>
</tr>
</tbody>
</table>

The data reveal that the students always proceeded in their translation by consulting a dictionary and making a first draft of translated paper. They usually read and understood the article. Someone did the research on knowledge background related to the article. The students themselves hardly checked and revised their first draft; discussed with their friends; did the final revise before submitting.

From the additional discussion, the students agreed that they skipped the important steps: checking and revising because of the short-provided period of time. They ensured that running the
translation process step by step could support their translation skills and good texts. They also thought that their vocabulary bank in English and Thai should be developed to reduce their misinterpretation of the English lexical meaning.

These were the guidance of the last question in this study that how we can reduce these errors in the students’ opinions. Moreover, the length of text should be related to the provided time. The additional exercises of each specific errors should be created. The process of translation should be simulated in class.

V. CONCLUSION

The conclusion of the research is grammatical knowledge and translation process played the significant roles in translating articles from English into Thai. To be skilled in translation, the students’ self-awareness about their strength and weakness is the main factor. In the further studies, investigating the factors affecting English into Thai translation in the different texts such as tales, news or short story is interesting. The result comparisons will suggest weakness and strength of the students’ translation skills that could be reduced or improved with the suitable techniques and strategies.

REFERENCES


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Applications of Calculus in Real Life
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drsososemdy@gmail.com

Abstract- In my paper, applications of calculus will be discussed by the gradient of a line or slope. Moreover, one of the applications of calculus, method of least square, fitting a straight line and a curve (parabola), will also be used.

Keywords - increasing (positive value), decreasing (negative), horizontal (zero) and vertical (undefined).

I. INTRODUCTION

Calculus is a part of mathematics and is also used in Physics. With calculus, the changing conditions of a system may be found or observed. By being studied calculus, a system may be controlled from affecting to us.

The person such as, Engineers, scientists, and economists, who do not know the calculus well, they may not clever in their work and so they may not be good in their works. In my paper, jobs opportunity of people, i.e., male and female who are over 18 years old and under 60 years old of government salary earners, company salary earners, workers and daily wager, in Mandalay Mahar Aung Myay township will be introduced by the average rate of change or secant slope and instantaneous rate of change or a gradient of a tangent line on a curve or tangent slope.

If the absolute value $|m| < 1$, its inclination is not very steep (inclination < 30°). The line from left to right is increasing, the slope is a positive value, decreasing from right to left, the line has a negative slope. If a line is horizontal, then it has a constant slope but a vertical line has an undefined slope. The two lines are parallel if they have the same value of slopes and they are orthogonal to each other if the product of their values of slopes is equal to -1.

(ii) Average and Instantaneous Rate of Changes or Secant Slope and Tangent Slope. The average rate of change of $y$ or secant slope $\frac{FQ}{PQ}$ of a function $y = f(x)$ with respect to $x$ over the interval $[x_1, x_2]$ is defined as the following:

$$\frac{\Delta y}{\Delta x} = \frac{f(x_2) - f(x_1)}{x_2 - x_1} = \frac{f(x_1 + h) - f(x_1)}{h} = \frac{\text{rise}}{\text{run}}$$

(1)

The instantaneous rate of change or tangent slope $m$ at $(x_1, f(x_1))$ of a curve needs an approach that takes into account the behavior of the secant through P and nearby point Q as Q moves toward P along the curve or the length $h$ of the interval over which the change occurs approaches zero. In symbol,

$$m = \frac{dy}{dx} = \lim_{\Delta x \to 0} \frac{\Delta y}{\Delta x} = \lim_{h \to 0} \frac{f(x_1 + h) - f(x_1)}{h}$$

(2)

Equation (2) is also called the derivative of the function $f(x)$ with respect to the variable $x$ at $(x_2, f(x_2))$. It is a function and is denoted by $f'$. The slope, $m$, or gradient of a straight line, is a number may be obtained from the following equation.

$$y = mx + c.$$ (3)

From Equation (3), the y-intercept or $c$ may be obtained, either the value of slope is zero or if the initial position $(x, y)$ and the slope, $m$, are known. From Equation (2), if the starting point or initial point and end point or terminal point are known, the slope of a curve at a point or a tangent slope $m$ may be calculated and then, the y-intercept or $c$ may be obtained at the given two points.

The steepness of a line, $m$, it is a number, may be obtained by taking the tangent of the angle measured above or below the horizontal line. In symbol,

$$m = \tan \theta.$$ (4)

II. CONCEPTS OF SLOPES

(i). The Behaviors or Characteristic Features of Tangent Slopes

Generally, there are two kinds of slopes, steep slope (high slope) and shallow slope (low slope). Besides, the other two kinds of slopes are flat slope (zero slope) and vertical (undefined slope).

The steepness, inclination, or declination shows the behaviors or characteristic features of the slope. Grade of a line is measured by the absolute value of the slope. A slope with a greater absolute indicates a steeper line.

Thus, not only a line, which is inclined an angle 45° to the positive horizontal axis in counter-clockwise direction, but also a line, which is inclined an angle 45° to the negative horizontal axis in counter-clockwise direction, is an arising line and has a value of slope +1 or $m$ is equal to 1.

If the absolute value $|m| > 1$, inclination is fairly steep. If the inclination is between 45° and 90°, the slope is positive and if the inclination is between 135° and 180°, the slope is negative and the direction of the line, tan $\theta$ is increasing. In both cases, the inclination or $\theta$ is assumed to be measured from the positive horizontal axis in counter clockwise direction.

Moreover, if a line which has its inclination angle $\theta$ - 45°, i.e., from the positive horizontal axis in clockwise direction or from the positive horizontal axis in counter clockwise direction the line is a falling line and it has a slope $m$ (-1).

If the absolute value $|m| < 1$, its inclination is not very steep (inclination < 30°). The line from left to right is increasing, the slope is a positive value, decreasing from right to left, the line has a negative slope. If a line is horizontal, then it has a constant slope but a vertical line has an undefined slope. The two lines are parallel if they have the same value of slopes and they are
orthogonal to each other if the product of their values of slopes is equal to -1.

(ii) Average and Instantaneous Rate of Changes or Secant Slope and Tangent Slope

The average rate of change of \( y \) or secant slope \( \frac{\Delta y}{\Delta x} \) of a function \( y = f(x) \) with respect to \( x \) over the interval \([x_1, x_2]\) is defined as the following

\[
\frac{\Delta y}{\Delta x} = \frac{f(x_2) - f(x_1)}{x_2 - x_1} = \frac{rise}{run} \tag{1}
\]

The instantaneous rate of change or tangent slope \( m \) at \((x_1, f(x_1))\) of a curve needs an approach that takes into account the behavior of the secant through \( P \) and nearby point \( Q \) as \( Q \) moves toward \( P \) along the curve or the length \( h \) of the interval over which the change occurs approaches zero. In symbol,

\[
m = \lim_{h \to 0} \frac{f(x_1 + h) - f(x_1)}{h} \tag{2}
\]

Equation (2) is also called the derivative of the function \( f(x) \) with respect to the variable \( x \) at \((x_1, f(x_1))\). It is a function and is denoted by \( f'(x) \).

The slope, \( m \), or gradient of a straight line, is a number may be obtained from the following equation

\[
y = mx + c. \tag{3}
\]

From Equation (3), the \( y \)-intercept or \( c \) may be obtained, either the value of slope is zero or if the slope, \( m \), and are known. From Equation (2), if the starting point or initial point and end point or terminal point are known, the slope of a curve at a point or a tangent slope \( m \) may be calculated and then, the \( y \)-intercept or \( c \) may be obtained at the given two points.

The steepest of a line, \( m \), is a number, may be obtained by taking the tangent of the angle measured above or below the horizontal line. In symbol,

\[
m = \tan \theta.
\]

I. THE APPLICATION IN REAL LIFE

In my paper, jobs opportunities of people, i.e., males and females who are over 18 and under 60 age of government salary earners, company salary earners, workers and daily wager, in Mandalay Mahar Aung Myay township will be discussed by means of slopes in two cases, negative and positive. Moreover, fitting a straight line and parabola will be presented by the method of least squares. All of them will be obtained for the following data shown in tables.

<table>
<thead>
<tr>
<th>Year</th>
<th>Civil Labourer</th>
<th>Company Labourer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( F )</td>
<td>( M )</td>
</tr>
<tr>
<td>2015</td>
<td>2090</td>
<td>842</td>
</tr>
<tr>
<td>2016</td>
<td>1989</td>
<td>681</td>
</tr>
<tr>
<td>2017</td>
<td>1953</td>
<td>756</td>
</tr>
</tbody>
</table>

Table (1)

<table>
<thead>
<tr>
<th>Year</th>
<th>Civil Labourer</th>
<th>Company Labourer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( F )</td>
<td>( M )</td>
</tr>
<tr>
<td>2015</td>
<td>8</td>
<td>274</td>
</tr>
<tr>
<td>2016</td>
<td>40</td>
<td>976</td>
</tr>
<tr>
<td>2017</td>
<td>23</td>
<td>507</td>
</tr>
</tbody>
</table>

Table (2)

(i) Negative Slope

A line is decreasing from left to right. The slope is negative, i.e. \( m \) is negative.

The getting of the civil salary earners job for both female and male are decreasing from year 2015 to year 2016 because of their slopes having negative values – 101 and -161.

Moreover, the getting jobs of the civil salary earner for female is decreasing from year 2016 to year 2017 because of the negative value of the slope -36 from year 2016 to year 2017. The getting jobs of the civil labourers for female is decreasing from year 2016 to year 2017 because of the negative value of the slope -17 from year 2016 to year 2017. The getting jobs of the daily wager’s (Company Labourer) for female is decreasing from 2016 to 2017 because of the negative value of the slope – 434 from year 2016 to year 2017.

The getting jobs of the civil labourer for male is decreasing from 2016 to 2017 because of the negative value of the slope -469 from year 2016 to year 2017.

The getting jobs of the company labourer for male is decreasing from year 2016 to year 2017 because of the negative value of the slope – 744 from year 2016 to year 2017.

All of the above cases, calculus will be applied in real life shown as the followings.

Civil Salary Earners’ Jobs for Female

\[
x_1 = 2015; x_2 = 2016 \\
\frac{\Delta y}{\Delta x} = f(x_2) - f(x_1) = 2090 \\
m = \frac{\Delta y}{\Delta x} = \frac{f(x_2) - f(x_1)}{x_2 - x_1} = -101
\]

Jobs of Civil Salary Earner for Female

\[
x_1 = 2016; x_2 = 2017 \\
f(x_1) = 1989; f(x_2) = 1953 \\
m = \frac{\Delta y}{\Delta x} = \frac{f(x_2) - f(x_1)}{x_2 - x_1} = \frac{1953 - 1989}{2017 - 2016} = -36 < 0.
\]

Civil Salary Earners’ Jobs for Male

\[
x_1 = 2015; x_2 = 2016 \\
f(x_2) = 681; f(x_1) = 842 \\
m = \frac{\Delta y}{\Delta x} = \frac{f(x_2) - f(x_1)}{x_2 - x_1} = -161 < 0
\]

Jobs of Workers for Female (Civil Labourer)

\[
x_1 = 2016; x_2 = 2017 \\
f(x_1) = 40; f(x_2) = 23 \\
m = \frac{\Delta y}{\Delta x} = \frac{f(x_2) - f(x_1)}{x_2 - x_1} = -17 < 0
\]
Jobs of Workers’ for male (Civil Labourer)

\[ x_1 = 2016; x_2 = 2017 \]
\[ f(x_1) = 976; f(x_2) = 507 \]
\[ m = \frac{\Delta y}{\Delta x} = \frac{f(x_2) - f(x_1)}{x_2 - x_1} = -469 < 0 \]

Jobs of Daily Wager’s for Females (Company Labourer)

\[ x_1 = 2016; x_2 = 2017 \]
\[ f(x_1) = 544; f(x_2) = 110 \]
\[ m = \frac{\Delta y}{\Delta x} = \frac{f(x_2) - f(x_1)}{x_2 - x_1} = -434 < 0 \]

Jobs of Daily Wagers’ for Males (Company Labourer)

\[ x_1 = 2016; x_2 = 2017 \]
\[ f(x_1) = 1049; f(x_2) = 305 \]
\[ m = \frac{\Delta y}{\Delta x} = \frac{f(x_2) - f(x_1)}{x_2 - x_1} = -744 < 0 \]

(ii) Positive Slope

A line is increasing from left to right. The slope is positive, i.e. \( m > 0 \).

For company salary earners’ jobs for female

\[ x_1 = 2015; x_2 = 2016 \]
\[ f(x_2) = 3255; f(x_1) = 2735 \]
\[ m = \frac{\Delta y}{\Delta x} = \frac{f(x_2) - f(x_1)}{x_2 - x_1} = 520 \]

The slope between two years from 2015 to 2016 is greater than zero, \( m = 520 \).

The getting of the company salary earners’ jobs for female is increasing from years 2015 to 2016, for the result of this slope is positive.

Company Salary earners’ jobs for male

\[ x_1 = 2015; x_2 = 2016 \]
\[ f(x_1) = 4250; f(x_2) = 4955 \]
\[ m = \frac{\Delta y}{\Delta x} = \frac{f(x_2) - f(x_1)}{x_2 - x_1} = \frac{4955 - 4250}{2016 - 2015} = 705 \]

The slope between years 2015 and 2016 is greater than 0 and positive. Its value is 705.

The getting of the company salary earners’ jobs for male is increasing from 2015 to 2016.

Worker’s jobs for female

\[ x_1 = 2015; x_2 = 2016 \]
\[ f(x_1) = 8; f(x_2) = 40 \]
\[ m = \frac{\Delta y}{\Delta x} = \frac{f(x_2) - f(x_1)}{x_2 - x_1} = \frac{40 - 8}{2016 - 2015} = 32 \]

The slope from year 2015 to year 2016 is greater than 0 and positive, for \( m = 32 \).

The getting of the worker’s jobs for female is increasing from 2015 to 2016.

Jobs of Civil Salary earner for male

\[ x_1 = 2016; x_2 = 2017 \]
\[ f(x_1) = 976; f(x_2) = 507 \]
\[ m = \frac{\Delta y}{\Delta x} = \frac{f(x_2) - f(x_1)}{x_2 - x_1} = 75 > 0 \]

The getting jobs of the for male is increasing from 2016 to 2017 because of the positive value of the slope 75 from year 2016 to year 2017.

Jobs of Company’s salary earner’s for female

\[ x_1 = 2016; x_2 = 2017 \]
\[ f(x_1) = 4955; f(x_2) = 5178 \]
\[ m = \frac{\Delta y}{\Delta x} = \frac{f(x_2) - f(x_1)}{x_2 - x_1} = 223 > 0 \]

The getting jobs of Company salary earner’s for female is increasing from 2016 to 2017 because of the positive value of the slope 223 from year 2016 to year 2017.

Jobs of company salary earners’ for male

\[ x_1 = 2016; x_2 = 2017 \]
\[ f(x_1) = 4250; f(x_2) = 4955 \]
\[ m = \frac{\Delta y}{\Delta x} = \frac{f(x_2) - f(x_1)}{x_2 - x_1} = 705 \]

The getting jobs of the company salary earners’ for male is increasing from 2016 to 2017 because of the positive value of the slope 705 from year 2016 to year 2017.

IV. CONCLUSIONS

In my conclusion, slope may be applied both in separation of a huam ability suh as medicine technological, education, economics and weather information (rainy, hot, cold). So it can be applied in real life.

ACKNOWLEDGMENT

Firstly, I would like to give my acknowledgement to my head Dr. Soe Soe for her encourage let to perform this paper. Secondly as she read and advised me to perform my paper the best. Finally, I am also grateful to all of the members who accepted my paper to be published in journal.
Appendix A

![Graph 1(a)](image1a)

Figure 1(a)

![Graph 1(b)](image1b)

Figure 1(b)

Appendix B

![Graph 2(a)](image2a)

Figure 2(a)

![Graph 2(b)](image2b)

Figure 2(b)
References


Hydrogeophysical studies for the determination of aquifer hydraulic characteristics and evaluation of groundwater potential: A case study of some selected parts of Imo River Basin, South Eastern Nigeria.

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ABSTRACT

Hydrogeophysical studies of some selected towns in Imo River Basin were carried out to determine the aquifer hydraulic characteristics and evaluate the groundwater potential of the study area. A total of thirty-eight (38) Vertical Electrical Sounding (VES) in fifteen (15) towns in Imo River Basin were conducted to obtain the aquifer resistivity data. The results of the qualitative interpretation of the VES data indicate that 75% of the field curves at the boundary of the aquifers terminated as K-shaped and Q-shaped type curves. The general shapes suggested that transverse resistance of the aquifers is the dominant parameter for the estimation of transmissivity in the study area. The estimation of hydraulic characteristics of the aquifers from the geoelectric parameters showed that the mean hydraulic conductivity values ranged from 1.48 $m/day$ to 135.2 $m/day$ and transmissivity values ranged from 121 $m^2/day$ to 6178.6 $m^2/day$. The results of the correlation between hydraulic and geoelectric parameters showed high coefficient of reliability ($R^2$): Resistivity and hydraulic conductivity with $R^2$ of 0.99; Transverse Resistance and Transmissivity with $R^2$ of 0.81. The derived analytical relations $\rho_m = 22.65K_m + 182.8; \quad R_m = 24.66T_m + 13090$ have presented an empirical relationship to estimate the values of the hydraulic parameters of aquifers in the study area. The analysis of the spatial variation of transmissivity magnitude and variation delineated the study area according to groundwater supply potential ranging from zones without groundwater supply prospect to withdrawal of lesser regional importance. It is envisaged that the parameters utilized in this study will help to reduce the additional expenditures of carrying out pumping tests and offer an alternative approach to pre-drilling estimation of hydraulic parameters for optimum development and proper management of groundwater resources in the study area.

Keywords: Transverse Resistance, Transmissivity, Hydraulic Conductivity, Type Curves, Coefficient Of Reliability, Dominant Parameters, Hydraulic Parameters, Geoelectric Parameters
I. INTRODUCTION

Groundwater can be located very efficiently, and groundwater management made sustainable with modeling and monitoring systems. Geophysical measurements sensitive to hydrogeological variables have the ability to provide information with much higher spatial resolution than hydrogeological measurement methods only.

Different correlation studies between hydraulic and geoelectrical properties have been carried out by many researchers in recent years to estimate aquifer properties such as yield, hydraulic conductivity and transmissivity. (Kelly, 1977; Niwas and Singhal, 1981; Onuoha and Mbazi, 1988; Mazac et al., 1985; Mbonu et al., 1991; Huntley, 1986).

They deduced the relationship between aquifer and geophysical parameters based on the assumption that the geology and groundwater quality remains fairly constant within the area of interest (Niwas and Singhal, 1981; Mbonu et al., 1991). The established relationships between the electrical and hydrological parameters of the aquifer can be used as a possible solution to the problems of wildcat drilling, contamination, pump testing costs, etc. (Laouini G. et al., 2017; Urish, 1981; Yander and Abolfazli, 1998). The conventional method for determining the hydraulic characteristics of an aquifer is the pumping test. However, this method can be expensive, time consuming and yields result that is relevant to a relatively small portion of the aquifer (Massoud et al., 2010). An alternative non-invasive and less expensive approach that provides more regional information is the estimation of the aquifer parameters from geo-electric parameters.

Assessment of aquifer parameters is an effective technique in groundwater resource management considered necessary for planning and economic utilization of groundwater.

There is proliferation of shallow substandard private water wells, poor planning and poor management of public wells in Imo River Basin, Nigeria. Over 60% of water wells developed in the basin is either abortive or not functional (Nwachukwu et al., 2010).

Although numerous boreholes have been drilled at various parts of the Imo River Basin, there has not been any systematic and comprehensive study to establish the nature and distribution of the aquifer beneath the basin. (Uma, 1989).

The objectives of this research are:

i. to determine the geoelectric parameters of the aquifers

ii. to estimate the aquifer hydraulic characteristics from surface geophysics

iii. to establish the empirical relationships between the geoelectrical parameters and hydraulic properties of the aquifers in the study area and

iv. evaluation of groundwater potentials for optimum development and proper management of groundwater resources in the study area.
2. STUDY AREA

The study area lies between latitudes 5°30’N to 6°N and longitudes 7°E to 7°30’E (Fig. 1). It covers about fifteen (15) selected towns in Imo River Basin.

Fig. 1. Map of Study Area.

The basin is a 140km N-S trending sedimentary syncline located at the mid South-Eastern part of Nigeria. The basin has rich deposit of clay minerals, sand, gravel and lignite. Based on near surface lithology, the Imo River Basin was divided into two zones (Nwachukwu et al., 2010). The northern zone consisting of a group of shaly formations which have greater drainage density than the Southern zone belonging to the sandy Benin formation. Age of the shaly zone range from Paleocene to Albian and the sandy zone is Oligocene to recent. Table 1 summarizes the general geology of the study area (after Uma and Egboka, 1985)
<table>
<thead>
<tr>
<th>Tertiary</th>
<th>Age</th>
<th>Formation</th>
<th>Lithology</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Maocene-recent</td>
<td>Benin</td>
<td>Formation: Medium-coarse grained poorly consolidated sands with clay lenses and stringers</td>
</tr>
<tr>
<td></td>
<td>Oligocene-Miocene</td>
<td>Ogwashi/Asaba</td>
<td>Consolidated sands with lignite seams at various layers</td>
</tr>
<tr>
<td></td>
<td>Eocene</td>
<td>Ameki</td>
<td>Formation: Consolidated sands with lignite seams at various layers</td>
</tr>
<tr>
<td></td>
<td>Paleocene</td>
<td>Imo Shale</td>
<td>Laminated clayey shale</td>
</tr>
<tr>
<td></td>
<td>Paleocene</td>
<td>Nsukka</td>
<td>Formation: Sandstones intercalated with shales and coal beds</td>
</tr>
<tr>
<td></td>
<td>Maestrichtian</td>
<td>Ajalli</td>
<td>Formation: White coloured sandstone</td>
</tr>
<tr>
<td></td>
<td>Maestrichtian</td>
<td>Mamu</td>
<td>Formation: Sandstone and coal seams</td>
</tr>
</tbody>
</table>

The geology of the Benin formation has been given by Uma and Egboka, 1985 among others. The Benin formation is made up of friable sands and minor intercalation of clay. The sand units are mostly coarse grained, pebbly, poorly sorted and contain lenses of fine grained sands. The formation starts as a thin edge at its contact with the Ogwashi/Asaba formation in the north of the area and thickens seawards. The Benin formation conformably overlies the Ogwashi/Asaba formation. The Ogwashi/Asaba formation (Lignite series) is also predominantly sandy with minor clay units. The formation is characterized by lignite seams at various levels. The lignite formation has a thickness of about 300m. This is underlain by the Ameki formation with thickness of 1460m, which is in turn underlain by the Imo Shale, Nsukka formation, Ajali formation and Mamu formation successively.

### 3 THEORETICAL BACKGROUND

Hydraulic and electric conductivities are dependent on each other since the mechanisms of fluid flow and electric current conduction through porous media are generally governed by the same physical parameters and lithological attributes.

When current flows parallel to the geoelectrical boundaries of a geoelectrical section, the parameters that influence current flow is longitudinal conductance $L_C$ and when current flows normal to the bed boundaries, the transverse resistance $(T)$ is significant.

Relationships between fluid transmissivity, transverse resistance and longitudinal conductance are based on the nature of relationships between hydraulic conductivity (Permeability, $K$) and electrical resistivity ($\rho$).

For a terminal H-shaped or A-shaped segment of the multilayer resistivity curves, the resistivity of the aquifer formation is lower than the resistivity of the layer below it at the boundary of the aquifer. Both the current flow and hydraulic flow for any of the two curve segments are dominated by horizontal in the aquifer substratum (Frohlick and Kelly, 1985). Thus the relationship between hydraulic conductivity ($K$) and electric resistivity ($\rho$) is inverse and the dominant Dar Zarrouk parameters for estimation of transmissivity is longitudinal conductance $L_C$:

$$k \propto \frac{1}{\rho} \quad (1)$$
\[ L_c = h/\rho \] (2)

The transmissivity of the aquifer is

\[ T = kpL_c \] (3)

Substituting eqn. (2) into eqn. (3)

\[ T = kp \left( \frac{L_c}{\rho} \right) = k h \] (4)

According to Heigold et al., (1979), the hydraulic conductivity value determined from geoelectrical technique is

\[ k = 386.4 \rho^{-0.93283} (m/day) \]

Where \( \rho \) is the resistivity of the aquifer.

For the terminal K-shaped or Q-shaped segment of the multi-layer resistivity curves, the resistivity of the aquifer is higher than the resistivity of the layer below it at the boundary of the aquifer substratum. Thus for either curve types, the relationship between \( k \) and \( \rho \) is direct and the dominant Zarronk parameter for the estimation of transmissivity is transverse resistance (\( R \)):

\[ k \propto \rho \] (5)

\[ R = h \rho \] (6)

The transmissivity of the aquifer substratum for a transverse current flow and lateral hydraulic flow is

\[ T = (k/\rho)R \] (7)

Substituting eqn. (6) into eqn. (7)

\[ T = \left( \frac{k}{\rho} \right) (h \rho) = k h \] (8)

In a porous aquifer according to Johasen (1977), the hydraulic conductivity value determined from geoelectrical technique is given by the equation.

\[ k(m/s) = 10^{-5} \times 97.5^{-1} \times \rho^{1.195} \] (9)

\[ k(m/day) = 60 \times 60 \times 24 \times k(m/s) \] (10)
4. MATERIAL AND METHODS

4.1. Data Acquisition and Interpretation

Thirty-eight (38) Schlumberger Vertical Electrical Soundings (VES) were carried out in the study area (Fig. 1) using Omega 1000 resistivity meter. The array spread for the current electrode spacing in the VES profiles range between 300m to 700m across the area.

The apparent resistivity ($\rho_a$) values were determined by taking the product of the resistance ($R_a$) as measured by the Terrameter and the geometric factor ($k$) which is dependent on the potential and current electrode spacing:

$$\rho_a = \pi \left( \frac{(AB)^2}{(MN)^2} \right) R_a$$

where $AB$ is the distance between the two current electrodes and $MN$ is the distance between the potential electrodes. The equation can be simplified to

$$\rho_a = kR_a$$

where $k$ is the geometric factor.

The field curves were generated by plotting the apparent resistivity values against the electrode spacing ($\frac{AB}{2}$).

The curves were interpreted using partial curve matching techniques. The geoelectric parameters obtained from the manual interpretation of VES data were refined or modified using the AGI-1D and Schlumberger Automatic analysis interpretation software.

The softwares require that the operator introduce the number, thickness and resistivities of the subsurface layers. The method of iteration was performed until the fitting error between the field data and the synthetic model curve became minimal and constant to generate the data for the estimated model (figure 2). According to Johansen (1977), the hydraulic conductivity can be determined from the geoelectrical technique using the equation

$$k(m/s) = 10^{-5} \times 97.5^{-1} \times \rho^{1.195}$$

$$k(m/day) = 60 \times 60 \times 24 \times k(m/s)$$

Transmissivity analysis was carried out using two methods: (i) descriptive statistical testing for identification of background transmissivity and anomalies and (ii) classification scheme introduced by Krasny (1993) for appraisal of groundwater supply potential.

The statistical testing method requires that all the transmissivity values in a particular region be pooled using transmissivity index ‘$T$’. According to Jetal and Krasny (1968), the relationship between transmissivity ($T$) and logarithmic transmissivity index ($Y$) is

$$T = 10^{Y-8.96} \times 86400$$

$$Y = \log \left( \frac{T}{86400} \right) + 8.96$$

where $T$ is the transmissivity in $m^2/day$. 

AFOR-OGIDI SQUARE AMAIFEKE, ORLU VES

Analytical result presented by the AGI 1D Software and the Schlumberger Automatic analysis package reveals nine sub-layers as follows:

<table>
<thead>
<tr>
<th>LAYER</th>
<th>DEPTH (m)</th>
<th>RESISTIVITY (Ohm-m)</th>
<th>LITHOLOGY</th>
<th>COLOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.5</td>
<td>380</td>
<td>Topsoil - Lateritic</td>
<td>Mixed Blue</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>8397</td>
<td>Sand</td>
<td>Red-Brown</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
<td>1178</td>
<td>Shale-Sandstone</td>
<td>Green</td>
</tr>
<tr>
<td>4</td>
<td>13</td>
<td>797</td>
<td>Mixed sand</td>
<td>Blue</td>
</tr>
<tr>
<td>5</td>
<td>20</td>
<td>15237</td>
<td>Shale-Sandstone</td>
<td>Red</td>
</tr>
<tr>
<td>6</td>
<td>24</td>
<td>8666</td>
<td>Sandstone</td>
<td>Off red</td>
</tr>
<tr>
<td>7</td>
<td>56</td>
<td>1137</td>
<td>Shally sand</td>
<td>Green</td>
</tr>
<tr>
<td>8</td>
<td>130</td>
<td>2668</td>
<td>Siltstone</td>
<td>Orange</td>
</tr>
<tr>
<td>9</td>
<td>&gt;192</td>
<td>230</td>
<td>Prospective unit</td>
<td>Blue</td>
</tr>
</tbody>
</table>

Fig. 2. Typical iterated sounding curve of the study area at VES 22

The transmissivity classification systems for the study area based on the magnitudes and variations of the transmissivity index (Y) as proposed by Krasny (1993) are given in tables 2 and 3.
Table 2: Krasny’s Classification of Transmissivity of Magnitude and Variation

<table>
<thead>
<tr>
<th>Classification of Transmissivity $T$ magnitude</th>
<th>Coefficient of $T$ magnitude ($m^2/d$)</th>
<th>Designation of $T$ magnitude</th>
<th>Groundwater Supply Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>&gt; 1000</td>
<td>Very high</td>
<td>Withdrawal of great regional importance</td>
</tr>
<tr>
<td>II</td>
<td>1000-100</td>
<td>High</td>
<td>Withdrawals of lesser regional importance</td>
</tr>
<tr>
<td>III</td>
<td>100-10</td>
<td>Intermediate</td>
<td>Withdrawals for local water supply (small communities and plants)</td>
</tr>
<tr>
<td>IV</td>
<td>10-1</td>
<td>Low</td>
<td>Smaller withdrawals for local water supply (private consumption)</td>
</tr>
<tr>
<td>V</td>
<td>1-0.1</td>
<td>Very low</td>
<td>Withdrawals for local water supply with limited consumption</td>
</tr>
<tr>
<td>VI</td>
<td>&lt; 0.1</td>
<td>Negligible</td>
<td>Sources for local water supply are difficult</td>
</tr>
</tbody>
</table>

Table 3: Classification of Transmissivity ($T$) Variation

<table>
<thead>
<tr>
<th>Standard Deviation of $T$ Index ($Y$)</th>
<th>Class of $T$ Variation</th>
<th>Designation of $T$ Variation</th>
<th>Hydrogeological environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 0.2</td>
<td>a</td>
<td>Insignificant</td>
<td>Homogenous</td>
</tr>
<tr>
<td>0.2-0.4</td>
<td>b</td>
<td>Small</td>
<td>Slightly heterogeneous</td>
</tr>
<tr>
<td>0.4-0.6</td>
<td>c</td>
<td>Moderate</td>
<td>Fairly heterogeneous</td>
</tr>
<tr>
<td>0.6-0.8</td>
<td>d</td>
<td>Large</td>
<td>Considerably heterogeneous</td>
</tr>
<tr>
<td>0.8-1.0</td>
<td>e</td>
<td>Very large</td>
<td>Very heterogeneous</td>
</tr>
<tr>
<td>&gt; 1.0</td>
<td>f</td>
<td>Extremely large</td>
<td>Extremely heterogeneous</td>
</tr>
</tbody>
</table>

The standard deviation of the Transmissivity Index ($Y$) variations represents the degree of heterogeneity of the hydrogeological environment.

By using the transmissivity analysis based on transmissivity Index ($Y$) classification (table 4), the groundwater supply potential designation for the various localities in the study area was identified as given in table 5.

Table 4: Transmissivity Analysis based on Transmissivity Index ($Y$) Classification

<table>
<thead>
<tr>
<th>S/N</th>
<th>Classification</th>
<th>Description</th>
<th>Range of $Y$</th>
<th>Groundwater Supply Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Negative Extreme Anomalies</td>
<td>Less than (mean - (2× standard deviation))</td>
<td>&lt; 6.37</td>
<td>Negligible</td>
</tr>
<tr>
<td>2</td>
<td>Negative Anomalies</td>
<td>Between (mean - standard deviation) and (mean - (2× standard deviation))</td>
<td>6.79 and 6.37</td>
<td>Very low</td>
</tr>
<tr>
<td>3</td>
<td>Background Anomalies</td>
<td>Between (mean – standard deviation) and (mean - (2× standard deviation))</td>
<td>6.79 and 7.63</td>
<td>Low</td>
</tr>
<tr>
<td>4</td>
<td>Positive Anomalies</td>
<td>Between (mean + standard deviation) and (mean + (2× standard deviation))</td>
<td>7.63 and 8.05</td>
<td>Moderate</td>
</tr>
<tr>
<td>5</td>
<td>Positive Extreme Anomalies</td>
<td>Greater than (mean + (2× standard deviation))</td>
<td>&gt; 8.05</td>
<td>High</td>
</tr>
</tbody>
</table>

Negative Extreme Anomalies – Zones without groundwater supply prospect; Negative Anomalies – withdrawal for local water supply with limited consumption; Background Anomalies – smaller withdrawal for local water supply (private consumption); Positive Anomalies – withdrawal for less regional importance; Positive Extreme Anomalies – Zones with high groundwater supply prospect
### Table 5: Results of summary Statistics of Transmissivity Index (Y), Krasny’s Transmissivity (r)

<table>
<thead>
<tr>
<th>S/N</th>
<th>Locality</th>
<th>T&lt;sub&gt;(m&lt;sup&gt;3&lt;/sup&gt;/day)&lt;/sub&gt;</th>
<th>Results of T&lt;sub&gt;Index (Y)&lt;/sub&gt;</th>
<th>Results of T Magnitude</th>
<th>Results of T Variation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Uzuakoli UZ</td>
<td>2114.2</td>
<td>7.34</td>
<td>Background Anomalies (Low)</td>
<td>Smaller withdrawal for local water supply</td>
</tr>
<tr>
<td>2</td>
<td>Uturu UT</td>
<td>1394.8</td>
<td>7.16</td>
<td>Background Anomalies (Low)</td>
<td>Smaller withdrawal for local water supply</td>
</tr>
<tr>
<td>3</td>
<td>Okigwe OK</td>
<td>1947.9</td>
<td>7.31</td>
<td>Background Anomalies (Low)</td>
<td>Smaller withdrawal for local water supply</td>
</tr>
<tr>
<td>4</td>
<td>Umuna UM</td>
<td>1350.6</td>
<td>7.15</td>
<td>Background Anomalies (Low)</td>
<td>Smaller withdrawal for local water supply</td>
</tr>
<tr>
<td>5</td>
<td>Nsu NS</td>
<td>121</td>
<td>6.10</td>
<td>Negative Extreme Anomalies (Negligible)</td>
<td>Zone without groundwater supply prospect</td>
</tr>
<tr>
<td>6</td>
<td>Umunumo UMN</td>
<td>817.9</td>
<td>6.93</td>
<td>Background Anomalies (Low)</td>
<td>Smaller withdrawal for local water supply</td>
</tr>
<tr>
<td>7</td>
<td>Orlu OR</td>
<td>2429.9</td>
<td>7.40</td>
<td>Background Anomalies (Low)</td>
<td>Smaller withdrawal for local water supply</td>
</tr>
<tr>
<td>8</td>
<td>Akokwa AK</td>
<td>2403.3</td>
<td>7.40</td>
<td>Background Anomalies (Low)</td>
<td>Smaller withdrawal for local water supply</td>
</tr>
<tr>
<td>9</td>
<td>Nkwerre NK</td>
<td>2424.9</td>
<td>7.40</td>
<td>Background Anomalies (Low)</td>
<td>Smaller withdrawal for local water supply</td>
</tr>
<tr>
<td>10</td>
<td>Isu IS</td>
<td>2871.5</td>
<td>7.48</td>
<td>Background Anomalies (Low)</td>
<td>Smaller withdrawal for local water supply</td>
</tr>
<tr>
<td>11</td>
<td>Atta AT</td>
<td>6178.6</td>
<td>7.81</td>
<td>Positive Anomalies (moderate)</td>
<td>Withdrawal for lesser regional importance</td>
</tr>
<tr>
<td>12</td>
<td>Ogwa OG</td>
<td>2328.1</td>
<td>7.39</td>
<td>Background Anomalies (Low)</td>
<td>Smaller withdrawal for local water supply</td>
</tr>
<tr>
<td>13</td>
<td>Isuochi ISC</td>
<td>940.9</td>
<td>6.99</td>
<td>Background Anomalies (Low)</td>
<td>Smaller withdrawal for local water supply</td>
</tr>
<tr>
<td>14</td>
<td>Arondizuogu AR</td>
<td>440.3</td>
<td>6.66</td>
<td>Negative Anomalies (Very Low)</td>
<td>Withdrawal for local water supply with limited consumption</td>
</tr>
<tr>
<td>15</td>
<td>Umuahia UMH</td>
<td>4439.8</td>
<td>7.67</td>
<td>Positive Anomalies (Moderate)</td>
<td>Withdrawal for lesser regional importance</td>
</tr>
</tbody>
</table>

### 5. RESULTS AND DISCUSSION

Thirty-eight (38) Vertical Electrical Soundings (VES) were interpreted qualitatively and quantitatively. The terminal shape of the vertical electrical sounding curve types identified in the study area at the boundary of the aquifers include 53%Q, 22%K, 14%H and 11%A types (table 6). Approximately, 75% of all the resistivity curves are of the terminal K and Q curve types whereas, the remaining 25% belong to the terminal H and A types within the study area. Therefore, terminal K and Q curve types are the most dominant sounding curve types.
The general shape of the resistivity curves (table 6) suggests that transverse resistance \((R)\) of the aquifers can be considered as the dominant dar-Zarrouk parameters for the estimation of transmissivity in the study area.

Equations 8, 9 and 10 were used to calculate the hydraulic conductivity and transmissivity values for the thirty-eight (38) VES stations. Table 7 is a summary of the mean values of aquifer parameters of the locations in the study area. The geoelectric parameters estimated mean values are apparent resistivity \((\rho_m)\) 72.7 in Nsu to 3170 Ohm-m in Atta, Depth \((d_m)\) 28.9m in Umuna to 148.8m in Arondizuogu, transverse resistance \((R_m)\) 144869 ohm-m\(^2\) in Atta to 360 ohm-m\(^2\) in Nsu. For hydraulic parameters, the estimated mean values are hydraulic conductivity \((K_m)\) 1.48 in Nsu to 135.2 \(m/day\) in Atta and transmissivity \((T_m)\) 121 in Nsu to 6178.6 \(m^2/day\) in Atta.

**Table 6: Summary of the Results Obtained from Interpreted VES Data**

<table>
<thead>
<tr>
<th>VES No.</th>
<th>Location</th>
<th>Aquifer Thickness (h(m))</th>
<th>Aquifer Depth (d(m))</th>
<th>Aquifer Resistivity (\rho(Ohm - m))</th>
<th>Curve Type</th>
<th>No. of layers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Uzuakoli Bd I</td>
<td>166.9</td>
<td>53</td>
<td>654.3</td>
<td>AKHAHAKQ</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>Uzuakoli Bd II</td>
<td>106</td>
<td>86.5</td>
<td>383</td>
<td>HAAAKQHAK</td>
<td>11</td>
</tr>
<tr>
<td>3</td>
<td>ABSU Uturu I</td>
<td>23.4</td>
<td>66.4</td>
<td>1990</td>
<td>HKQ</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>ABSU Uturu II</td>
<td>52.3</td>
<td>35.6</td>
<td>148.2</td>
<td>KHQQHAKQ</td>
<td>11</td>
</tr>
<tr>
<td>5</td>
<td>Isokwe Okigwe</td>
<td>4.4</td>
<td>0.9</td>
<td>1490</td>
<td>H</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>Amogu Okigwe</td>
<td>41</td>
<td>30</td>
<td>2340</td>
<td>KHAA</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>Aghala Okigwe</td>
<td>49</td>
<td>172</td>
<td>3800</td>
<td>AKQHAK</td>
<td>8</td>
</tr>
<tr>
<td>8</td>
<td>Umualumoke Okigwe</td>
<td>42</td>
<td>65</td>
<td>800</td>
<td>HAKQHA</td>
<td>8</td>
</tr>
<tr>
<td>9</td>
<td>Umulolo Okigwe</td>
<td>21.1</td>
<td>27.4</td>
<td>207</td>
<td>KQ</td>
<td>5</td>
</tr>
<tr>
<td>10</td>
<td>Ogbugbe Okigwe</td>
<td>24.2</td>
<td>74.6</td>
<td>1600</td>
<td>KQ</td>
<td>5</td>
</tr>
<tr>
<td>11</td>
<td>Okaie Umuma I</td>
<td>27.6</td>
<td>53.2</td>
<td>2770</td>
<td>AK</td>
<td>4</td>
</tr>
<tr>
<td>12</td>
<td>Okaie Umuma II</td>
<td>17.9</td>
<td>4.7</td>
<td>420</td>
<td>K</td>
<td>3</td>
</tr>
<tr>
<td>13</td>
<td>Ezeoke Nsu I</td>
<td>135.7</td>
<td>84.2</td>
<td>30.4</td>
<td>HAAKQ</td>
<td>7</td>
</tr>
<tr>
<td>14</td>
<td>Ezeoke Nsu II</td>
<td>28</td>
<td>86</td>
<td>115</td>
<td>AKQQ</td>
<td>7</td>
</tr>
<tr>
<td>15</td>
<td>Umunumo I</td>
<td>25.9</td>
<td>71.2</td>
<td>1310</td>
<td>KHQQH</td>
<td>8</td>
</tr>
<tr>
<td>16</td>
<td>Umunumo II</td>
<td>50.9</td>
<td>29</td>
<td>39.8</td>
<td>KQ</td>
<td>5</td>
</tr>
<tr>
<td>17</td>
<td>Okporo Orlu</td>
<td>106.5</td>
<td>86</td>
<td>436.1</td>
<td>KHAQQ</td>
<td>9</td>
</tr>
<tr>
<td>18</td>
<td>Umuawo Orlu</td>
<td>85.5</td>
<td>107</td>
<td>308.6</td>
<td>KQAHAK</td>
<td>9</td>
</tr>
<tr>
<td>19</td>
<td>Umudikwa Orlu</td>
<td>97</td>
<td>95</td>
<td>866</td>
<td>HAKHAK</td>
<td>9</td>
</tr>
<tr>
<td>20</td>
<td>Owerre Nkwoji Orlu</td>
<td>105</td>
<td>87</td>
<td>2063</td>
<td>AAAAKQQ</td>
<td>9</td>
</tr>
<tr>
<td>21</td>
<td>Amaifeke Orlu</td>
<td>48.7</td>
<td>67.3</td>
<td>505</td>
<td>AKQ</td>
<td>6</td>
</tr>
<tr>
<td>22</td>
<td>Akokwa Orlu</td>
<td>67.7</td>
<td>124.8</td>
<td>1035.2</td>
<td>HAKQHK</td>
<td>9</td>
</tr>
<tr>
<td>23</td>
<td>Alaekwe Nkwerre</td>
<td>93</td>
<td>72</td>
<td>482</td>
<td>HAKHAACK</td>
<td>10</td>
</tr>
<tr>
<td>24</td>
<td>Ugara Nkwerre</td>
<td>18.1</td>
<td>32.9</td>
<td>1310</td>
<td>HA</td>
<td>4</td>
</tr>
<tr>
<td>25</td>
<td>Umudi Nkwerre</td>
<td>30.1</td>
<td>24.6</td>
<td>2460</td>
<td>K</td>
<td>3</td>
</tr>
<tr>
<td>26</td>
<td>Umulolo Isu</td>
<td>104.1</td>
<td>88.3</td>
<td>409.1</td>
<td>AAKQQ</td>
<td>7</td>
</tr>
<tr>
<td>27</td>
<td>Umudike Isu</td>
<td>107.8</td>
<td>84.2</td>
<td>760</td>
<td>KHAAKQ</td>
<td>8</td>
</tr>
<tr>
<td>28</td>
<td>Atta Ikeduru</td>
<td>45.7</td>
<td>72.5</td>
<td>3170</td>
<td>KHK</td>
<td>5</td>
</tr>
<tr>
<td>29</td>
<td>Umuezee Ogwa</td>
<td>41</td>
<td>108</td>
<td>2960</td>
<td>KHQQ</td>
<td>7</td>
</tr>
<tr>
<td>30</td>
<td>Alaee Ogwa</td>
<td>44</td>
<td>62</td>
<td>788.6</td>
<td>KQQHAK</td>
<td>9</td>
</tr>
<tr>
<td>31</td>
<td>Ochi Ogwa</td>
<td>49</td>
<td>46.7</td>
<td>539</td>
<td>KQ</td>
<td>4</td>
</tr>
</tbody>
</table>
## Table 7: Mean Values of Aquifer Parameters of the Localities in the Study Area

<table>
<thead>
<tr>
<th>S/No.</th>
<th>Location</th>
<th>Y</th>
<th>$K_m$</th>
<th>$\ell_m$</th>
<th>$h_m$</th>
<th>$d_m$</th>
<th>$R_m$</th>
<th>$T_m$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Uzuakoli</td>
<td>7.34</td>
<td>15.5</td>
<td>518.6</td>
<td>136.4</td>
<td>69.7</td>
<td>74929</td>
<td>2114.2</td>
</tr>
<tr>
<td>2</td>
<td>Uturu</td>
<td>7.16</td>
<td>36.9</td>
<td>1069.1</td>
<td>37.8</td>
<td>15</td>
<td>27162</td>
<td>1394.8</td>
</tr>
<tr>
<td>3</td>
<td>Okigwe</td>
<td>7.31</td>
<td>64.5</td>
<td>1706.1</td>
<td>30.2</td>
<td>16.6</td>
<td>60897</td>
<td>1947.9</td>
</tr>
<tr>
<td>4</td>
<td>Umuna</td>
<td>7.15</td>
<td>59.5</td>
<td>1595</td>
<td>22.7</td>
<td>28.9</td>
<td>41985</td>
<td>1350.6</td>
</tr>
<tr>
<td>5</td>
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$K_m$ - Mean hydraulic conductivity; $\ell_m$ - Mean resistivity; $h_m$ - Mean thickness; $d_m$ - Mean depth; $R_m$ - Mean transverse resistance; $T_m$ - Mean transmissivity

Correlation analysis was applied to establish the empirical relationships between geoelectric parameters and hydraulic parameters. The results of the analysis (Figs.3 and 4) for the fifteen locations showed high coefficient of reliability $R^2$:

(i) $\ell_m$ and $k_m$ with $R^2$ of 0.99

(ii) $R_m$ and $T_m$ with $R^2$ of 0.81.
Correlation of Resistivity and Hydraulic Conductivity

\[ y = 22.657x + 182.83 \]

\[ R^2 = 0.9947 \]

Fig. 3. Correlation of Resistivity and Hydraulic Conductivity of the fifteen locations in the study area.
Fig. 4. Correlation of Transverse Resistance and Transmissivity of the fifteen (15) locations in the study area.

The regression equations of the hydraulic and geoelectric parameters from the study area are:

\[ l_m = 22.65K_m + 182.8 \]  \hspace{1cm} (17)

\[ R_m = 24.66T_m + 13090 \]  \hspace{1cm} (18)

Equations (17) and (18) can be used to estimate the aquifer hydraulic characteristics in the study area where the survey did not cover.

Comparisons of resistivity map (fig.5) with hydraulic conductivity map (fig.6) transverse resistance map (fig.7), and transmissivity map (fig.8) show that areas underlain by relatively higher resistive aquifer materials have higher transverse resistance, hydraulic conductivity, and transmissivity values respectively. These relationships are expected because resistivity is directly proportional to the three parameters which are used to define target areas of good groundwater potential.
Fig. 5. Resistivity map

Fig. 6 Hydraulic Conductivity map

Fig. 7. Transmissivity map

Fig. 8 Transverse Resistance map
The result of the classification based on the Transmissivity Index (Y) (Fig. 9) shows that approximately 13% of the study area are under moderate magnitude (withdrawal of lesser regional importance), 73% low (smaller withdrawal for local water supply), 7% very low (withdrawal for local water supply with limited consumption) and 7% negligible (zone without groundwater supply prospect).

From Krasny’s Classification Scheme, the standard deviation value of 0.42 observed in Transmissivity Index (Y) values of the area represents a moderate transmissivity variation and a fairly heterogeneous environment.

![Transmissivity Index Map](image)

Fig. 9. Transmissivity Index Map

6. CONCLUSION

The application of VES technique has provided detailed information on the hydrogeoelectrical characteristics of the aquifers in the study area. The general terminal shapes of the vertical electrical sounding curves revealed that transverse resistance is the dominant Dar- Zarrouk parameter for the estimation of transmissivity in the study area.

The results of the correlation between hydraulic and geoelectric parameters showed high coefficient of reliability. Thus the regression equations of these parameters can be used to estimate the hydraulic conductivity and transmissivity values in the area the survey did not cover.

The analysis of spatial variation of transmissivity magnitude and transmissivity variation has classified the study area according to their groundwater supply potential ranging from zone without groundwater supply prospect to withdrawal of lesser regional importance. The standard deviation in the transmissivity index identified the study area as fairly heterogeneous hydrogeological environment.

The overall implication of the data analysis in this research is that transmissivity index classification has been applied successfully to assess the groundwater resources potential of the study area. The results of the study are
reliable and consistent with the geology of the study area. Hydraulic parameters are of crucial importance in groundwater prospecting. The parameters utilized in this study will help to reduce the additional expenditures of carrying out pumping tests and offer an alternative approach to pre-drilling estimation of hydraulic parameters for optimum development and proper management of groundwater resources in the study area.

ACKNOWLEDGMENTS

The author would like to acknowledge GEOPROBE INT’L CONSULTANTS, Owerri and Imo State Water Development Agency (IWADA) for the data and information utilized in the study.
REFERENCES


A Review Paper on

“U-Boot Beton: The Concrete Saver”

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http://dx.doi.org/10.29322/IJSRP.10.07.2020.p10383

Abstract: U-Boot technology is capable of supporting large without beams. U-Boot beton is a farm work made of recycled polypropylene. Voids from work placed in between the top in bottom reinforcements of slab. It is used to create slabs with large span or that are able to support large load without beams. U-boot is fire resistance. It is a recycled polypropylene formwork that was designed to create lightened slab & rafts. U-boot systems can be combined with other technologies pre-fabricated with other techniques such as post tensioned steel and pre-fabricated slabs. The technology of hollow slab with part tensioned steel. It reduces the weight of slab & its thickness.

Keywords: U-boot Foot/Needles, spacer, joint, fire resistance, low cost material

INTRODUCTION

U Boot is a technology that reduced the amount of concrete required. U-boot technology comes to 2001 when Robert II Grande, an Italian engineer, developed and patented a new system of hollow former to reduce transport vehicles. It is the recycled polypropylene formwork technology used for construction purposes. One of the important barrier with constructions, in instance of horizontal slabs is the soaring weight, which ceiling the span.

It creates lighter economical design for structure. For this reason major developments of reinforcement concrete have focused on enhancing the span. This is used to construct two way slab, large span slab, and mushroom slab and raft foundation in RCC structure. It is suitable for high rise building, hospitals and parking management Residential and industrial buildings. In u-boot automation, slabs are fabricated with large span a contract floor thinner by depleting the weight while keeping the advance of reinforced concrete technology.

OBJECTIVES

The U-Boot technology is very useful technology for building construction. The main objective is to reduce the dead load of slab and reduced the overall cost of slab. The U-Boot reduce the amount of concrete required. This is especially important for environmentally green and sustainable.

HISTORY AND BACKGROUND

U-boot technology comes to 2001 when Robert-II Grande, an Italian engineer, Developed and patented a new system of hollow former to reduce transport vehicles. This is a new technology that has been in operation since 2002.

TYPES OF U-BETON

- Single U-Beton
- Double U-Beton

Single U-Beton is available of various up beton height and foot height of dimension (52 cm * 52 cm) And 10, 13,16,20,24 And 28 cm in Height.

MATERIAL USED

Cement, Steel, Fine aggregate, Course aggregate, Water, Recycled plastic mould (u-boot Shells)
SCOPE

This technique will also be used later. As population increases, its demand will also increase as we will need large and economic house in future. It can be used in public as well as residential buildings.

INSTALLATION PROCESS

1. Place lower reinforcement above the formwork.
2. Now place the U-Boot above the lower reinforcement at the specified intervals provided by the horizontal link connectors.
3. Now complete the upper reinforcement which above the U-Beton.
4. Now Pouring of concrete is being done.
5. Now concrete is poured and slab is ready.

ADVANTAGES
- By using U-Boot technology when can increased number of floors.
- By using U-Boot beton we can get large span.
- Using the U-Boot does not place any beam between the poles.
- Therefore there is a decrease in the number of pillars.
- The weight on the poles and foundation results in a decrease in the overall weight of the structure.
- Due to U-Boot Beton reduced foundations – less deep foundation excavation.
- U-Boot technology improved acoustic behaviour.
- By reducing the number of poles, the economic pillars is increased
- Thickness of the slab is reduced

APPLICATIONS

- Used in public buildings, hospitals industries, auditoriums, malls, etc.
- Used in raft foundations.
- Used in two way slabs.

BENEFITS OF THIS SYSTEM
- Design freedom
- Down stand beams and bearing walls eliminated
- Reducing overall costs
- Reduced dead weight
- Longer spans between columns
- Construction is less weather dependent

CONCLUSION

If we want to save more concrete then this technology has to be used, less use of iron in the slabs. Pillars and foundation up to a total of 15%. There are anti-seismic advantages connected to reduced building weight slimmer pillars and foundation, there are low chance of seismic effect on the buildings. Due to the fact, that the structural behaviour of this new kind of monolithic flat slab is the same as for solid slab, excluding slab-edge column connection, we surely can talk appropriateness of use and advantages of the new technology. This technology is very expected in modern construction and perhaps future of civil engineering belongs to this new kind of hollow slab.

REFERENCES


BIOGRAPHY

Shoeb Khan Taslim Khan
Currently pursuing B.E. (Civil Engineering) from Babasaheb Naik College of Engineering, Pusad.
Analysis of The Effect of Capital Adequacy Ratio (CAR), Non Performing Loan (NPL), Net Interest Margin (NIM), Operating Expenses to Operating Income (BOPO), and Loan to Deposit Ratio (LDR) on Profitability of State-Owned Banks in The 2009-2018 Period

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http://dx.doi.org/10.29322/IJSRP.10.07.2020.p10384

Abstract- Banks have a vital role in the economic and financial system of a country. They play roles in managing, controlling, and protecting public funds to create a healthy financial industry. Therefore, the bank needs to consider and maintain its condition. It can be seen from the assessment of the risk and performance of the bank. The assessment can use information in the financial statement and its financial ratio analysis. The financial ratio analysis can help business stakeholders including bank owners, bank managers, the public who use the services, and Bank Indonesia as the bank’s supervisory authority. This research aims to identify the effect of Capital Adequacy Ratio (CAR), Non-performing Loans (NPL), Net Interest Margin (NIM), Operating Expenses to Operating Income (BOPO), and Loan to Deposit Ratio (LDR) on the profitability of the bank in the 2009 – 2018 period proxied by Return on Assets (ROA). This research used a quantitative approach. The sample was selected using a non-probability sampling technique in which it involved all state-owned banks, namely Bank Rakyat Indonesia, Bank Mandiri, Bank Negara Indonesia, and Bank Tabungan Negara. The data were analyzed using panel data regression analysis. The result of this study indicated that CAR, NPL, NIM, BOPO, and LDR significantly and simultaneous affect ROA. Further, CAR, BOPO, and LDR partially and significantly have a negative effect on profitability (ROA). In detail, NIM has a significant positive effect on profitability (ROA) and NPL does not affect profitability (ROA) in the state-owned banks in the 2009-2018 period.

Index Terms- CAR, NPL, NIM, BOPO, LDR, and ROA

I. INTRODUCTION

Banks play a crucial role in the economic and financial system of a country. The Law of the Republic of Indonesia Number 10 of 1998 concerning banking explains that banks are business entities collecting funds from the public in the form of savings and distribute the funds to the public in the form of credit and or other forms to improve their life. Therefore, banks have a crucial role as they help to improve the economy of a country.

Referring to the Bank Indonesia Regulation Number 13/1/PBI/2011 concerning Risk-Based Bank Rating of public banks explain that it is an assessment of the performance and risks of a bank. Therefore, it requires an analysis of the financial performance of the bank to assist investors in determining investment decisions in which investors expect continuously grows profits. Financial performance can be seen from the financial statements issued by the bank which functions to determine appropriate decisions for internal and external parties (Irman and Wulansari, 2018).

Bank performance can be measured based on its level of profitability. It uses Return on Assets (ROA) to measure the level of profit or profitability of the bank. ROA is counted by comparing the profit before tax to the total assets owned by the company. ROA focuses more on the company’s ability to earn revenue through its activities or operations as a whole. Thus, the higher the value of ROA, the higher the level of return gained by the company (Wulandari, 2018). The following figure shows the average ROA of State-Owned Banks in 2009 – 2018.
Based on Figure 1, the average ROA of state-owned banks experienced fluctuations during 2009-2018. The trendline of the above indicates a decrease. In 2009–2013, the average ROA of state-owned banks consistently increased, but it declined in 2014-2016. It is because the ROA values of Bank BRI decreased by 4.73%, 4.19%, and 3.84% in 2014-2016. Besides, Bank Mandiri also experienced the same, in which its ROA values declined 3.57%, 3.15%, and 1.95% in 2014 - 2016. Further, the ROA values of Bank BNI also decreased to 2.64% in 2015 and Bank BTN declined to 1.14% in 2014. During 2014–2016, the profitability of the bank was considered under pressure. It is due to declining credit growth and declining third party funds (DPK). Besides, the increase of non-performing loans particularly of the mining sector and other commodities with weakening prices (Republika.co.id, 2015). However, in 2017–2018, the average ROA of state-owned banks has re-increased.

Fahmi (2014: 194), bank performance typically relies on the CAMEL method. It consists of 5 aspects, namely Capital, Assets, Management, Earnings, and Liquidity. They use financial ratio analysis. It uses Capital Adequacy Ratio (CAR) for capital, Non-performing Loan (NPL) for assets, Net Interest Margin (NIM) for management, Operating Expenses to Operating Income (BOPO) for earning, and Loan to Deposit Ratio (LDR) for liquidity aspect. The result of financial ratio analysis is useful in assessing management performance in a period (Kasmir, 2015: 104).

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<td>15,74</td>
<td>16,70</td>
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<td>3,55</td>
<td>3,13</td>
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<td>2,61</td>
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<td>NIM(%)</td>
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<td>6,45</td>
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<td>6,36</td>
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<td>BOPO(%)</td>
<td>80,38</td>
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<td>ROA(%)</td>
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<td>3,46</td>
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<td>2,90</td>
<td>2,56</td>
<td>2,72</td>
<td>2,74</td>
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Table 1 State-owned Banks Ratios in the 2009-2018 Period

Based on table 1, state-owned banks show a tendency of relatively fluctuating CAR, NPL, LDR, NIM, BOPO, and ROA values in 2009-2018. Besides, each variable of CAR, NPL, NIM, BOPO, and LDR on ROA in 2009-2018 indicates unsuitable development. Further, a research gap between previous inconsistent research results encourages the researcher to conduct this current research.

Based on the elaborated issues above, the formulation of problems of this research cover (1) Do Capital Adequacy Ratio (CAR), Non-performing Loans (NPL), Net Interest Margin (NIM), Operating Expenses to Operating Income (BOPO), and the Loan to Deposit Ratio (LDR) partially affect the profitability of state-owned banks in the 2009-2018 period? (2) Do the Capital Adequacy Ratio (CAR), Non-performing Loans (NPLs), Net Interest Margins (NIM), Operating Expenses to Operating Income (BOPO), and Loan to Deposit Ratio (LDR) simultaneously affect the profitability of state-owned banks in the 2009-2018 period?

II. IDENTIFY, RESEARCH AND COLLECT IDEA

Definition of Bank and its Functions

According to Act Number 10 of 1998 concerning Banking, Bank is a business entity collecting funds from the public in the form of savings and distributes them to the public in the form of credit and or other forms to improve the standard of living of the community. Banks have three general functions and three special functions. The general functions cover collecting funds in the form of savings, distributing funds to the public in the form of credit, and financial services to improve the community’s life. The special functions include agents of trust, agents of development, and agents of service.
Financial Ratio
Kasmir (2015:104) states that the financial ratio is activities comparing the numbers in the financial statements with the implemented ones by dividing each number with another. The comparison is between one or more components of one or more financial statements in certain periods. The calculation of financial ratios can be useful for assessing the performance of company management in a period, such as the achievement of predetermined targets and management capabilities in managing company resources effectively.

Capital Adequacy Ratio (CAR)
According to Fahmi (2014: 181), the Capital Adequacy Ratio (CAR) is the bank performance ratio in measuring capital adequacy owned by banks which is useful to support all activities which may cause risks. CAR is also the amount of capital related to the credit risk of assets in the bank balance (Indonesian Bankers Association, 2016:162).
\[
\text{CAR} = \frac{\text{Capital (Core capital+Complementary capital)}}{\text{Risk-Weighted Assets (ATMR)}} \times 100\%
\]

Non-Performing Loan
Taswan (2010: 164) stated that net-performing loan is the ratio of non-performing loans to total loans, in which the intended loans are loans given to third parties (excluding other banks) and non-performing loans are substandard loan, bad loans, or doubtful loans. Non-performing loans are calculated on a gross basis that is not reduced with PPAP.
\[
\text{NPL} = \frac{\text{non-performing loans}}{\text{total loans}} \times 100\%
\]

Net Interest Margin (NIM)
Pandia (2012: 71-72) explained that the Net Interest Margin (NIM) is a useful ratio to measure the capability of bank management in managing its productive assets to obtain net interest income. The value of this ratio is considered better if it is higher as it shows an increased interest received to productive assets managed by the bank. Therefore, it provides lower problematic profitability of the bank.
\[
\text{NIM} = \frac{\text{interest income - interest expense}}{\text{average productive assets}} \times 100\%
\]

Operating Expense to Operating Income (BOPO)
According to Pandia (2012: 72), BOPO is an efficiency ratio that is useful for measuring the ability of bank management in managing operating expenses to operating income. The value of this ratio is considered better if it is smaller as it indicates higher efficiency of operating cost spent by the bank so that it has smaller problematic profitability.
\[
\text{BOPO} = \frac{\text{total operating cost}}{\text{total operating income}} \times 100\%
\]

Loan to Deposit Ratio (LDR)
The Indonesian Bankers Association (2018: 180) states that the Loan to Deposit Ratio (LDR) is a loan ratio given to third parties, excluding loans to other banks both in Rupiah and foreign currencies against third party funds (current accounts, savings, and deposits) both in Rupiah and foreign currencies. LDR is a comparison of loans provided to third party funds (Taswan, 2010: 167).
\[
\text{LDR} = \frac{\text{loans}}{\text{third party funds}} \times 100\%
\]

Profitability
Sutrisno (2012: 222) stated that profits are the acquisition of policies applied by the company management and the profit can be useful to measure and determine the level of profits gained by the company. One of the profitability ratios that can be used is Return on Assets (ROA). According to the Indonesian Bankers Association (2016: 151), profit before tax is profit contained or recorded in the financial statements of the bank income in the current year period. Meanwhile, the average total asset is the average total assets of the bank on the financial statements.
\[
\text{ROA} = \frac{\text{profit before tax}}{\text{average total assets}} \times 100\%
\]

Previous Research
Some previous research regarding the relationship between CAR, NPL, LDR, NIM, BOPO ratios and the profitability (ROA) of banks show different or inconsistent results. In detail, research conducted by Stevani and Sudirgo (2019) and Irman and Wulansari (2018) found that CAR has a significant and negative effect on ROA. However, another research conducted by Syamsuddin (2013) provides different results in which CAR has a significant positive effect on ROA. Meanwhile, Hutagalung et al (2013), Wulandari (2018), and Maria (2015) found that CAR has no significant effect on ROA. Further, Yogiayana (2013), Yuhasril (2019), dan Inggawati et al (2018) revealed that NPL has a significant and negative effect on ROA but Avrima and Pangestutti (2016) found that NPL has a positive effect on ROA. Other studies carried out by Maria (2015), Wulandari (2019) and Amzy et al (2019) showed that NPL has no significant effect on ROA.
Moreover, research conducted by Maria (2015), Avrita and Pangestuti (2016), and Yuhasril (2019) revealed that NIM has a significant and positive effect on ROA. On the other hand, Syamsuddin (2013) stated that NIM has no significant effect on ROA. Maria (2015) and Hutagalung et al (2013) found that BOPO has a significant and negative effect on ROA. It is different from research conducted by Nanda et al (2019) in which BOPO has a significant and positive effect on ROA. Yogianta (2013) found that LDR has a significant positive effect on ROA but Wulandari (2018), Maria (2015), Stevani and Sudirgo (2019), and Hutagalung et al (2013) found that LDR has no significant effect on ROA. Further, Amzy et al (2019) and Inggawati (2018) revealed that LDR shows a negative effect on ROA.

![Figure 2. Framework of Hypothesis](image)

Notes:
- : Shows partial effect
- : Shows simultaneous effect

**Research Hypothesis**

A hypothesis is a logically predicted relationship between two or more variables and it is in the form of statements and can be tested (Sekaran, 2006:135). Based on the elaborated theories above and the results of previous research, the researcher formulated the following hypotheses:

$H_1$: CAR significantly affects the profitability (ROA)

$H_2$: NPL significantly affects the profitability (ROA)

$H_3$: NIM significantly affects the profitability (ROA) of state-owned banks

$H_4$: BOPO significantly affects the profitability (ROA)

$H_5$: LDR significantly affects the profitability (ROA)

$H_6$: CAR, NPL, NIM, BOPO, and LDR significantly affect the profitability (ROA)

This research is quantitative and aims to analyze the effect of CAR, NPL, NIM, BOPO, dan LDR ratios on the profitability of state-owned banks in 2009-2018. Based on the aims, this study is descriptive and verification. The sample was selected using a nonprobability sampling technique in which this study used all members of the population as samples. The sample covered Bank Rakyat Indonesia, Bank Mandiri, Bank Negara Indonesia, and Bank Tabungan Negara that published financial reports and annual reports in the 2009 – 2018 period. It used secondary data from the financial reports and annual report of each bank’s official website.

**Data Analysis Method**

This study used descriptive statistic tests, classical assumption test, panel data regression analysis, coefficient of determination test (R2), simultaneous test (F-test), and partial test (T-test). Descriptive statistics are useful for providing a general description of the data obtained including maximum, minimum, mean, and standard deviation (standard) values. Before the data were processed, the researcher performed the classical assumptions test to ensure that the data were valid and could be processed. The researcher used the classical assumption test on normality test, multicollinearity test, heteroscedasticity test, and autocorrelation test. The collected data were then analyzed using panel data regression method. The panel data regression model equation is as follows:

$$Y_{it} = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \beta_5 X_{5it} + \epsilon_{it}$$
III RESULT AND DISCUSSION

Result of Descriptive Statistics Tests

<table>
<thead>
<tr>
<th>Variable</th>
<th>CAR</th>
<th>NPL</th>
<th>NIM</th>
<th>BOPO</th>
<th>LDR</th>
<th>ROA</th>
</tr>
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<tbody>
<tr>
<td>Maximum</td>
<td>22.96</td>
<td>4.68</td>
<td>10.77</td>
<td>88.97</td>
<td>108.86</td>
<td>5.15</td>
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<tr>
<td>Minimum</td>
<td>13.20</td>
<td>1.55</td>
<td>4.32</td>
<td>59.93</td>
<td>59.15</td>
<td>1.14</td>
</tr>
<tr>
<td>Mean</td>
<td>17.6272</td>
<td>2.7260</td>
<td>6.3365</td>
<td>73.2082</td>
<td>87.0737</td>
<td>3.0000</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>2.6934</td>
<td>0.8380</td>
<td>1.5081</td>
<td>7.9862</td>
<td>12.8222</td>
<td>1.0763</td>
</tr>
<tr>
<td>Observations</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
</tbody>
</table>

Source: Output EViews 10 Student Lite Version (processed data)

Based on table 2, the Capital Adequacy Ratio (CAR) variable has a mean value of 17.63%. The maximum value of the CAR variable reaches 22.96% in 2017 and a minimum value of 13.20% in 2009 at Bank BRI. Based on Bank Indonesia Regulation Number 15/12/PBI/2013, the minimum limit of CAR for a bank is 8%. The mean value of the CAR ratio is 17.63% which is higher than the minimum limit set by Bank Indonesia. Therefore, it can be said that the CAR of state-owned banks is considered good. CAR variable has a standard deviation value of 2.69% in which it is lower than the mean value of 17.63%. It indicates that the CAR variable has a low deviation level and the data are less varied or relatively homogeneous.

The Non-performing loan (NPL) variable of state-owned banks has a mean value of 2.73%. The maximum value of the NPL variable reaches 4.68% in 2009 with a minimum value of 1.55% in 2013 at Bank BRI. Based on Bank Indonesia Regulation Number 17/11/PBI/2015, the maximum limit of the NPL ratio is 5%. The mean value of the NPL ratio is 2.73% which is lower than the maximum limit set by Bank Indonesia. Thus, it can be said that the NPL ratio of state-owned banks is relatively good. The NPL variable has a standard deviation of 0.84% which is lower than the mean value of 2.73%. It indicates that the NPL variable has a low deviation level and the data are less varied or relatively homogeneous.

The Return on Asset (ROA) variable has a mean value in 2014 at Bank BTN. The standard deviation value in table 2 is 1.08% which is lower than the mean value of 87.07%. It shows that the ROA variable has a low deviation level and the data are less varied or relatively homogeneous.

The Loan to Deposit Ratio (LDR) variable of state-owned banks has a mean value of 87.07%. The maximum value of the LDR variable is 108.86% in 2014 at Bank BTN with the minimum value of 59.93% in 2009 at Bank BRI. Based on the Circular Letter of Bank Indonesia Number 6/23/DPNP 2004, the maximum value of BOPO is 94% to 96%. The standard deviation value in table 2 is 7.99% which is lower than the mean value of 73.21%. It indicates that the BOPO variable has a low deviation level and the data are less varied or relatively homogeneous.

The Operating Expenses to Operating Income (BOPO) variable of state-owned banks have a mean value of 73.21%. The maximum value on the BOPO variable is 88.97% in 2014 at Bank BTN with the minimum value of 59.93% in 2012 at Bank BRI. Based on the Circular Letter of Bank Indonesia Number 6/23/DPNP 2004, the maximum value of BOPO is 94% to 96%. The standard deviation value in table 2 is 7.99% which is lower than the mean value of 73.21%. It indicates that the BOPO variable has a low deviation level and the data are less varied or relatively homogeneous.

The Return on Asset (ROA) variable of state-owned banks has a mean value of 3%. Based on Bank Indonesia Regulations, the minimum value of the ROA ratio is 1.5%. It is higher than the minimum value set by Bank Indonesia. Thus, it can be said that the ROA of state-owned banks is good. The maximum value of the ROA variable is 5.15% in 2012 at Bank BRI and the minimum value of 1.14% in 2014 at Bank BTN. The standard deviation value in table 2 is 1.08% which is lower than the mean value of 3%. It indicates that the ROA variable has a low deviation level and the data are less varied or relatively homogeneous.

Classical Assumption Tests

1. Normality Test

Source: Output EViews 10 Student Lite Version (processed data)
Based on Figure 3, the Jarque-Bera Normality test statistic result is 1.887953 and it is significant with the probability value of 0.389078. Thus, the probability value is higher than the significant level ($\alpha = 5\%$) meaning that it is not significant. Therefore, it can be concluded that the residuals are normally distributed.

2. Multicollinearity Test

### Table 3 Result of Multicollinearity Test

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient Uncentered VIF</th>
<th>Centered VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>0.181847</td>
<td>290.4359</td>
</tr>
<tr>
<td>CAR</td>
<td>0.000102</td>
<td>51.82535</td>
</tr>
<tr>
<td>NPL</td>
<td>0.003185</td>
<td>41.28903</td>
</tr>
<tr>
<td>NIM</td>
<td>0.000370</td>
<td>25.05083</td>
</tr>
<tr>
<td>BOPO</td>
<td>5.40E-05</td>
<td>467.8002</td>
</tr>
<tr>
<td>LDR</td>
<td>8.45E-06</td>
<td>104.5477</td>
</tr>
</tbody>
</table>

*Source: Output EViews 10 Student Lite Version (processed data)*

Table 3 presents the relationship or correlation between independent variables. Based on the results of the multicollinearity test, the VIF value is lower than 10. The VIF values range from 1.153435 to 5.365535. It shows that there is no multicollinearity in the regression model used.

3. Heteroscedasticity Test

### Table 4 Result of Heteroscedasticity Test

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Value</th>
<th>Prob. (5,34)</th>
<th>Prob. Chi-Square (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>F-statistic</td>
<td>1.266222</td>
<td>0.3010</td>
<td></td>
</tr>
<tr>
<td>Obs*R-squared</td>
<td>6.279132</td>
<td>0.2800</td>
<td></td>
</tr>
<tr>
<td>Scaled explained SS</td>
<td>4.189627</td>
<td>0.5225</td>
<td></td>
</tr>
</tbody>
</table>

*Source: Output EViews 10 Student Lite Version (processed data)*

Based on the results of the Glejser heteroscedasticity test in table 4, the value of Obs*R-squared is 6.279132 with a Chi-Square probability of 0.2800. The probability value of Chi-Squared is higher than the significant level ($\alpha = 5\%$) meaning that it is not significant. Therefore, it can be concluded that there are no heteroscedasticity issues in the model used in this research and the model can produce a BLUE (Best Linear Unlock Estimator) estimator.

4. Autocorrelation Test

### Table 5 Result of Autocorrelation Test

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Value</th>
<th>Prob. F (2,32)</th>
<th>Prob. Chi-Square (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>F-statistic</td>
<td>0.951054</td>
<td>0.3970</td>
<td></td>
</tr>
<tr>
<td>Obs*R-squared</td>
<td>2.244236</td>
<td>0.3256</td>
<td></td>
</tr>
</tbody>
</table>

*Source: Output EViews 10 Student Lite Version (processed data)*

Based on the result of the LM test of Breusch-Godfrey statistics in table 5, the value of Obs*RSquared is 2.244236 with a Chi-Squared Probability of 0.3256. The Chi-Squared probability value is higher than the significant level ($\alpha = 5\%$) meaning that it is not significant. Therefore, it can be concluded that there are no autocorrelation issues in the model used in this research.
Selection of Panel Data Model

The Chow Test aims to determine the most appropriate or best model among the common effect or fixed-effect models. The hypotheses that can be used in this test are as follows:

H₀: Common Effect Model
H₁: Fixed Effect Model

If the probability (F-statistic) is < 0.05, then H₀ is rejected meaning that the fixed effect model is considered better than the common effect model. On the other hand, if the probability (F-statistic) is >0.05, then H₀ is accepted meaning that the common effect model because is considered better than the fixed effect model.

Table 6 Chow Test

<table>
<thead>
<tr>
<th>Effects Test</th>
<th>Statistic</th>
<th>d.f.</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cross-section F</td>
<td>6.661374</td>
<td>(3,1)</td>
<td>0.0013</td>
</tr>
<tr>
<td>Cross-section Chi-square</td>
<td>19.901081</td>
<td>3</td>
<td>0.0002</td>
</tr>
</tbody>
</table>

*Source: Output EViews 10 Student Lite Version (processed data)*

Based on the results of the Chow test in table 6, it can be seen that the probability value of Cross-section F is 0.0013 <0.05. Based on the data above, it can be decided that H₀ is rejected and the model used in this study is the fixed effect model.

Panel Data Regression

Table 7 Result of Regression Using Fixed Effect Model

<table>
<thead>
<tr>
<th>Variable (Cross)</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>8.886297</td>
<td>0.596334</td>
<td>14.90153</td>
<td>0.0000</td>
</tr>
<tr>
<td>CARit</td>
<td>-0.021695</td>
<td>0.010613</td>
<td>-2.044202</td>
<td>0.0495</td>
</tr>
<tr>
<td>NPLit</td>
<td>-0.088404</td>
<td>0.049863</td>
<td>-1.772267</td>
<td>0.0861</td>
</tr>
<tr>
<td>NIMit</td>
<td>0.255779</td>
<td>0.041683</td>
<td>6.136228</td>
<td>0.0000</td>
</tr>
<tr>
<td>BOPOit</td>
<td>-0.083852</td>
<td>0.007536</td>
<td>-11.12733</td>
<td>0.0000</td>
</tr>
<tr>
<td>LDRit</td>
<td>-0.008556</td>
<td>0.003440</td>
<td>-2.487013</td>
<td>0.0185</td>
</tr>
<tr>
<td>BBNI--C</td>
<td>-0.184299</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BBRI--C</td>
<td>0.227464</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BBTN--C</td>
<td>0.098909</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMRI--C</td>
<td>-0.142073</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Source: Output EViews 10 Student Lite Version (processed data)*

This panel data regression equation explains the effect of Capital Adequacy Ratio (CAR), Non-performing Loans (NPL), Net Interest Margin (NIM), Operating Expenses to Operating Income (BOPO), and Loan to Deposit Ratio (LDR) on ROA of state-owned banks in the 2009 – 2018 period as follows:

\[
Y = 8.886297 - 0.021695 \text{CARit} - 0.088404 \text{NPLit} + 0.255779 \text{NIMit} - 0.83852 \text{BOPOit} - 0.08556 \text{LDRit} + \epsilon_{it}
\]
Coefficient of Determination Test (R²)

According to Ghozali (2017: 55), the coefficient of determination (R²) is useful to measure the ability of the model in explaining the variation of the dependent variable. The coefficient of determination is between 0–1. The smaller the value of the coefficient of determination (R²), the more limited the ability of independent variables in explaining the variation of the dependent variable. The coefficient of determination (R²) closes to 1 means that the independent variables provide almost all information needed in predicting the variation of the dependent variable. Based on the regression result in table 7, it can be seen that the Adjusted R-Squared value is 0.9855 or 98.55%. It means that the independent variables of CAR, NPL, NIM, BOPO, and LDR can explain or affect the dependent variable of ROA of state-owned banks in 2009–2018 of 98.55% and the rest of 1.45% can be explained by other variables outside the research.

Simultaneous Test (F-test)

Simultaneous test or F-test is required to determine whether all independent variables have a simultaneous effect on the dependent variable (Ghozali, 2017: 56). If the F-statistical probability value is <α (0.05), then H₀ is rejected. On the other hand, if the F-statistical probability value is > α (0.05), then H₀ is accepted. Based on table 7, it can be seen that the statistical F value is 334.2565 and the F-statistical probability value is 0.0000 which is lower than the significance level of 0.05 (0.000 <0.05). Based on these data, it can be seen that H₀ is rejected indicating that CAR, NPL, NIM, BOPO, and LDR simultaneously have a significant effect on profitability proxied by ROA in state-owned banks in the 2009-2018 period.

Partial Test (T-test)

In general, the partial test or T-test is to find out the relationship between each independent variable and the dependent variable. If the t-statistic probability value is <α (0.05), then H₀ is rejected but if the t-statistic probability value is > α (0.05), then H₀ is accepted. Based on table 7, it can be seen that the probability value (t-statistic) of the CAR variable is lower than the significance level (0.0495 <0.05). Based on these data, it can be concluded that H₀ is rejected. It means that the CAR variable partially has a significant and negative effect on the ROA of state-owned banks in 2009-2018. The probability value (t-statistic) of NPL variable is higher than the significance level (0.0861> 0.05). Thus, it can be concluded that H₀ is accepted meaning that the NPL variable partially has no significant affect the ROA of state-owned banks in 2009-2018.

The probability value (t-statistic) of NIM variable is lower than the significance level (0.000 <0.05). Therefore, it can be concluded that H₀ is rejected. It means that the NIM variable partially has a significant and positive effect on the ROA of state-owned banks in 2009-2018. The probability value (t-statistic) of BOPO variable is lower than the significance level (0.000 <0.05). Thus, it can be concluded that H₀ is rejected meaning that the BOPO variable partially has a significant and negative effect on the ROA of the state-owned bank in 2009-2018. The LDR variable has a probability value (t-statistic) smaller than the significance level (0.0185 <0.05). So, it can be concluded that H₀ is rejected which means that the LDR variable partially has a significant and negative effect on the ROA of state-owned banks in 2009-2018.

The Effect of Capital Adequacy Ratio on Profitability (Return on Assets)

Based on the regression result in table 7, the coefficient of the CAR variable is -0.021695 meaning that an increase in CAR values of 1% with the assumption that other variables are constant or zero, then the ROA of the state-owned banks decrease by 0.021695 or negatively affect. Based on table 7, the result of the partial test or t-test showed that the probability value (t-statistic) of CAR is 0.0495 which is lower than the significance value (0.0495 <0.05) so that H₀ is rejected. Then, it can be concluded that the CAR variable partially has a significant and negative effect on ROA of state-owned banks in the 2009-2018 period.

The result of this study indicates that any increase in CAR will cause a decrease in ROA. It is because of the Risk-Weighted Assets (RWA) contains assets with the highest risk from loans. If loans increase, it will affect the increase in total RWA. It can cause a decrease in the CAR value in the bank. Loans also provide great contributions to the bank in which the increase of loans will cause an increase in bank interest income. Therefore, the decrease in CAR value caused by an increase in loans can affect the increase in bank income. It also affects the profit before tax or ROA. The result of this research is in line with the previous research conducted by Stevani and Sudirgo (2019) and Irman and Wulansari (2018).

The Effect of Non-performing Loans on Profitability (Return on Assets)

Based on the regression result in table 7, the coefficient of the NPL variable is -0.088404 meaning that an increase in NPL values of 1% with the assumption that other variables are constant or zero, then the ROA of the state-owned bank decrease by 0.088404 or have a negative effect. In the result of partial test or t-test in table 7, the probability value (t-statistics) of NPL is 0.0861 which is higher than the significance value (0.0861> 0.05), so that H₀ is accepted. Therefore, the NPL variable does not significantly affect the ROA of state-owned banks in 2009-2018.

The result of this research is contradicted with the hypothesis that NPL has a significant effect on ROA. It is because the state-owned bank samples have a low credit risk value which is below the maximum limit of 5% set by Bank Indonesia. Therefore, the low credit risk value will not affect the profit or cause an increase in ROA. State-owned banks also have a relatively high capital so that the risks can be covered with the capital owned by the banks. On the other hand, the result of this study is in line with previous research conducted by Irman and Wulansari (2018), Amzy et al (2019), Maria (2015), Stevani and Sudirgo (2019), and Wulandari (2018).
Effect of Net Interest Margin on Profitability (Return on Assets)

Based on the regression result in table 7, the coefficient of the NIM variable is 0.255779. It means that if there is an increase in the NIM of 1% with the assumption that the other variables are constant or zero, then the ROA of the state-owned banks increases by 0.255779 or have a positive effect. The result of the partial test or t-test in table 7 showed that the probability value (t-statistic) of NIM is 0.0000 which is higher than the significance value (0.0000 <0.05) so that H₀ is rejected. Thus, the NIM variable partially has a significant and positive effect on ROA of state-owned banks in 2009-2018.

The result of this research is in line with the proposed hypothesis in which there is a significant relationship between NIM and ROA. If the provision of loans by a bank's management is prudent, then the quality of its productive assets will be maintained. Good quality of productive assets will increase the net interest income obtained from the provision of loans. This can cause bank profits to increase, including the level of income of the total assets. Hence, the increase in profits obtained will increase financial performance too. The result of this research supports the previous research conducted by Maria (2015), Irman and Wulansari (2018), Wulandari (2018), Yogianta (2013) and Amzy et al (2018).

Effect of Operating Expenses to Operating Income on Profitability (Return on Assets)

Based on the result of regression in table 7, the coefficient of BOPO variable is -0.083852. It means that if there is an increase of 1% of the BOPO with the assumption that other variables are constant or zero, then the ROA of the state-owned banks decrease by 0.083852 or negatively affect. The result of the partial test or t-test in table 7 showed that the probability value (t-statistic) of BOPO of 0.0000 or lower than the significance value (0.0000 <0.05) so that H₀ is rejected. Thus, the BOPO variable partially has a significant and negative effect on ROA of the state-owned banks in 2009-2018.

Based on table 2, the mean value of BOPO of state-owned banks in 2009-2018 is 73.21%. It indicates that the performance of state-owned banks in managing its operations or business in 2009-2018 has been effective and efficient. The higher the BOPO value, the less efficient in managing its operating expenses, and it is followed by a decrease in operating income and affect the profit before tax obtained by the bank. The lower the BOPO value, the more efficient and better the performance of the management of a bank in carrying out its operations. Thus, the opportunity to obtain profits also increases. The increase in profits affects the ROA of the bank. The result of this research is in line with research conducted by Maria (2015), Irman and Wulansari (2018), Wulandari (2018), Stevani and Sudirgo (2019), Syamsuddin (2013), Hutagalung, et al (2013), and Yogianta (2013) in which there is a negative effect of BOPO on ROA.

Effect of Loan to Deposit Ratio on Profitability (Return on Assets)

Based on the result of regression in table 7, the coefficient of the LDR variable is -0.008556. It means that if the LDR increases by 1% with the assumption of other variables are constant or zero, then the ROA of state-owned banks decreases by 0.008556 or negatively affect. The result partial test or t-test in table 7 showed the LDR probability value (t-statistic) of 0.0185 which is higher than the significance value (0.0185 <0.05) so that H₀ is rejected. Therefore, the LDR variable partially has a significant and negative effect on ROA of state-owned banks 2009-2018.

The result of this research revealed that any increase in LDR causes a decrease in ROA. It occurs because the LDR ratio of state-owned banks continues to increase each year and reaches the peak in 2018. The higher the LDR ratio, the lower the condition of bank liquidity. Banks are considered unable to meet the obligation to pay funds to customers for distributed loans. Banks need to be careful in providing or using funds. An increase in the LDR of a bank can also be caused by the provision of credit on a high scale without followed with a high return rate of non-performing loans. The less optimal use of funds makes banks difficult to earn profits and finally decrease its profitability. The result of this research is in line with the previous research conducted by Inggawati et al (2018) and Amzy et al (2019).

IV CONCLUSION

Based on the discussion of the result of data analysis with panel data regression test, it can be concluded that:

1. Simultaneous test (F-test) shows that the Capital Adequacy Ratio (CAR), Non-performing Loans (NPL), Net Interest Margin (NIM), Operating Expenses to Operating Income (BOPO), and Loan to Deposit Ratio (LDR) simultaneously has a significant effect on the profitability of state-owned banks in the 2009-2018 period.
2. Partial test (t-test) shows that the Capital Adequacy Ratio (CAR), Operating Expenses to Operating Income (BOPO), and Loan to Deposit Ratio (LDR) variables partially have a significant negative effect on ROA of state-owned banks in the 2009-2018 period. The Non-performing Loan (NPL) variable partially does not significantly affect the ROA of state-owned banks in the 2009-2018 period. The Net Interest Margin (NIM) variable partially has a significant positive effect on ROA of state-owned banks in the 2009-2018 period.

V SUGGESTION

The researcher provides some suggestions related to research in financial institutions and other market actors as follows:
1. For banks, to increase the profitability value by observing the NIM variable because it has a positive and significant effect. State-owned banks have to consider it and maintain the NIM values higher the minimum limit as set by Bank Indonesia. In addition, it has to consider CAR, BOPO, and LDR variables that have a negative and significant effect to maintain within the limits set by Bank Indonesia.

2. For investors, to look at the information contained in the research and carefully select the company. Investors have to consider the level of loan risk for a bank, the level of capital adequacy, the level of liquidity, and the company’s ability to regulate the level of operating cost efficiency before investing.

REFERENCES


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Urban Agglomeration and COVID-19 Clusters: Strategies for Pandemic Free City Management

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Abstract Cities become central locations that coordinate most of the socio economic networks of a country. Therefore the urban agglomerations that have high population densities are identified as the most vulnerable hotspots during a period of pandemic in a country. Therefore this study focuses mainly on the identification of sustainable strategies for pandemic free city management in developing countries in a post COVID era. Literature related to the context along with the scholarly articles were reviewed in fact collection in this study while using diagrams and flow charts in information presentation. The study could investigate the urban agglomerations of developing countries as the most vulnerable sites for the clustering of COVID 19 cases in the world. Further the underserved settlements, public service places, manufacturing industries, retail service centers, transportation hubs, banking and finance sections, educational institutions and health care centers were identified as the clustering hot spots of infection carriers in more than 85% of the developing countries. Thus the study concluded that the practical measures should be implemented by devising from prevailing liberalized policies and major urbanization characteristics like human interactions and movements while strengthening and monitoring the prevailing social distancing and health precautions for a better achievement in almost all the socio economic sectors of the country in the reawakening after a period of two month quarantine until the discovery of a reliable cure for the pandemic.

Key words: COVID 19, urban agglomeration, Developing countries, COVID 19 hotspots

I. INTRODUCTION

Cities are the central hot spots for capital, labor, information and innovations. Being the central locations for more than 80% of the socio economic services, the cities play an important role in the socio economic structure of the world (Acuto, 2020). Urban agglomeration which concentrates the people from a number of cities and their suburbs together regardless of administrative boundaries, have created a feasible platform for the accumulation of high densities of urban dwellers. This urban agglomeration has automatically interconnected most of the important carriers of global economic development (Fang & Yu, 2017). Although the cities become major functional bodies of a country, they are dual edged during an infectious disease outbreak. Cities play the role of transmitting the infectious disease in an alarming rate while becoming a place of providing health care assurance on the other hand. Today, roughly 4 billion people, more than half of the world’s population is living in the cities and it is projected that more than two third of the global population would be living in cities by 2050. According to the recent studies it is revealed that around 600 cities generate two thirds of global GDP. Precisely because they are hubs for transnational commerce and mobility, densely populated and hyper-connected cities which can magnify the pandemic risk (Desai, 2020). However, the disease has now spread to 215 countries including Italy, Spain, USA, United Kingdom and many South Asian Countries and all the countries are in a giant life risk having nearly 537,179 deaths and about 11,580,119 confirmed cases by 7th July 2020. COVID-19 is causing global trade to be disrupted, flights are being cancelled, and many people are now working or staying at home. The world is facing a huge socio economic threat with this coronavirus outbreak as most of the economic centers and many active non sleeping cities of the world have been locked down with this rapidly spreading virus.

As it is not just cities that are at risk of COVID 19, but also their local and global supply chains, housing schemes, travel networks, industrial zones and specific neighborhoods that have become the sources of contamination. Especially in the developing countries like Sri Lanka, India and Pakistan, this issue has become more serious booming more clusters in urban areas with the high concentration of underserved urban dwellers in the cities. Therefore managing epidemics in urban agglomerations is incredibly important. In the reawakening of the cities of the developing countries after a full or half lockdown for more than two months of quarantine, the cities need more preparedness to combat the Covid 19 as a frontline victim. Therefore this paper intends to discuss about the contamination hotspots of COVID 19 in urban agglomeration and the sustainable strategies that can be adapted by developing countries for a Covid free urban territory.

II. URBAN AGGLOMERATIONS IN DEVELOPING COUNTRIES AND COVID 19 CLUSTERS

Urban agglomerations have become the urbanized “growth poles”, especially against the background of increasing population flow to cities. Therefore the cities become the main centers of collecting more population from per urban territories irrespective of administrative boundaries. The cities have become the attractive centers of population especially in the...
developing countries mainly due to the clustering of main service providing hubs in the cities. Therefore the urban agglomerations are considered as the centers which are at the highest risk during a period of a pandemic.

The COVID 19 pandemic outbreak is identified as one of the fast spreading pandemic diseases identified so far. Figure 2.1 clearly shows the different magnitudes in the spread of this deadly pandemic all over the world. Also the figure evidences for the fact that COVID 19 is not a pandemic which is specific only for a particular region in the world where it has affected the entire world in different magnitudes. Asian, European and North American regions are prominent among the highly affected areas in the world. One significant factor is that more than 90% of clusters are identified associated with densely populated urban agglomerations and mega cities in the world.

According to the figure 2.1, it is much clear that most of the COVID 19 clusters are identified associated with the urban agglomerations of developing countries where most of the vulnerable areas have highly impacted from all its socio economic aspects. The impacts of COVID 19 o urban agglomerations which need more managerial solutions are discussed in the next section.

![Figure 2.1: Clustering and spread of COVID 19 all over the world](https://www.cell.com/trends/molecular-medicine/fulltext/S1471-4914(20)30065-4)

III. THE IMPACTS OF COVID 19 CLUSTERING IN URBAN AGGLOMERATIONS

This rapid spreading deadly pandemic has become an area of interest for most of the researchers during the period of quarantine. Most of the studies that have been carried out regarding the COVID 19 have basically addressed a number of socio economic impacts all over the world. When going through different studies that have been done on the impacts of COVID 19 throughout the world, it was understood that a study of identifying the sustainable measures for a pandemic free city management is a study which needed more attention in the current world. Therefore the socio economic impacts of COVID 19 which need more attention and sustainable measures can be discussed as follows.

These lock-downs and the Covid-19 prevention measures have resulted in an observable decline in the economies of most of the developing countries as the main city centers which handled more than 80% of country’s economic activities became stand still. Wuhan city which became the epicenter of the infection it was estimated that revenue lost in both retail and food services during the Chinese New Year week is reported to be RMB 1 trillion ($142 billion), as major chains shuttered stores across the country (Lu, 2020).

On the other hand, the fishing industry which is a prominent livelihood of the developing nations have become stand still due to the lock down and quarantine measures. The effects on small-scale fisheries are felt throughout the entire fish chain, from harvesting to processing and marketing. In countries like Norway and Philippines, the surveying reports suggest that the fishing industry has been declares a critical industry and stays open with social distancing mandated at places of work. Major metropolitan areas, such as Manila and other parts of the country are ordered to go on lock down or stay at home. Truck drivers are facing quarantine or preventing from moving seafood from outlying fish landing sites to big city markets. Therefore it is much clear that reliable and sustainable measures are utmost important in reawakening of the cities for a pandemic free life style (Brito & Eyng, 2020).

When considering about the apparel and textile industry which is a labor oriented source of income has completely been disrupted with the low demand for cloths during this time as well as due to social distancing and less labor precaution methods. According to a recent news reports, in Bangladesh, the world’s second-largest garment exporter, about one million garment workers have lost their jobs as a direct result of sourcing changes. An online survey of Bangladesh employers, administered between March 21 and March 25, 2020, indicated that 72.4% of furloughed workers have been sent home without pay, and 80.4% of dismissed workers have not received severance pay. In most of the countries these labor oriented industries including construction and engineering, textile industry which support nearly a half of GDPs of many developing countries have become stand still with the current pandemic situation and are identified as the areas which need more concern in sustainable city management (European Civil Society, 2020).

Transportation sector has been one of the primary victims of COVID-19. From rickshaw pullers to airlines, all have been
affected economically by the pandemic. For instance, India’s overall energy demand has been fallen down by 11% in March 2020. Due to lockdown in many countries, the demand for passenger transport has been adversely hit. The freight segment has had a mixed short-term effect in terms of transportation demand. There is a surge in demand for truck drivers in transportation of essential goods. For instance, there is 40% to 60% increase of product being moved into grocery stores and warehouses in US since COVID spread started. Public transportation modes and also the terminals and transits are also identified as the main hotspots of the pandemic spread. In developing countries, much concern should be paid on the health security of public transport modes as it plays an important role in the daily lives of the people (Harikumar, 2020).

According to the World Tourism Organization (UNWTO) the international tourist arrivals will be down by 20% to 30% in 2020 when compared with 2019 figures, equivalent to a loss of 300 to 450 US$ billion in international tourism receipts (exports) – almost one third of the US$ 1.5 trillion generated globally. out of the top 10 destinations by international tourists arrivals (France, Spain, United States, China, Italy, Turkey, Mexico, Germany, UK and Thailand), 8 result to be the hardest hit by COVID-19, implying that the economic shock on tourism will be further exacerbated in these countries. Also the estimates suggest the developing countries that depend mainly on the tourist industry will be greatly hit from this sudden downfall in the industry thus they need more attention on the health security to attract more tourists to those countries with the most appropriate health precautions (Maniga, 2020).

To date, COVID19-driven school closures have impacted over one billion students. By current World Bank information gathering, at the time of writing this, 150 countries are reporting school closures. These numbers have increased rapidly since late February. Apart from its direct impact on schooling, the pandemic impacts include the possible use of school facilities as make-shift hospitals, as in some low-infrastructure rural areas the school may be the only public building available. That may cause lengthier disruption of education services making the building unavailable for education purposes. Also, as part of the coping mechanisms the practice of offering alternative services of remote learning may work better for those students in households with better connectivity and with higher initial digital skills. This leaves those already disadvantaged further behind, so school closures with the inappropriate system coping mechanisms, might imply an exacerbation in inequality in education (UNESCO, 2020).

When considering the impacts of COVID 19 discussed above, it’s an uncomfortable truth to accept the fact that the main cities which function as the hearts of the countries should be back to normal after a period of fully or partial lock down to unfreeze the frozen economies of the countries. Therefore, a study which aims on elaborating healthy measures for a proper preparedness with a continuous monitoring system is an urgent necessity in the current day world which has kind of a research gap. The next section brings out the sustainable strategies that can be taken to build up sustainable pandemic free urban agglomerations in recent future.

IV. STRATEGIES FOR THE SUSTAINABLE PANDEMIC FREE CITY MANAGEMENT

Countries play an important role in mitigation and adaptation to this pandemic environment to restart the non-functioning city centers before the discovery of a reliable cure for this deadly pandemic. But the preparedness of the cities for the reawakening is varied over the world. The levels of development, socio economic perspectives of its people and the awareness of the people play a big role in speed recovery of the country. The cities with a high concentration of urban poor and deep economic inequalities are potentially more vulnerable than those that are better resourced, less crowded and more inclusive. Therefore, some strategies can be introduced for the optimal preparedness of cities in developing countries which are mainly woven around primary, secondary, tertiary and quaternary economic activities for a speedy recovery as shown in figure 2 in summary form.
In most of the developing countries, majority of the cities are agglomerated with high population densities clustered around different economic activities and services. Therefore a complete lockdown of the country during a period of pandemic would not provide equal opportunities for all to stay at home and work from home to receive their monthly stipend to the bank accounts as more than 50% of the city dwellers engage in daily stipend based informal economic activities which need daily movements from the city and towards the city. Moreover, the urbanized and peri-urban populations have a higher risk of disease contamination due to unplanned settlement structures, high population densities, extensive public transport systems etc. Therefore, the strategic measures should be compiled under a well-established monitoring system preparing cities to be functioned in a pandemic situation in a country. The interaction between these adoptable strategies pertaining to different socio economic sectors can further be depicted through figure 3.

The priority of the pandemic free city planning should be given to the public health implementing the most suitable measures that mostly address the health conditions of those who are in crowded and substandard houses in urban areas. Informal settlements in most of the cities available in developing countries like Sri Lanka, India and Pakistan have relatively limited access to safe water, sanitation and hygiene facilities where their vulnerability for a spreading epidemic is absolutely high.

Although the main cities are identified as a center for advanced medication, they have been paralyzed in front of the unexpected increase in the number of COVID 19 cases day by day. Therefore the coordination and coherence in health precaution measures such as the spot checking of body temperature, sanitary precautions like masks, gloves and hand sanitizers using a randomly selected samples from the community while directing the needful to the medical consultations are much important for pandemic control among urban communities. For example, Kigali City in Rwanda is providing access to basic water and sanitation facilities for free. Therefore, the functioning of government sponsored water tankers, mobile hand washing facilitators can control the spread of pandemic to a considerable extent.

The health sector which becomes the backbone of a country during a period of pandemic should maintain all prevailing health precautions when handling with normal patients and COVID cases. Government and private health care providers of the countries must step up efforts to provide access to emergency services in cities’ most under-served areas, as well as help those who need to quarantine like in the countries such as Colombia. Further the methods like herbal steams, herbal beverages can be promoted and encouraged in tourist industry as health precautions in post COVID era.

Figure 3: Interactions between adoptable strategies pertaining to different socio economic sectors
Additionally, the health sector should closely interact with the state intelligence services which have the quick access to trace and detect all the locations where a COVID 19 patient has visited. Formulation of a civil task force which works closely with health sector would be an additional benefit for the tracing of COVID 19 cases in the underserved settlements of the countries. As more than half of city dwellers are settled in these underserved settlements in countries like Sri Lanka, India and in most of the African countries, this kind of a strategy would be more beneficial to manage the COVID 19 clusters in those areas. Few members can be appointed for the task force from the same environment as representatives as they have strong mental databases which have the ability to grasp all necessary locations within that underserved settlement during a short period of time with his/her experienced social links. Moreover, City governments must work more closely with community leaders and NGOs that work in informal settlements and other at-risk communities to minimize and prevent the impact of the pandemic. Like in Hong Kong and Singapore creative partnerships with communities, NGOs, the private sector and universities can be highlighted as the necessary measures in pandemic control in majority of developing countries.

The other major factor that should be considered in pandemic free city planning is food production and delivery process. The continuous supply of food in adequate amounts and required qualities under health precautions in urban and peri urban areas is an essential necessity in a period of pandemic to address the food related problems among city dwellers especially who have limited access to safe food sources. Price fluctuations in essential food items should be discouraged while ensuring food security of the community. In door food delivery systems, the quality and the safety of the products should be well concerned and the delivery mode or the vehicles used should be under the high health and hygiene measures. It would be really appropriate to discourage the large gatherings in restaurants and cafeterias encouraging more efficient home delivery and take away services. Anti-money methods can be encouraged in payments for food products to avoid the number of customers gathered in food stalls and restaurants as a health precaution method to reduce the increase of COVID 19 clusters in urban agglomerations. As the efficient and sufficient food provision is an important aspect to be discussed in a period of pandemic, the methods should be under the continuous monitoring system for better achievements in such a period.

Further, the discouragement of food miles can be identified as one of the most suitable solutions for a country during a pandemic. Food being the major primary necessity of the human beings, the mobility and movements associated with food production, transportation and marketing are relatively high. The encouragement of city and peri urban dwellers for more home gardening and roof top gardening can reduce the food miles of the entire area. The food security and the quality of the products are also assured in this method. If all the city dwellers living in urban areas can practice with sustainable measures of home gardening, the movements and interactions may be reduced while limiting the number of food supplying vehicles entering to the cities daily ensuring the self-sufficiency of that particular area or the region.

Fishing industry being an important livelihood among urban dwellers along the coastal belts of most of the developing island nations like Sri Lanka, Maldives, India and most of African nations, precaution methods are much important in their process of back to normal. Limitation of the number of vessels that can land on the beach or at fishing ports at any one time and limit only essential personnel at landing sites, keeping individuals that are not directly involved in the capture, unloading, transport, purchase, sale or processing of fish away from landing sites, provision of information to fishing communities on ways to reduce the spread of the virus through the practice of social distancing via their traditional leaders and respected leaders in fishing communities. Further the regular thermal checkups before and after the arrival of fishing boats in sea journeys can be encouraged under a well monitoring in a period of pandemic. The door delivery system should be more efficient and the quality of the products should be maintained. Rules should be compiled to have mobile fish stalls under convenient prices with government recommendations and health precautions in such a way that it does not cluster more customers at a point in a particular time. The continuous practice of correct health advices by sellers and door delivery services should be monitored under strict rules and regulations.

The retail services become very much important in a country as it includes the services associated with Fast Moving Consumer Goods (FMCGs). The consumer goods should be high in quality and in good brands where the safe door delivering should be done via a taxi service or through self-driving by the seller. In addition to that, the marketing process should be keen enough to enroll the customers of a particular product making them feeling like involving in indoor shopping allowing a bargaining system in online shopping as well. In the indoor shopping centers, measures should be taken to maintain the social distance between the customers and while reducing number of customers gathering at one place at a time. More human free markets and mobile vending machines can be established in highly crowded urban areas to avoid the gathering of more people in a particular place at a time. Credit and debit card based payment systems can be promoted to avoid the clustering of more customers around the shop cashiers. Anti-money system would be a better sustainable strategy which can be implemented during a period of pandemic in a country.

Introduction of an entry fee system in the supermarkets in city agglomerations can discourage the clustering of more customers in market places. This fee can be changed according to the time of shopping like a considerable amount per head in peak hours of marketing to discourage the number of individuals visiting the shop. This method would increase the proportion of people enjoying the online shopping as well as it will limit the number of family members out for shopping at a time. Further, the supermarkets can be rearranged in a periodical manner which directs the customer to the place where they need to get their essentials. For example if the areas have been allocated separately for vegetables, fruits, grocery and other items, the customers can directly go to the areas where they have the necessity.

Further, the transport system of a country which manages the movements of people from one place to another is relatively at high risk during a period of pandemic in a country. Therefore
the arrangements should be made to carry fewer and more dispersed passengers in buses and trains and public spaces are needed to be dispersed especially at entrances and the exits at stations and bus terminals. The public transport modes can be made safer and secured using a card payment system which allows the passenger himself to punch the card at the entrance. This allows the travelers to buy and authenticate tickets on their mobile phone like in countries such as Norway, China and UK. This would be a sustainable remedy to break the conductor authority based over loadings in public buses in Sri Lanka. Introduction of different bus charges in peak hours and non-peak hours may encourage the passengers to travel in non-peak hours. And also the clustering of passengers in transport terminals can be reduced by introducing different starting and finishing hours or the working hours in the offices and service centers. Cycling can also be promoted as a safer and faster way for the transportation of short distances. For instance Cities like Bogotá, Berlin and Mexico City have expanded such efforts to discourage the rapid spreading of pandemics.

When it comes to the construction and engineering section, it is identified as a labor oriented industry which needs more labor to be functioned. During a period of a pandemic like COVID 19 which has a very high transmitting rate, importing labor from other countries like China and Korea (the most popular labor importing destinations of developing countries), is highly vulnerable. Therefore the use of local labor in constructions under the supervision of local and foreign expertise knowledge received via off site communication methods such as online discussions can be encouraged in the post COVID era. Further, the sites which have already started working with foreign labor should be highly monitored compiling rules and regulations assigning the responsibility of providing healthy accommodation and transportation facilities to their mother companies.

Textile industry which plays an important role in Sri Lankan economy should be refunctiooned under government recommended health precautions. The labor practices should be properly monitored concerning on social distancing at work places and the wearing of sanitary kits during working hours. The accommodation places should not be clustered and the factories should make duty rosters for their workers in shift basis in such a way that it uses the minimum number of labors per day to function the industry. At the same time the local sawing industry can be promoted introducing mobile tailor shops which can visit the customer for measurement taking and fit-on adjustment of the garments.

Mobile and online banking, cash less card based transactions should be encouraged for a secured and safe banking and finance services in post COVID era. All government and private sector banks can make arrangements to facilitate their customers with effective mobile banking methods where their mobile phones serve as wallets encouraging anti money system in all monetary transactions. More walking pet machines in city areas would encourage its customers to have safe banking services at their door steps which would ultimately become a controlling factor of the rapid spreading pandemic.

The online teaching methods which are based on school or institutional intranet systems can be promoted as a sustainable strategy in pandemic free city planning. In this distance learning system, all the students and teachers should have equal level of access to equipment and technology. And also the priority should be given on marginalized and rural settings which have limited access to the latest technologies as the education system is something that cannot be fragmentized based on their rural urban settings. Therefore, the distance learning process along with online exam methods should be promoted with training sessions and equipment for both students and teachers for sustainable achievements during a period of pandemic. The schools and educational institutions located away from the main city centers can be started under heath precaution methods that allow the students to be present in schools in a roster basis as the senior classes first and then the junior and primary.

Finally the government services sector which addresses the needs and wants of the majority of the local community needs to be reopened under a well monitored health precaution system. The government office services can be rendered in shift basis under previously arranged appointment methods. Further, the consultations can be done via official websites and over the phone under a well monitored time table. Consultation time slots can be prepared in such a way that it does not gather a large number of people in a particular place at a time. The efficient and quality service via off site modes as much as possible would be an additional beneficiary to avoid the clustering of people in front of the government offices for services. Further the methods can be compiled to receive and submit the essential government service related documents and certificates like educational certificates, birth and death registrations, driving license etc. on an online basis to reduce the office visits.

V. CONCLUSION

The COVID 19 pandemic has turned the world outside our door steps into a very different environment limiting all our complicated social linkages to the size of our homes. This layout has made most of the cities which were internationally connected hubs filled with millions of people working, commuting, sightseeing, drinking, dancing and hugging one another, isolated with social distancing and with face covered, mask wearing people whose eyes are filled with frighten and wear no single smile of companion with each other. This condition all over the world has brought out the attention of responsible authorities and executives to compile, implement and monitor the necessary health measures to reawake from the current pandemic situation.

Accordingly, the itchy truth is that, no one can predict that this is neither the first nor the last pandemic that our modern cities will face. Until the discovery of a reliable cure, the emergence of victims of COVID 19 is absolute. But the avoiding of clustering and community spreading can be controlled to a considerable extent through the safer practices of the community. Sustainable measures are indeed essentials to rethink, re plan and redesign before the reopening of the country to the public community. Therefore, it is crystal clear that COVID 19 pandemic has hit the reset button of the entire world allowing global community to find sustainable strategies to rebuild the empty streets, quarantined urban dwellers, locked-down cities and Stand stilled economies with an astonishing consent.

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A Comparative Study Of Constructivist Approach In Buddhist And Western Psychotherapy

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Abstract: Client centered psychotherapy is not a newly introduced approach by western psychologists. It can be seen in Asian psychology too; vastly in Buddhist psychology. Both Buddhist and western psychology tend to practice the client centered therapeutic approach. In this paper it was aimed to conduct a comparative study of constructivist approach in Buddhist and western psychotherapy. When reaching this aim, Sutta Pitaka has been used as the primary source while research works of modern scholars have been used as secondary sources. According to research findings it was shown that client centered psychotherapeutic process in Buddhist psychology is remarkable and Buddhist and western psychology can facilitate each other and mutually enrich each other’s insights for a better and vital therapeutic approach that can be accepted by both eastern and western clients alike.

Keywords: Buddhist psychotherapy, client, client centered psychotherapy, constructivist approach, psychotherapy in western psychology

Aim

The main of this paper was to conduct a study on constructivist approach in Buddhist and western psychotherapy.

Method

The comparative historical method has been used as the research method of this paper. Sutta Pitaka, and relevant Buddhist books have been used as primary sources to collect information. Research papers, articles and books written later periods regarding the constructivist approach in Buddhist and western psychotherapy.as the secondary sources to elaborate and analyze research findings.

Literature Review

Client centered psychotherapy in which client is considered as the active participant in the therapeutic process can be found both in Asian and western Psychology (Michel & Donald, 2005). To Arjun (n.d.), Gautama Buddha from the east and John dewy from the west are the foremost constructivist thinkers with regard to knowledge construction. In client centered psychotherapy the client is often active in the process of finding solution to his/her problem by him/herself under the guidance of a skillful therapist (Kerthiratne, 2016). Client-centered Buddhist psychotherapy provides great solutions to burning mental diseases that people suffer due to existing political, social, economic and cultural issues. The final goal of psychotherapeutic process in Buddhist psychology is to direct the client towards Nibbana (Galmangoda, 2017).

INTRODUCTION

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To Buddhism, diseases are of two types: physical and mental. Here, the researcher’s aim is to find only about mental diseases since it relates the topic under discussion. The Buddha was a physician as well as surgeon according to his teachings (SNI: 134). He was an expert in doing surgeries to remove Laba, Dosa and Moha from the lives of ordinary people. Client-centered Buddhist psychotherapy provides great solutions to burning mental diseases that people suffer. To the Buddha, every person suffers from mental disease except those who have reached the ultimate goal; Nibbana. As Roga Sutta illustrates, it is difficult to find a person who is healthy both physically and mentally for even one moment. “Monks, there are to be seen these who can admit freedom from suffering for one year…hundred years. But monks, therefore beings are hard to find in the world who can admit freedom from mental illness even for a moment. In one sense everyone is subjected to mental diseases except the enlighten ones who have destroyed the Asavas” (ANIV: 157). Dhamma is the best medicine for any disease he prescribed. No medicine similar to Dhamma can be found. Therefore, the Buddha asked his disciples to take Dhamma as the best medicine for any disease. The person who takes Dhamma as a medicine stops the cycle of rebirths forever (ANV: 87). In Sallekha Sutta, the Buddha discusses 44 behaviors that are exhibited by men due to mental diseases they suffer. In addition, the Buddha has suggested constructive procedures that can be followed by clients to prevent mental diseases as well (MNI: 40).

DISCUSSION

In client centered Buddhist therapeutic approach, the Buddha has admired the cognitive ability and freedom of the client in the process of knowledge construction when finding solution to his/ her burning issues. To the Buddha, the client is active in the therapeutic process. The client is viewed as an agent of knowledge construction but not a passive object. This view is accepted in western psychotherapy too. In client centered therapeutic process, the Buddha performed his role in numerous ways. Since he believed that psychotherapy is not something administered to client but achieved by the client himself. To implement a successful client-centered therapeutic environment, the Buddha suggests five qualities to develop in a therapist.

1. Gradual talk (Anupubbikatam)
   The therapist should consider the level of defilements of the client before starting the therapeutic process. If the defilement level is high, the process should start from simple to complex. Here the intended meaning is that the therapeutic movement should be started from simple concepts: generosity, compassion, eight worldly condition, morality etc. Such background knowledge helps the client to understand deep concepts: four noble truth, eight fold path etc. For Kalupahana (2010), when the gradual talk is used by the therapist, he/she maintains the mental balance of the client. The story of Suppabuddha is an example of gradual talk.

2. Talk in sequence (pariyadassni katam)
   Here, the therapist supports the client in whatever is good and shows the course.

3. Compassionate talk (Anandayattam paticca katam)
   The successful therapist displays compassion towards the client and helps him/her in a cooperative way.

4. Talk without material expectation (Naamisantaro)
   The therapist acts towards the client without expecting any material.

5. Non-judgment (attanca paranca anupaca katam) (ANIV: 124)
   A successful therapist does not compare his/ her client with others.

There is a list of qualities that should be developed by a therapist as a skillful communicator in client-centered therapy to be effective in the therapeutic process.

1. The therapist should listen to the client (Sota).
2. Having listened to the client, he gets client’s attention (Saveta).
3. Therapist learns more about the process of therapy (Uggheta).
4. Therapist helps the client to remember what client has learned (Dhareta)
5. Therapist knows a lot (Vinnata)
6. Therapist presents what he/she says descriptively (Vinnapeta)
7. Therapist is capable of suitable and unsuitable things (Kusalosahitasahitassa)
8. Therapist is not aggressive (na ca kalakahari) (NVIV: 186).

The Buddha dedicated all his day by dividing it into five parts for helping clients to find solutions their mental issues in constructive manner: Perabathkisa (morning time), Pasubathkisa (evening time), Perayamkisa (first half of the night), Madiyamkisa (Midnight), Pasuluyamkisa (Last half of the night) (DN I: 45).

In Buddhist constructive therapeutic process, the structure of Four Noble Truth: the noble truth of the suffering, the noble truth of the cause of suffering, the noble truth of the end of suffering and the noble truth of the path that leads to the end of suffering was used by the Buddha in significant way to help his clients to overcome the problems they suffer. Here, the client understands suffering; organizes the origin of his her ill-being; recognizes that there is a way of overcoming ill-being; acts in order to over comes the ill-being; follows required norms for living; follows required norms to change his/her practice of life.

The Buddha gave priority to his "clients" to think more about their mental problems in a constructive way and to express their condition freely. Here, the Buddha was an active listener in the therapeutic process. For example, on the Buddha’s way to visit relatives (Kimbulvathpura), he met his lay life wife Yasodhara. Before going to Yasodhara, the Buddha asked Rev, Sariputta, Maha Moggallana and father, Suddhodana those who accompanied him not to disturb Yasodhara to explain what in her mind was. He wanted to make an opportunity for Yasodhara to express what she needs freely and to help her to have the suitable mentality to understand reality (Ja: 90). This is called free association in Freud’s theory (Freud, S 1989 & Fred, A (1937).

In interpretation of resistance, the next method of the Freudian psychoanalytic therapy, it is argued that there may be any form of opposition from the patient to the process of psychoanalysis. In Gestalt therapy too, if a statement made by the clients does not reflect their true feelings, it would be challenged. Alavaka Sutta in Samyutta Nikaya gives an example of challenging the client’s statement in Buddhist therapeutic process. When the Buddha went to Alavaka’s place to guide him to solve the questions he had, the latter opposed the Buddha. Alavaka asked four times the Buddha to go out from his place and come in. Here, in the first three occasions the Buddha surrendered Alavaka and did what he asked, but in the fourth occasion the Buddha did not do what Alavaka said. The Buddha challenged Alavaka "No, O friend, I will not get out. Do what you will (SNI: 213)."

In the therapeutic process the Buddha talked less and motivated his "clients" to explore solutions by themselves. The way the Buddha tackled the cases of Kisagotami and Angulimala illustrates the client-centered therapeutic principles followed by him. The Buddha allowed both Kisagotami and Angulimala to find solutions to their burning problems by themselves (DhpA: 270).

Princes Bhadda Vaggiyas were searching for a woman in the jungle. The Buddha motivated them to direct their search towards themselves rather than looking for someone else. Since the princes agreed to be vigilant about them by themselves, the Buddha preached them doctrine. Finally, they understood the reality like absorbing colours by a pure cloth (Vis: 23).

It is obvious that the mentality of persons who are in trouble is weak. Therefore, the task of the therapist should be to help the clients with compassion to build up their self-confidence. This principle was illustrated by the Buddha in the case of Patacara. She had gone mad because of the unexpected death of her loving two children, husband and parents. When she was treated sarcastically by others, the Buddha helped her to recover her self-confidence. Firstly, the Buddha asked her to have concentration. She who regained self-confidence, listened to the Buddha’s preaching and understood the truth behind the life because of the ingenuity of the Buddha’s therapeutic process (DhpA: 260).
In therapeutic process, the Buddha admired the ability and freedom of the client, so, the Buddha did not try to inculcate what he wanted in client. In Kalamas, the Kalamas were encouraged to realize what is wholesome (kusala) and unwholesome (akusala) by themselves. The task of the Buddha was to provide them with criteria for deciding difference between wholesome and unwholesome thoughts (ANI: 188).

The therapist must understand and respect human differences and not try to sway clients away from their own beliefs. Upali Sutta in Majjima Nikaya illustrates how the Buddha exhibited his flexibility in front of the "client" and how the former were allowed to take decisions without applying any force to accept his teachings. As Upali Sutta mentions, Upali wanted to be a follower of the Buddha, Dhamma and Sangha. At that occasion, the Buddha told him not to follow the Buddha, Dhamma and Sangha without having a proper understanding of them. The Buddha also preached him to have a reflection on his decision which was to embrace Buddhism. The most important thing behind this was the Buddha's further admonishing of Upali to treat Nighanthanatha Putta as he treated Nighanthanatha Putta early though he embraced Buddha, Dhamma and Sangha (MNI: 371). Furthermore, the Buddha asked Upali to offer alms and open the door for alms to Nighanthanathaputta without ignoring him.

Carl Roger’s therapeutic approach is called client centered or person centered because of the focus on the person’s subjective view of the world. In Roger’s explanations on constructive psychotherapy the client was encouraged to look for solutions to his/her mental problem by him/herself (Roger, 1951). As he explained further, the individual has with himself vast resources for self-understanding; for altering his/her concept, attitudes and self-directed behavior. These resources can be tapped if only a definable climate of facilitating psychological attitudes can be provided (Roger, 1980). In this type of therapy the client discovers feelings of which they are unaware (Lahey, 2009). Roger (1961) rejected both psychoanalysis and behaviorism because of their deterministic nature. When examining the incidents of the Kisagotami and Bhaddavaggiya princes, it is clear that these two incidents provide much more insights that could develop Roger’s theory further.

The Buddha’s views were the same as Roger’s views. For Roger, the job of the therapist in client-centered therapy is not to employ specific therapy techniques or to interpret the client’s behavior, but to create an atmosphere that is emotionally safe for the clients so they can feel free to express their feelings to the therapist. Furthermore, Roger believes that the awareness to solve the problem comes from the client not from the interpretations. This was the basic view of the Buddha according to Kalamas and Veemansaka Sutta.

As Roger argues if the therapist solves the clients' problems, the client would remain dependent on the therapist. In the Buddhist therapeutic process the Buddha reflected the client’s emotions remarkably. Even in client-centered Buddhist therapy, it is accepted that the therapist says relatively little in the therapeutic process. In Roger’s client-centered therapy, giving instructions to the client in order to motivate him/her to find solutions to his/her problem is strongly advised against, but in the Buddhist therapeutic process, if the client is unable find solution to the problem by him/herself, instructions are given until he/she reaches real understanding. This is a characteristic that distinguishes the Buddhist method from that of Roger's. Having helped the client by providing necessary instructions, the Buddha let the client be independent on his/her way to find solutions.

Although the client centered therapeutic approach in western psychology is somewhat similar to its Buddhist counterpart, it can be argued that there are some lessons that can be taken from Buddhist psychotherapy to direct therapeutic process in western psychology towards a more fruitful approach. Client centered therapeutic strategies used in western psychology can be identified in Buddhist constructive psychotherapy too. Therefore, it is noticeable that some client centered therapeutic strategies in western psychology have not newly been introduced by western psychologists. Constructive therapeutic strategies in Buddhist psychology are innovative. Moreover, it is possible to explore ways in which client centered psychotherapy in Buddhist and western psychology can
facilitate each other and mutually enrich each other's insights for a better and vital therapeutic approach that can be accepted by both eastern and western clients alike.

**CONCLUSION**

Client centered psychotherapy in Buddhist psychology is much older than client centered psychotherapy in western psychology. Both traditions keep the client in the centre of therapeutic process in order to provide productive service to the client. Though Buddhist and western psychotherapy have commonalities, still there are some lessons that can be taken from Buddhist psychology to expand western psychotherapy towards a more vital approach. Though psychotherapy in western psychology aims to solve problems or issues that clients face in problematic situations, the Buddhist psychotherapy applies its methodologies to solve the problems of clients those who suffer from mental diseases as well as to improve the quality of day-to-day life of common people. Therefore, the Buddhist psychotherapy provides insights for western psychology to expand and improve its present form. In the therapeutic process the Buddha paid attention to accurate information coming from the client and to construct solid communication and a sound social relationship with the client.

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Benefits Of Physical Fitness And Exercise To Pregnant Women In Ekiti State.

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Abstract: This paper focused on benefits of physical fitness and exercise to pregnant women in Ekiti state. It has been proved through literature evidence that exercise can enhance easy and safe delivery for pregnant women. Yet, these days many pregnant women in Ekiti State suffer from discomfort, pains and chronic diseases, which could be linked to non-participation in exercise. This could be attributed to the perception and attitude of the pregnant women towards exercise. This has to do with their level of knowledge about benefits inherent in exercise participation to pregnant women. As well as their knowledge and skill relating to choice of exercise and mode of participation. Hence this paper is to enlighten the pregnant women in Ekiti State on the benefits of physical fitness and exercise participation during pregnancy and how it will really assist them in easy and safe delivery. And to stay healthy without any disease during and after the period of their pregnancy.

Keywords: Pregnancy, Exercise, Fitness, Physical and Health

I. INTRODUCTION

Pregnancy is a thing of joy to many people, it is the expectation of most women and it is one of the things that depicts womanhood. Most especially in the African culture. Pregnancy is the period in a woman’s life in which a fetus develops inside her uterus. According to Kristeen et al. (2019) pregnancy occurs when a sperm fertilizes an egg after it’s released from the ovary during ovulation. Pregnancy can be defined as a state of carrying a developing embryo or fetus within the female body (William, 2018). The period of pregnancy is a delicate period in the life of a woman. It requires physical fitness and good health status. Exercise is a major means through which these can be achieved, aside nutrition. Exercising during pregnancy improves health status and keeps the mother and child stay safe. World Confederation for Physical Therapy (WCPT, 2011) affirmed that exercise in pregnancy enables pregnant women to develop, maintain and restore maximum movement and functional ability throughout their pregnancy. Physical fitness for pregnant women during pregnancy is vital care that can improve their health status and make them stay healthy without illness.

The researchers observed that today, many cases of maternal mortality, stress, difficulty in breathing, pelvic pain, diabetes and chronic diseases are very common among pregnant women in Ekiti state. People of intellect and vast wisdom have equally failed in their mission to rescue the chaotic situation (Famayo, 2017). There is need for revisitation of the primitive era, where vigorous
physical activities and exercises were given priority, thus, reasons for their good health, longevity, less of contagious and chronic diseases, rare cases of untimely death etc. (Famayo, 2019). Pregnancy is a critical period of body weight regulation.

Maternal obesity and excessive gestational weight gain have become increasingly common and contribute to poor obstetrical outcomes. Many pregnant women in the area of study do not consider it necessary to exercise their body system during pregnancy. Except during child labour when they are compelled by the physician to do exercise vigorously. They perceive it as a mere waste of time and this may have implications on their health. This could cause them a lot of stress and discomfort more than necessary during delivery, aside other things. This paper therefore aims at enlightening pregnant women and significant others on the benefits of physical fitness and exercise to pregnancy in Ekiti State.

II. CONCEPT OF PHYSICAL FITNESS

Physical fitness can be defined as the capacity to perform an assigned duty efficiently without any record of casualty and have reserved energy to perform other daily recreational activities and stay healthy. According to the Centers for Disease Control and Prevention (CDC) (2020) physical fitness is defined as the ability to carry out daily tasks with vigor and alertness, without undue fatigue and with ample energy to enjoy leisure-time pursuits and respond to emergencies. Physical fitness is the capacity of the heart, blood vessels, lungs and muscles to function at optimum efficiency.

Physical fitness components are divided into five health-related and six skill-related components which are required for good health and optimal performance. The health-related are those physical fitness components that are required for physiological functioning of the body. These components contribute to positive health status of humans generally and pregnant women by reducing the stress, pains, chronic diseases and increasing work efficiency. The skill-related physical fitness components are those components that are responsible for locomotive movement of the body. They are required in order to make one cope with day to day activities, aside optimal performance in sports.

Here are brief descriptions of health-related physical fitness components:

Cardiovascular endurance

This is the ability of the heart and lungs to work together to provide the needed oxygen and fuel to the body during sustained workloads. It is the ability of the heart and lungs to gather, process and deliver oxygen to body cells for usage. This could be developed through jogging, cycling and swimming. The Cooper Run is used most often to test cardiovascular endurance (Groose, 2017). Cardiovascular endurance is also referred to as cardiorespiratory endurance that means body’s ability to efficiently and effectively intake oxygen and deliver in body’s tissues by way of the heart, lungs, arteries, vessels and vein (Laura, 2020). This is the ability to measure how long or fast a person can perform an activity and how this impacts on measurements such as heart rate and oxygen consumption.

Muscular strength

Muscular strength is the amount of force a particular muscle group can produce in one, all-out effort. This could be developed by using the bench press, leg press or bicep curl. The push up test is most often used to test muscular strength (Laura, 2020 & Groose, 2017). This is the ability of how weight can be moved in relation to repetitions. Exercises of multiple joints and muscle groups such as squats or bench press are often used. Also, it is the ability of a muscular unit or combination of muscular units, to apply force. This is the “power” that helps a person to lift and carry heavy objects. Without muscular strength, the body would be weak and unable to keep up with the demands placed upon it.

Muscular endurance

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Muscular endurance is the ability of the muscles to perform continuously contract against a given resistance without fatiguing. Examples of activities that require muscular endurance are cycling, step machines and elliptical machines (Laura, 2020 & Groose, 2017). The sit up test is most often used to test muscular endurance. It is the ability of body systems to process, deliver, store and utilise energy. Muscular endurance is the ability of a muscle or group of muscles to sustain repeated contractions against a resistance for an extended period of time (Elizabeth, 2020).

**Flexibility**

Flexibility is the ability of each joint to move through the available range of motion for a specific joint. Example is stretching individual muscles or the ability to perform certain functional movements such as the lunge (Laura, 2020 & Groose, 2017). This is the ability to maximise the range of motion at a given joint. Flexibility is one of the most important, yet often overlooked, components of physical fitness. Without flexibility, the muscles and joints would grow stiff and movement would be limited. The ability to achieve an extended range of motion without being impeded by excess tissue, i.e. fat or muscle (BrianMac Sports Coach [BMSC], 2020).

**Body composition**

Body composition is the body’s ratio of fat mass to fat-free mass. This is the component that reduces the negative health outcomes, such as heart diseases and type 2 diabetes, attaining and maintaining a healthy body composition is a goal of just about all regular exercise routine (Laura, 2020). Body composition is the amount of fat mass compared to lean muscle mass, bone and organs. This can be measured using underwater weighing, Skinfold readings and bioelectrical impedance. Underwater weighing is considered the “gold standard” for body fat measurement, however because of the size and expenses of the equipment needed very few places are set up to do this kind of measurement. Body composition refers to primary distribution of muscle and fat in the body, measured by body fat percentage (Jennifer, 2020 & Topend Sports [TS], 2019).

Here are also brief descriptions of six skill-related physical fitness components:

**Agility**

The rate at which an individual is able to perform a movement and change entire body in space with speed and accuracy. This is ability to move and change direction with speed whilst maintaining control. Also it can be defined as the ability to rapidly and accurately change the direction of the body in space. The act of a sports performer to quickly and precisely move or change direction without losing balance or time. Agility is the ability to move and change direction and position of the body quickly and effectively while under control (Elizabeth, 2019).

**Balance**

The ability to maintain centre of mass over a base of support. The ability to maintain equilibrium while stationary or moving. Also is a maintenance of a centre of mass over a base of support. The time between the presentation of a stimulus and the onset of movement. Balance is the ability to stay upright and in coordinated control of our body and its movement (Sport Resilience [SR], 2016).

**Power**

Power can be defined as the ability to exert maximum muscular contraction instantly in an explosive burst movement. Power can also be defined as the amount of force a muscle can exert. The product of strength and speed expressed as the work done in a unit of time. The ability to use two or more parts together. Power is the ability to exert a maximal force in as short a time as possible, as in accelerating, jumping and throwing implements (TS, 2020).

**Speed**
Speed can be defined as the amount of time it takes the body to perform specific tasks. Also is the ability to retain the centre of mass of the body above the base of support. Speed is a maximal rate in which an individual is able to perform a movement or cover a distance in the shortest period of time. The ability to minimise the time cycle of a repeated movement (Groose, 2017).

**Coordination**

This is the ability that integrates the skill components so that effective movement are achieved. The ability to combine several distinct movement patterns into a singular distinct movement (Groose, 2017). Coordination is a way of using two or more parts of the body together, smoothly and efficiently. The ability to use the sense and body parts in order to perform motor tasks accurately without deficiency.

**Reaction time**

This can be defined as time taken to initiate a response to a stimulus. This can further be defined as time required for a sports performer to respond to quick reaction or stimuli and the initiation of their response e.g sprint. Reaction time is the key of getting faster to favourite game. This is the length of time between a stimulus and response to that stimulus (Timothy, 2019).

### III. CONCEPT OF EXERCISE

Exercise is physical activity that is planned, structured for the purpose of conditioning any part of the body. It is a sub-set of physical activity. Physical activity is any bodily movement produced by skeletal muscles that requires energy expenditure – including activities undertaken while working, playing, carrying out household chores, travelling and engaging in recreational pursuits (World Health Organization [WHO], 2018). Exercise is one of the remedies used to improve health, maintain fitness and is important as a means of carrying out physical rehabilitation. Exercise is defined as a planned, structured and repetitive subset of physical activity that improves or maintains physical fitness, overall health or well-being as an intended intermediate or final objective (WCPT, 2011). Exercise can also be defined as a program that improve health status and reduce the risk of developing several diseases. Exercise is defined as any movement that makes muscles work and requires body to burn calories (Arlene, 2017).

There are three main types of exercise which are: aerobic exercise, resistance exercise and stretch exercise.

**Aerobic exercise**

This is a form of exercise that works with the major muscles, including the lungs and heart. It helps carry oxygen around the body and pumps more blood to the heart. This helps the heart and lungs become stronger, along with other muscles (Diabetes Care Community [DCC], 2018). Aerobic exercise is the activities that increase breathing and heart rate for an extended period of time – keeping the heart, lungs and circulatory system healthy. Encyclopedia (2020) stated that aerobic exercise is sustained exercise that increases blood flow to the muscles, strengthening the cardiovascular system and lungs. Aerobic activities are great for burning calories and helping with weight loss when combined with a healthy diet. Examples are brisk walking, running, cycling, jump rope, dancing, spinning, hiking, swimming etc.

**Resistance exercise**

Resistance exercise forces the muscles to work repeatedly to overcome a resistant force. The resistant force may come from an external source, such as weight lifting. Alternatively, it may come from the body’s own weight, such as push-ups and sit-ups (CDC, 2018). Resistance exercise are activities that make human muscles work harder and help to maintain muscle and bone strength e.g weight lifting, push up, squat thrust, dumbbells, kettlebells etc. These are the activities that break down glucose for energy without using oxygen.
Stretch exercise

Stretch exercise is also known as flexibility exercise. These are exercises that increase flexibility and extend muscle mobility. This can be important to help prevent falls (CDC, 2018). Flexibility exercises stretch your muscles, helping your body to stay supple e.g rolling, lower back, arm cycling, rotation of the neck, waist and twisting etc.

IV. PERCEPTION AND ATTITUDE OF PREGNANT WOMEN IN EKITI TOWARD EXERCISE PARTICIPATION

It has been observed by the researchers that many of the pregnant women do not exercise during pregnancy, because they believe that exercise can lead to miscarriage. Also they do not register early for antenatal care where advice can be given to them on exercise. They perceive it to be a mere waste of time. This may have implication on their health and their pregnancy. Many of the pregnant women are afraid to participate in exercise because of the fear that exercise would have negative influence on their health and pregnancy. Also they believe that exercise do cause a lot of pain to the body during pregnancy, stress the baby and affect the position of the baby in the womb. They also believe that exercise does weaken the body and they feel it is not good for their body. It was also observed that majority of the pregnant women do not have the knowledge of the benefits of exercise to pregnancy. Few of them that have the knowledge of benefits of exercise to pregnancy and wish to participate in exercises do not have spousal support. More so, many of the pregnant women believe that walking from one place to another and doing their house chores e.g sweeping, washing of clothes, cleaning of dishes, fetching of water etc. are the same as exercising. It was also observed that some of them do not have time for exercise due to the nature of their job and are of the opinion that exercise during pregnancy is additional burden. Also some are of the opinion that they do not need to exercise their body until their delivery period. Some of them that wish to participate in exercise find it difficult getting started, because they do not have instructor to take them on the type of exercises they need to do.

Visitation to fitness centres across Ekiti State, most especially Ado-Ekiti the State capital. Revealed that pregnant women do not register there. Through observation of major roads in the State capital and some local government headquarters in the morning and evening. It was noted that pregnant women do not come out for walk. Also, visitation to Oluyemi Kayode Stadium, Ado-Ekiti; which is the state owned stadium on Saturdays. Revealed that only on a very few occasions do we have few pregnant women coming to keep fit. From all the above mentioned, it is clear that the attitude of pregnant women in Ekiti is not tilted toward exercise participation. This could be attributed to the fact that many of them lack the knowledge of the benefits inherent in exercise participation for pregnant women. Aside that, they lack the knowledge and skill required for the choice of exercise and the how, when and where exercise is to be performed.

V. BENEFITS OF EXERCISE TO PREGNANT WOMEN

The period of pregnancy is usually accompanied with some challenges which could be emotional, psychology, physical etc. Due to the change in physiological state of the woman. Exercise could be a way to overcome these challenges. Exercise also assists the pregnant woman to cope with symptoms of pregnancy and make her feel better.

Below are the benefits of exercises to pregnant women:

Reduce pain

Exercise during pregnancy improve the health status of the pregnant women, it drastically reduce pains that they do undergone during pregnancy such as pelvic pain and backache. It also enhance their quality of life by lubricating the joints and reduce stiffness. Also exercise decrease the level of discomfort in their flexibility. Research has shown that regular exercise during pregnancy can ease pain long term by improving muscle tone, strength and flexibility. Exercise may also cause a release of endorphin the body’s natural painkillers (WebMD, 2019).
Improve mood

Physical fitness can enhance your mood through the release of dopamine, neurotransmitter, endorphins and endocannabinoids (Famayo & Adubi, 2019). Regular exercise reduces the risk of depression and anxiety of the pregnancy as it makes pregnant women feel happy and more relaxed. Exercise during pregnancy reduces depression, releasing endorphins that help improve mood while diminishing stress and anxiety (Bellefonds, 2018).

Increased energy

It enhances the level of fitness during pregnancy and makes pregnant women to be agile and work effectively without undue stress. It boosts their capacity in caring out their day to day activities. Regular exercise improves muscle strength and endurance to deliver oxygen and nutrients to body tissue s and help cardiovascular system to work more efficiently. Taking part in exercise help the lung to produce enough air and extracting sufficient oxygen to produce the energy required by the body. Jennifer (2006) stated that new research suggested that regular exercise during pregnancy increase energy levels even among people suffering from chronic medical conditions associated with fatigues like cancer and heart diseases.

Improved posture

Exercise reduces the level of postural defects; it rebuilds the shape of the body and makes the posture of pregnant women look attractive. Regular exercise reduces the level of swelling in ankles, hands and face during pregnancy. It mostly strengthens the muscles and improves balance and coordination that might want to lead to postural defects. Regular exercise during pregnancy can improve body posture and decrease discomforts such as backaches and fatigue (WebMD, 2020).

Muscular strength

Regular partaking in exercise builds muscle tone and strength that makes pregnant women to endure the delivery stress. This can also increase their stability and improves blood supply to the muscles to work effectively, also increase their level of endurance to make use of oxygen. Exercise increase muscular strengths that helps to build strong, healthier muscles and bones. It enhances more stability, balance and flexibility to endure child labour (Emily, 2019).

Improved blood circulation

This can enhance heart fitness in pumping the blood properly into the body and reduce high blood pressure which is peculiar to pregnant women. Regular exercise services the heart, because it builds the heart against blood failure in the body system. It enhances regular flow of blood by reducing the work force of the arteries in transporting the blood into our body system. Medline Plus (MP) (2017) stated that exercise strengthens heart and improves circulation. The increased blood flow raises the oxygen levels in the body. This helps lower risk of heart diseases such as high cholesterol, coronary artery diseases and heart attack. Regular exercise also lower pressure and triglyceride level.

Disease prevention

Exercise reduces the risk of cardiovascular disease of pregnant women during and after the pregnancy, it also improves the body insulin to work effectively. Regular exercise reduces the risk of diseases like preeclamsia, gestational diabetes and hypertension that do combat with pregnant women during pregnancy. Exercise boosts immune system and insulin to protect the heart against disease. Regular exercise reduces the morbidity and mortality rate associated with cardiovascular disease, hypertension and type 2 diabetes mellitus among other chronic diseases (Hinman et al., 2015)

Easy delivery

Exercise prepare pregnant women’s body for labour as it makes delivery easy for them and build more stamina needed for labour and delivery. It makes the body respond to every care being giving to them during childbirth. Also reduce the risk of childbirth pains and allow their body to be flexible. Regular exercise throughout pregnancy enhances active labour for 4 hours and 24minutes
compared with 6 hours and 22 minutes for those that do not use to exercise. It shortens the duration of labour, reduces the risk of cesarean section and operative-assisted vaginal delivery (Suzanne, 2017 & Hinman et al., 2015)

**Post–delivery recovery**

Exercise speed up body recovery from maternal tears after birth and quicken recovery from blood wasted during labour. It enhances the quick response to treatment after birth and makes pregnant women healthy. Regular exercise during pregnancy give a great chance of recovery physically after childbirth, the more fit during pregnancy the more will after delivery (Bellefonds, 2018).

**VI. CONCLUSION**

Based on literature evidence from previous studies, the impact of exercise on pregnancy can not be underestimated. Exercise is one of the prenatal activities that pregnant women are supposed to be doing while in pregnancy so as to enhance the level of their fitness. Exercise is one of the most reliable activities that need to be properly done by women during pregnancy in order to attain/maintain a high level of fitness. As well as ensure easy and safe delivery. Against this backdrop, the researchers recommended that: physicians should encourage the pregnant women during their prenatal check up to always exercise. Health care providers who care for pregnant women should enlighten them on the benefits of exercise. Pregnant women should be performing at least 20–30 minutes exercise 3 days in a week.

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Analysis of Preconception Healthcare Services Delivered in Selected Medical Officer of Health Areas of Kandy District in Sri Lanka

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Abstract - Rate of reduction of maternal and neonatal mortality in Sri Lanka had slowed down recently, highlighting the need of effective preconceptional interventions to achieve the set healthcare goals. Though many health benefits are offered by the preconception healthcare services, adequate information is not available to evaluate the quality of preconceptional services being offered, especially at community level. This study is aimed to evaluate the status of preconception care delivered to primiparous women of Yatinuwara, Warallagama and Udunuwara Medical Officer of Health Areas in the Kandy district, before their first live pregnancy. A descriptive cross-sectional study was conducted at selected community antenatal clinics and primiparous women below 32 weeks of gestation living in above mentioned areas for more than six months were included. Based on the size of the study population, 218 participants were selected and data on pre pregnancy healthcare services were collected using a consensually validated, pre tested and interviewer administered structured questionnaire. Responses gathered from 217 participants revealed that, 0.95 (95% CI, 0.92-0.98) was above adolescent age and 0.12(95% CI, 0.08-0.16) had preconceptional medical consultations. Almost 0.3 (95% CI, 0.23-0.36) of pregnant women underwent preconceptional measurement of Body Mass Index and 0.52 (95% CI, 0.45-0.58) had folic acid supplementation for at least three months while 0.96 (95% CI, 0.939-0.99) had Rubella vaccination and 0.23 (95% CI, 0.17-0.29) had participated in at least one health education session. Moreover, 0.91 (95% CI, 0.87-0.95) had planned pregnancies while 0.16 (95% CI, 0.11-0.21) had preconceptional screening for chronic diseases. Private sector involvement had been high with 74.2% pre pregnancy consultations. Only 0.037 (95% CI 0.012 to 0.062) had received overall pre-pregnancy care, as per the study protocol. Special attention should be given to improve preconceptional medical consultations, health education services, screening for chronic diseases and effective use of the services offered by National Preconception Health care package of Sri Lanka.

Index Terms – preconception care, pre-pregnancy care, pre-pregnancy preparedness, preconceptional interventions

I. INTRODUCTION

Maternal and child health is a key component of the preventive and curative health care delivery system and interventions identified for improvement, are targeted as life cycle approaches(1). With the declaration of Alma ata in 1978 all governments were directed to form policies to protect and promote health of all (2) and in Sri Lanka, the infant mortality rate has witnessed gradual improvement from 19.3 per 1000 live births in 1990 to 10.7 per 1000 live births in 2010 which, is also reflected in the monitoring of achievement of Millennium Development Goals(3). Nevertheless, the rate of reduction has slowed down in recent years while the maternal mortality ratios have been on a declining trend from 61 deaths in 1995 to 44 deaths reported in 2005(4). It is evident that, existing strategies need to be revisited and additional efforts are needed for Sri Lanka’s healthcare sector to accomplish Sustainable Development Goals in future while, focusing on the key facts stated in the South East Asia region report of World Health Organization (WHO) published in August 2013, highlighting the importance of preventing identified causes for maternal morbidity and mortality, prior to conception (5).
Cardiac diseases have been identified as the major cause of maternal mortality in Sri Lanka while congenital abnormalities, complications of preterm birth, neonatal sepsis and cardiac anomalies are causes of infant deaths.

Evidence shows that, medical conditions could get aggravated due to physiological changes happening during pregnancy and the outcomes may not be managed properly during antenatal, perinatal and postnatal periods thus, emphasising the importance of effecting interventions to women and couples prior to conception, which could be in the form of biomedical, behavioural and social health improving the overall health status. Preventing the consumption of alcohol, vaccinating against Rubella, improving family planning to avoid unwanted pregnancies and unsafe, illegal abortions, providing free access to healthcare for low income women and addressing health concerns prior to pregnancy have already been identified as some of the effective interventions to be adopted, prior to conception.

Even before the WHO identified its importance, Sri Lanka has given priority in including the concept of pre pregnancy in the vision of the Maternal and New-born Health programme and strives to “Ensure optimum survival and quality of life for both mother and new born through provision of evidence based, best available care and services during pre-pregnancy, pregnancy and postpartum periods” However, certain studies done in Sri Lanka have shown lack of preconceptional preparedness among women and the Ministry of Health has specifically included the provision of comprehensive pre pregnancy care as a key objective of the Maternal and New born Health programme developed for 2012-2016 period, along with certain other important objectives. As a key objective of this programme, it is expected to increase the coverage of pre pregnant women who receive pre pregnancy care services while other objectives include (1) reducing age specific fertility rates (2) reduction in abortion specific mortality rates (3) attentive involvement in looking into needs of family planning (4) augmenting rubella immunisation coverage (5) increasing the percentage of pregnant women receiving pre conceptional folic acid supplementation and (6) increasing the total contraceptive prevalence rate. The Medial Officer of Health (MOH) and the assigned healthcare team is required to coordinate activities related to the delivery of services under the healthcare package which includes risk screening, physical assessment, vaccinations, health education, counselling and provision of other services. Further, various tools such as invitation card (directing card to meet the Public Health Midwife, PHM, given by the marriage registrar), screening tool (preconception care screening check list), guide book for health workers, book for new couples and preconception healthcare clinics and monthly education sessions are used, to attract and educate newly married couples on the importance of preconception care.

Though many health benefits have already been offered by the government under the preconception healthcare services, only few studies have been done to assess the effectiveness of the programmes in terms of community awareness levels, accessibility and deliverability of such services, quality and scale of preconception services etc. Therefore, this research aims to contribute towards identifying the extent of the provision of pre pregnancy care services and also the gaps of such services at grass root level, upon selecting three Medical Officer of Health (MOH) areas in the Kandy district of Sri Lanka.

II. OBJECTIVE

To describe the pre conception care services delivered to women of Yatinuwara, Warallagama and Udunuwara Medical Officer of Health (MOH) areas of the Kandy district, before their first live pregnancy and the services offered under the National Pre Conception Healthcare package of Sri Lanka.

III. METHODOLOGY

This was a descriptive cross-sectional study conducted at the Community Antenatal clinics of Yatinuwara, Warallagama and Udunuwara Medical Officer of Health (MOH) areas of the Kandy district. The data was collected over a period of two months at the selected antenatal clinics commencing from 10th of August 2015. Ethical clearance was obtained from the Ethics Review Committee of the Post Graduate Institute of Medicine of the University of Colombo and the Administrative clearance was obtained from the Provincial Director of Health Services of Central Province. Study population included the primiparous women attending the Community Antenatal clinics below 32 weeks of gestation and living in the above mentioned MOH areas while, pregnant women who had been residing in the said areas for a period of less than six months before their last regular menstrual period were excluded. Calculated sample size was considered as 231 which, was allocated based on the population size of the three (3) MOH areas while, the number of Antenatal clinic centres selected for the study was decided, considering the sample size of each area.
An interviewer administered structured and pretested questionnaire was developed after the literature review, interviews with experts and Focus Group Discussions and made available in all three languages while, data was collected upon visiting each Antenatal clinic. Verified data was analysed using SPSS computer package, with univariate analysis being done initially followed by a bivariate analysis done on selected variables.

IV. RESULTS

With one primiparous mother refusing to participate, out of the remaining 217 participants majority of the pregnant women were around 27 years old and most of them (39.2%) had obtained post-secondary/ non-tertiary education up to grade 13, as per the ISCED 2011 classification. Rest of the key socio demographic characteristics are shown in Table 1 below.

<table>
<thead>
<tr>
<th>Age of the Participant</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Mode</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of the Participant</td>
<td>17</td>
<td>43</td>
<td>27.2</td>
<td>26</td>
<td>27</td>
</tr>
<tr>
<td>Age of the spouse</td>
<td>18</td>
<td>49</td>
<td>30.3</td>
<td>30</td>
<td>30</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Distribution of ethnicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethnicity</td>
</tr>
<tr>
<td>Distribution of ethnicity</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Distribution of religion</th>
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</thead>
<tbody>
<tr>
<td>Religion</td>
</tr>
<tr>
<td>Distribution of religion</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Level of Education of study participant categorized according to the International Standard Classification of Education 2011 (ISCED 2011)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education Category*</td>
</tr>
<tr>
<td>---------------------</td>
</tr>
<tr>
<td>Primary (grades 1-5)</td>
</tr>
<tr>
<td>Lower Secondary (grades 6-8)</td>
</tr>
<tr>
<td>Upper Secondary (grades 9-11)</td>
</tr>
<tr>
<td>Post-Secondary/Non tertiary (grades12-13)</td>
</tr>
<tr>
<td>Short cycle tertiary</td>
</tr>
<tr>
<td>Bachelors level</td>
</tr>
<tr>
<td>Masters level</td>
</tr>
<tr>
<td>Doctorate level</td>
</tr>
</tbody>
</table>

Table 1: Socio demographic details of the participants
Preconception care

With the participants of the study being categorised based on identified components of preconception healthcare services as indicated in Table 2, only eight (8) pregnant women, proportion of 0.037 (95% CI 0.012 to 0.062), had received overall care, as per the study protocol.

Table 2: Preconception care components and number of receivers

<table>
<thead>
<tr>
<th>Component of Preconceptional health care</th>
<th>Frequency/ percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Pregnant women aged more than 19 (above adolescent age)</td>
<td>206 (94.9%)</td>
</tr>
<tr>
<td>2  Measurement of BMI and got an explanation about the value of BMI</td>
<td>26 (12%)</td>
</tr>
<tr>
<td>3  Pre-pregnancy consultation by a Medical officer</td>
<td>66 (30.4%)</td>
</tr>
<tr>
<td>4  Preconceptional folic acid supplementation for minimum of three months</td>
<td>113 (52.3%)</td>
</tr>
<tr>
<td>5  Rubella immunization before pregnancy</td>
<td>208 (95.8%)</td>
</tr>
<tr>
<td>6  Participated to at least one pre pregnancy health education session</td>
<td>51 (23.5%)</td>
</tr>
<tr>
<td>7  genetic counseling before pregnancy (i.e. if there were marriages among close relatives)</td>
<td>-</td>
</tr>
<tr>
<td>8  When pregnancy was an expected pregnancy</td>
<td>198 (91.2%)</td>
</tr>
<tr>
<td>9  Pre pregnancy screening and diagnosis of chronic diseases</td>
<td>3 (1.4%)</td>
</tr>
</tbody>
</table>

*Since one participant has received more than one component of care the total is not shown*

Sources and modes of delivery of pre-pregnancy healthcare

Sources of pre pregnancy care is referred to the institutes and sectors which provide such care and modes of care refers to the categories of healthcare personnel and the manner of delivery of such services as stated in Table 3.
Remarkably, overall majority (22.5%) of the respondents have obtained pre-pregnancy medical consultations from the private sector institutes.

### Health education

Though two sessions of health education are usually conducted by the staff of MOH, only one (1) study participant had attended both sessions. Healthcare sector staff in the respective areas consisting of MOHs (28.4%), Public Health Nursing Sisters (PHNSs: 24.5%) and Public Health Midwives (PHMs: 47.1%) have conducted education sessions as shown in Table 5 below in order, to create awareness and educate the respondents on pre pregnancy care.

Table 3: Sources and modes of delivery of some components of pre pregnancy care

<table>
<thead>
<tr>
<th>Pre pregnancy care</th>
<th>Health sector</th>
<th>Institute and health care personnel</th>
<th>Total participants who received care</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Govt. sector</td>
<td>Private sector</td>
<td>MOH preconception care clinic</td>
</tr>
<tr>
<td>1 Pre pregnancy of measurement of BMI</td>
<td>21(9.7)</td>
<td>10(4.6)</td>
<td>18(8.3)</td>
</tr>
<tr>
<td>2 Pre pregnancy medical consultation</td>
<td>17(7.8)</td>
<td>49(22.5)</td>
<td>13(6.0)</td>
</tr>
<tr>
<td>3 Screening of couples having a family history of chronic diseases</td>
<td>9(4.1)</td>
<td>26(11.9)</td>
<td>2(0.9)</td>
</tr>
</tbody>
</table>
Though seven (3.2%) women had mentioned that, they were married to a close relative none of them have been referred to or given any genetic counselling prior to pregnancy. Out of 119 (54.8%) participants who had a family history of chronic diseases only 35 (16.1%) respondents were screened and only two (0.9%) of them had been screened by MOH while others (i.e. 15 women; 6.9%) had been screened by medical officers of private sector.

**Folic acid supplementation**

Though 163 (75.1%) participants were aware of the effects of folic acid on foetal congenital malformations, only 154 (71%) respondents had consumed the supplement as a preconception care mechanism. Majority (i.e. 44 women; 20.3%) of them had been made aware mostly by their own family members and 10.6% had gained knowledge from friends while, the midwives in the areas had educated about 12.4% of pregnant women.

**Care provided according to the National Preconception Care package**

Details of the study participants who received pre-pregnancy care according to identified components of the national preconception healthcare package are shown in Table 6.
As per the study protocol, only 14 participants received overall care under the National Preconception Care package and the proportion was 0.06 (95% CI-0.029 to 0.091).

**Family planning**

The methods introduced had been adopted by 50 (23.0%) study participants and 30 (13.8%) had used oral contraceptive pills while, 10 (4.6%) couples have used condoms and an equivalent number had used natural methods. Moreover, 26 participants who had agreed on family planning methods (i.e. 52% out of total family planning users) had a pre-pregnancy meeting with PHMs and out of the 167 non-adopters, 59 participants (i.e.35.3% out of total non-adopters) have had a pre-pregnancy meeting with PHM.

Significant statistical difference was not prominent regarding the age of participants who received pre-pregnancy care according to the National Preconception Care package and non-receivers based on Fishers exact test (p=0.762) and independent sample T test (p=0.987). Similarly, statistical analysis of the impact of ethnicity (p=0.702), education level (p=0.362) and income level (p=0.585) on the two categories did not indicate any significance, as well as employment (p=0.604) based on the Chi square test.

V. **CONCLUSION**

This study presented a realistic view of provided preconception care and the pre-pregnancy preparedness, among pregnant women in MOH areas of Yatinuwara, Warallagama and Udunuwara in the Kandy district, remained unsatisfactory. Notably, involvement of the private sector specialist obstetricians was evident and screening of married couples for chronic diseases was handled by them. Provision of Rubella vaccination by public sector was satisfactory. Nevertheless, overall, the preconception care levels in these areas remained at low levels, amidst educational and awareness programmes being conducted by MOH, PHM and other institutes. Similarly, all healthcare services offered under the National Preconception Care package were less effective due to deficiencies identified in the provision of such care and also due to lack of initiatives taken in creating awareness among the newly married couples.

---

Table 6: Details of the preconception healthcare package and analysis of recipients

<table>
<thead>
<tr>
<th>Components of National preconception health care package</th>
<th>frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receiving the Invitation card from the marriage registrar</td>
<td>01</td>
<td>0.05</td>
</tr>
<tr>
<td>Study participant meeting the PHM</td>
<td>56</td>
<td>25.8</td>
</tr>
<tr>
<td>PHM’s visit to meet the study participant when she failed to meet PHM</td>
<td>29</td>
<td>13.4</td>
</tr>
<tr>
<td>Total study participants who had Pre-pregnancy meetings with PHM</td>
<td>85</td>
<td>39.2</td>
</tr>
<tr>
<td>Delivery of Preconception care check list</td>
<td>31</td>
<td>14.3</td>
</tr>
<tr>
<td>Completion of preconception care check list and handing over it to PHM</td>
<td>26</td>
<td>12.0</td>
</tr>
<tr>
<td>Delivery of information on preconception health care clinic and health education sessions to study participant</td>
<td>36</td>
<td>16.6</td>
</tr>
<tr>
<td>Participation to Health education sessions conducted by MOH staff</td>
<td>16</td>
<td>7.4</td>
</tr>
<tr>
<td>Participation of spouse to health education sessions</td>
<td>13</td>
<td>6.0</td>
</tr>
<tr>
<td>Usage of family planning methods before first pregnancy</td>
<td>50</td>
<td>23</td>
</tr>
<tr>
<td>Unmet need of family planning</td>
<td>13</td>
<td>6.7</td>
</tr>
<tr>
<td>Study participants who consulted a dental surgeon before pregnancy</td>
<td>48</td>
<td>22.1</td>
</tr>
<tr>
<td>Study participants whose initial diagnosis of chronic diseases were made before pregnancy and after marriage</td>
<td>3</td>
<td>1.4</td>
</tr>
</tbody>
</table>

Since one participant had received more than one component of care the total is not shown above
This study provides an insight on specific areas for improvement in providing preconception care and one such key issue is, sorting out administrative issues by the marriage registrar of the area in ensuring that the newly wedded couples do meet the PHM. The tasks performed by the PHMs in providing preconception healthcare needs to be broad based and they should be empowered to carry out their duties efficiently to register eligible married couples for preconception healthcare services. Moreover, the need of an effective monitoring mechanism to monitor the coverage of target population by the preconception health care clinics and through educative sessions, was also identified. A more collective and cohesive approach needs to be adopted by Medical Officers of Health, General Practitioners and Specialist Medical Officers in creating awareness amongst the many youth (i.e. both men women) regarding the importance of obtaining preconception healthcare services. Therefore, this research provides information on what adjustments may be made to current programmes, to improve maternal and new-born healthcare services in the country to achieve better results.

VI. ACKNOWLEDGMENT

The author acknowledges the support given by the academic staff and other officials at the Post Graduate Institute of Medicine, University of Colombo, Consultant Community Physicians of Family Health Bureau of Department of Health, Sri Lanka, the officials at the Provincial Directorate of Health Services, Central Province, Sri Lanka and the staff at the Regional Directorate of Health Services in Kandy, Sri Lanka.

REFERENCES


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Optimization of acetic acid pretreatment of corn stover for bioethanol production

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Abstract- It has been found that different pretreatment of corn stover produces varying quantities of reducing sugars. Therefore, this study experimentally investigated the optimum conditions with respect to concentration of acetic acid, temperature and time. Response surface methodology (RSM) was employed for the analysis of the simultaneous effect of acid concentration, pretreatment temperature and time on the resulting total reducing sugar concentration obtained. A three-variable, five-level Central Composite Rotatable Design (CCRD) of experiment was used to develop a statistical model for the optimization of the process variables. The findings showed that the optimum total reducing sugar were acetic acid concentration: 91.89%, temperature: 150 °C and time: 5 hours. Under these conditions, the total reducing sugar concentration obtained was 21.09mg/mL. Validation of the model indicated insignificant difference (±1.2) between predicted and observed values. This study found that corn stover has a potential of producing substantial amount of reducing sugars which are the major raw materials in the production of bioethanol.

Index Terms- Acetic acid, Corn stover, Reducing sugars, bioethanol, Response surface methodology (RSM)

I. INTRODUCTION

Corn stover is lignocellulosic biomass that can be converted into fermentable sugars for the production of second generation biofuels such as cellulose ethanol[1, 2]. The conversion process is facilitated by use of either enzymatic or chemical hydrolysis. Chemical pretreatment processes include the use of acids, alkalis, catalyzed steam-explosion, Ammonia fiber/freeze explosion (AFEX), pH-controlled liquid hot water, Ionic liquids (ILs) and organic solvents, among others[3].

Currently the world is faced with crisis of fossil fuel depletion and environmental degradation. Demirbas [4] indicated that the oil crisis and the continuous increase in oil prices have led countries to investigate new and renewable fuel alternatives.

The major organic components of biomass are celluloses, hemicelluloses and lignin [1, 4-6].

There are three ways to use biomass. It can be burned to produce heat and electricity, changed to gas-like fuels such as methane, hydrogen and carbon monoxide or converted to a liquid fuel. Biofuels (liquid or gaseous fuels produced from biomass) are predominantly two forms of alcohol: ethanol and methanol. Biofuels generally offer many benefits including sustainability, reduction of greenhouse gas emissions, regional development, reduction of rural poverty and fuel security [4, 7].

The most commonly used biofuel is ethanol. This is generally produced from sugarcane, corn, and other grains. Gasoline and ethanol blends are already used in cities with high air pollution. However, ethanol made from biomass is currently more expensive than gasoline. Therefore, there is a need to find out the less expensive ways to produce ethanol from other biomass crops. Ethanol feedstocks are classified into three types:

i. Sucrose-containing feedstocks.
ii. Starchy materials.
iii. Lignocellulosic biomass.

Lignocellulosic biomass, such as agricultural residues (corn stover and wheat straw), wood and energy crops, is attractive materials for ethanol fuel production since it is the most abundant reproducible resource on Earth. Production of renewable biofuels can be classified based on the production technologies employed as illustrated in Table 1

Table 1: Classification of renewable biofuels based on their production technologies[4]

<table>
<thead>
<tr>
<th>Generation</th>
<th>Feedstock</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>First generation biofuels</td>
<td>Sugar, starch, vegetable oils or animal fats</td>
<td>Bioalcohols, vegetable oil, biodiesel, byosyngas, biogas</td>
</tr>
<tr>
<td>Second generation biofuels</td>
<td>Non-food crops, wheat straw, corn, wood, solid waste, energy crops</td>
<td>Bioalcohols, bio-oil, bio-DMF, biohydrogen, bio-Fischer-Tropsch diesel, wood diesel.</td>
</tr>
<tr>
<td>Third generation biofuels</td>
<td>Algae</td>
<td>Vegetable oil, biodiesel</td>
</tr>
<tr>
<td>Fourth generation biofuels</td>
<td>Vegetable oil, biodiesel</td>
<td>Biogasoline</td>
</tr>
</tbody>
</table>

Lignocellulose materials are broken down into individual sugars followed by fermentation to ethanol.

The prerequisite in the utilization of lignocellulose for ethanol production is to efficiently yield fermentable hydrolyzates rich in glucose from the cellulose content present in the feedstock.
A pretreatment process is employed to breakdown the lignocellulose to fermentable sugars. This is the key process of production of second-generation biofuels. Various pretreatment techniques have been developed during last decades, which increase cellulose accessibility by modifying chemical compositions or cell wall structures. The prevailing challenge is the accessibility of these polymers and how to convert them into fuels and building blocks for utilization. The flow diagram given in Figure 1 illustrates a generalized production of biofuels from lignocellulosic biomass.

Figure 1: The schematic diagram showing the conversion of lignocellulosic biomass to fuel.

II. MATERIALS AND METHODS

2.1 Raw materials
Corn stover samples were collected from the farm around Moi University. Collection of raw materials was done by random sampling method. These samples were prepared according to Laboratory Analytical Procedure (LAP) of National Renewable Laboratory Analytical Procedure (LAP) of National Renewable Energy Laboratory (NREL) “Preparation of samples for compositional analysis”[8].

The pretreatment of corn stover was performed in batch reactors at chemical laboratory in Moi University. This was carried out at a constant ratio of solids to liquids of 1:10 for all experimental runs.

In order to come up with reducing sugars, the insoluble solids after pretreatment were subjected to dilute hydrochloric acid hydrolysis. Appropriate conditions for dilute HCl hydrolysis are: 2.5% HCl concentration, 120°C and hydrolysis time of 1hr [9, 10].

2.2 Pretreatment and hydrolysis
Energy Laboratory (NREL) “Preparation of samples for compositional analysis”[8].

The pretreatment of corn stover was performed in batch reactors at chemical laboratory in Moi University. This was carried out at a constant ratio of solids to liquids of 1:10 for all experimental runs.

In order to come up with reducing sugars, the insoluble solids after pretreatment were subjected to dilute hydrochloric acid hydrolysis. Appropriate conditions for dilute HCl hydrolysis are: 2.5% HCl concentration, 120°C and hydrolysis time of 1hr [9, 10].

2.3 Analysis of reducing sugars
The total reducing sugars of the hydrolyzates was determined by UV-Vis Spectrophotometer, at 540nm wavelength using 3, 5-dinitrosalicylic acid (DNS reagent) with glucose as standard[11].

In order to get the overall pretreatment/hydrolysis yields, having found the optimum yield, calculations were done according to equation 1 [12].

Overall yields = \[
\text{Total reducing sugars concentration} \times \text{Dilution} \times 100\% \\
\text{Weight of cellulose and hemicellulose in raw biomass}
\]

2.4 Experimental design
In order to come up with optimal conditions for pretreatment of corn stover to yield fermentable sugars, full factorial central composite rotatable design (CCRD) was used. The independent pretreatment factors to be determined were: acetic acid concentration (X1, %), pretreatment temperature (X2, °C) and pretreatment time (X3, hours). Reducing sugars was the dependent response (Y, mg/ml). Milled corn stover is maintained at 10% [13] solids to liquid ratio in all experiments.

As a result, the design involved, F=2^k factorial points, 2k axial points, and n0 centre points. In this case k was the number of independent variables. The two axial points were on the axis of each design variable at a distance of α from the design centre. For rotatable CCD, α was calculated according to Equation 2:

\[
\alpha = F^{1/4}
\]

Therefore, \(\alpha = (2^1)^{1/4} = 1.682\)

The total number of experimental runs N is given by \(N=F+2k+n_0\).

This gives 20 runs i.e. \(N=2^3+2*3+2*3=20, n_0=2k\).

The variables were coded according to the Equation 3.

\[
X_i = \frac{x_i-x_0}{\Delta x}
\]

Where, \(x_i\) was the uncoded value of variable \(i\), \(x_0\) the value of \(X_i\) at the center point and \(\Delta x\) the step change between levels 0 and 1. The behaviour of the system was explained by second order polynomial- Equation 4.

\[
Y = \beta_0 + \sum_{i=1}^{3} \beta_i X_i + \sum_{i=1}^{3} \sum_{j=1}^{3} \beta_{ij} X_i X_j + \sum_{i=1}^{3} \sum_{j=1}^{3} \beta_{ij} X_i X_j X_j
\]

Where, Y was the fermentable sugars yield, \(\beta_0\) the offset term, \(\beta_i\) the coefficient of linear effect, \(\beta_{ij}\) the coefficient of squared effect, \(\beta_{ij}\) the coefficient of interaction effect and \(X_i\) was the coded value of variable \(i\). Table 2 indicates the independent variables of pretreatment conditions both in terms of coded levels and actual values.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coded levels/Actual levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetic acid concentration, X1 (%)</td>
<td>-1.682 70 85 95 99.97</td>
</tr>
<tr>
<td>Pretreatment temperature, X2 (°C)</td>
<td>13.295 150 175 200 217.05</td>
</tr>
<tr>
<td>Pretreatment time, X3 (hrs)</td>
<td>0.977 2 3.5 5 6.02</td>
</tr>
</tbody>
</table>

Acetic acid pretreatment parameters of lignocellulosic biomass were: concentration 75-95%, pretreatment temperature 150-200°C and pretreatment time 2-5 hours according to [14].

2.6 Preparation of standard/calibration curve
In determination of total reducing sugar concentration after pretreatment followed by hydrolysis, glucose was used as the standard. The recommended range of glucose concentration is 1.2-24mg/ml [15].

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III. RESULTS, ANALYSIS AND DISCUSSIONS

3.1 Calibration curve
The absorbances of different concentrations of glucose were found as indicated in the Table 3.

Table 3: Results for Calibration curve

<table>
<thead>
<tr>
<th>Test tube No.</th>
<th>Concentration of glucose (mg/ml)</th>
<th>Volume of DNSA added (ml)</th>
<th>Volume of Rochell’s Salt added (ml)</th>
<th>Absorbance at 540nm</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>25</td>
<td>25</td>
<td>0.135</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
<td>25</td>
<td>25</td>
<td>0.267</td>
</tr>
<tr>
<td>3</td>
<td>12</td>
<td>25</td>
<td>25</td>
<td>0.543</td>
</tr>
<tr>
<td>4</td>
<td>16</td>
<td>25</td>
<td>25</td>
<td>0.782</td>
</tr>
<tr>
<td>5</td>
<td>20</td>
<td>25</td>
<td>25</td>
<td>1.022</td>
</tr>
<tr>
<td>6</td>
<td>24</td>
<td>25</td>
<td>25</td>
<td>1.161</td>
</tr>
</tbody>
</table>

A plot of glucose concentration against absorbance was plotted using Microsoft excel as shown in Figure 2. The curves equation was $y = 0.0545x - 0.1117$ with a regression analysis of 0.9908. This indicated that there was a good correlation of the observations made in Table 3.

![Figure 2: Glucose standard curve](image)

3.2 Experimental results and Statistical analysis
Table 4 shows experimental results (actual response and predicted response) obtained from different sets of pretreatment conditions. Actual response was obtained by applying Beer-Lambert law together with calibration curve of Figure 2. Predicted response was obtained by use of second-order polynomial obtained from actual responses.

Design Expert 11 version software was used to analyze the data obtained. By applying multiple regression analysis to experimental data, the following second degree polynomial (Equation 5)

$$Y = 16.38 + 1.31X_1 + 0.4231X_2 + 2.94X_3 + 0.0938X_1X_2 - 0.7988X_1X_3 - 1.65X_2X_3 - 0.3099X_1^2 + 0.9028X_2^2 - 0.4955X_3^2$$

was found to represent relationship between reducing sugar concentration and acetic acid concentration, pretreatment time and temperature:

Equation 4 in terms of coded factors was used to make predictions about the response for given levels of each factor. By default, the high levels of the factors were coded as +1 and the low levels are coded as -1. Predicted reducing sugar concentrations are indicated in Table 4 along with the observed reducing sugar concentration. In order to access the significance of the quadratic model fit to the results, model summary statistics and analysis of variance (ANOVA) was carried out and presented in Table 5 and 6 respectively.

Table 2: Actual and predicted responses of pretreatment

<table>
<thead>
<tr>
<th>Run No.</th>
<th>$X_1$ (%)</th>
<th>$X_2$ (°C)</th>
<th>$X_3$ (hrs)</th>
<th>Actual Response Y (mg/ml)</th>
<th>Standard deviation</th>
<th>Predicted response (mg/ml)</th>
</tr>
</thead>
<tbody>
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Table 3: Model summary statistics

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<th>Adjusted R²</th>
<th>Predicted R²</th>
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<td>0.8658</td>
<td>0.5515</td>
<td>91.25</td>
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</table>

Table 4: Analysis of Variance (ANOVA) for Quadratic Model for Reducing Sugar concentration

The Model F-value of 14.62 implies the model is significant and that there is only a 0.01% chance that F-value this large could occur due to noise.

The model terms X₁, X₁X₂, X₂² were significant since their P-values were less than 0.05.

The Lack of Fit F-value of 2.14 implied that Lack of Fit was not significant relative to the pure error. There was a 21.14% chance that a "Lack of Fit F-value" this large could occur due to noise.

Table 5: Fit Statistics

<table>
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<tr>
<th>Std. Dev.</th>
<th>Mean</th>
<th>C.V. %</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2</td>
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<td>7.29</td>
<td>0.9293</td>
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<tr>
<td>Adjusted R²</td>
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<tr>
<td>Predicted R²</td>
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<tr>
<td>Adeq. Precision</td>
<td>13.6901</td>
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</table>

The coefficient of determination (R²) of the model was 0.9293 (Table 7), which indicated that the model adequately represented the real relationship between the variables under consideration. An R² value of 0.9293 means that 92.93% of the variability was explained by the model and only 7.07% was as a result of chance. The coefficient of variation (C.V) obtained was 7.29%. The Coefficient of Variation (C.V) indicated the degree of precision with which the treatments were carried out. A low value of C.V suggests a high reliability of the experiment [16]. Adequate precision value (13.6901) measures the signal to noise ratio, and a ratio greater than 4 is generally desirable [17].

The Predicted R² of 0.5515 was not as close to the Adjusted R² of 0.8658. The difference was more than 0.2. This suggested that the model may have fit random noise[18].

3.2.1 Model adequacy checking

In order to proceed with optimization of a fitted response surface, it was important that the model provided an adequate fit [18]. This involved examining the fitted model to ensure that it provided an adequate approximation of the true system. Residuals analysis was an important tool in checking model adequacy.

A normal probability plot of residuals was done to check normality assumption, as in Figure 3 the residuals plot were approximately along a straight line and therefore normality assumption was satisfied and there was no apparent problem with normality revealed [18].

A plot of Externally Studentized Residuals versus predicted response and a plot of the externally studentized residuals versus run number Figure 4 and 5 respectively did not reveal any model inadequacy. This was because all the externally studentized residuals were in the interval of -3≤ residuals≤3. According to Myers, et al [18], any observation outside this interval (outlier) was potentially unusual with respect to the observed response.

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
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<th>F-value</th>
<th>p-value</th>
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<td>16.37</td>
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<tr>
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<tr>
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</table>
3.3 Optimization analysis

Response surface plots were generated in order to optimize the variables that influence acetic acid pretreatment of corn stover. The three-dimensional (3D) plots were generated by keeping one variable constant at the centre point and varying the others within the experimental range [19].

Figure 6 shows the response surface and corresponding contour plot (Figure 7) for total reducing sugar concentration as a function of acetic acid concentration and pretreatment temperature. From the two plots, it can be inferred that as acetic acid concentration increased with pretreatment temperature, the total reducing sugar concentration increased. Reducing sugar concentration reached maximum value of 18.79mg/ml at 95% acetic acid concentration and at temperature of 200°C as shown by the trend of the surface plot.

The trend observed in Figure 6 may be attributed to the catalysing activity of the acid. Increasing the concentration of acid implied a corresponding increase in the number of hydrogen ions present in the solution hence the hydrolysis process will occur more rapidly. Consequently, the rate at which the glycosidic bonds are broken will increase resulting in a high conversion of hemicellulose fractions into fermentable sugars [20].
Figure 6: Acetic acid concentration vs. temperature response surface plot

Figure 7: Acetic acid concentration vs. temperature contour plot

Figure 8 shows the response surface and corresponding contour plot (Figure 9) for total reducing sugar concentration as a function of acetic acid concentration and pretreatment time. The effect of interaction of the two variables was that as acetic acid concentration increased with time, the total reducing sugar concentration increased reaching maximum value of 19.02mg/ml at 95% acetic acid concentration and at time of 5hrs as shown by the trend of the surface plot below.

At high acid concentration, the cellulose fraction is disrupted and glucose is produced. Since the acid acts as a catalyst, high concentration of acid may therefore increase the rate of the hydrolysis reaction rate consequently increasing the sugar concentration [20].

Figure 8: Acetic acid concentration vs. time response surface plot

Figure 9: Acetic acid concentration vs. time contour plot

The effect of interaction between temperature and time was shown in Figure 10 and 11 and it was seen that maximum reducing sugar concentration of 20.93mg/ml was obtained at a temperature of 150°C and at a time of 5 hours.

Sustaining the hydrolysis reaction (i.e., longer reaction time) at high temperatures may result in the degradation of the fermentable sugars to furfural and hydroxyl methyl furfural. This suggests that temperature plays a very important role in the hydrolysis of lignocellulosic materials [20].
yield was found to be 64.4%. According to [21], corn stover was pretreated using various pretreatment methods and then subjected to standard evaluation techniques, the yields of sugars was found to be more or less the same. It was found out that the overall yield of sugars was 70-80% of untreated corn stover. This indicated that the value of reducing sugars from this research was lower. This difference could be attributed to random errors that occur during lab experiments. In addition, the observed difference in sugar yield indicates that possibly there might be noticeable differences in terms of sugar yields from different types of corn stover. Different types of analytical equipment have also different accuracies and reliabilities. This could possibly be another factor that brought out the difference in sugars yields to those from literature.

IV. CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusions
In this work, acetic acid pretreatment of corn stover followed by dilute HCl hydrolysis was studied quantitatively over five levels using a three variable central composite rotatable design for response surface methodology. From the study, the following conclusions can be drawn:

- It was concluded that acetic acid pretreatment of corn stover was influenced by the concentration of acid, pretreatment temperature and time.
- The optimum pretreatment conditions were found to be 91.89% Ethanoic acid concentration, 150°C and 5hrs. Total reducing sugars under these conditions was 21.09mg/ml.
- Pretreatment of corn stover as carried out in this study, yielded substantial amounts reducing sugars which can be fermented to produce bioethanol.
- This study leads to extended utilization of corn stover beyond being used as animal feed (which has low nutrient content) to industrial utilization and hence reduction in utilization of food crops such as starches for bioethanol production.

4.2 Recommendations
From this research, the following recommendations can be made:

- Since lignin is a complex polymer which forms a protective layer around cellulose and hemicellulose fibres, analysis of its removal is recommended to further determine the effectiveness of pretreatment.
- Analysis of major specific reducing sugars to determine the right microorganism to use during fermentation.
- Techno-economic analysis of corn stover to be carried out to determine uses of corn stover beyond animal feeds.
- Analysis of fermentation of reducing sugars obtained from corn stover pretreatment and hence its industrial application in bioethanol production.

REFERENCES


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Post-Nesting Migration and Mitochondrial DNA Structures of Olive Ridley Turtles (*Lepidochelys olivacea*) Nested on Beaches of the Bird’s Head of Papua and the Lesser Sunda Regions, Indonesia

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Abstract- The olive ridley turtle (*Lepidochelys olivacea*) is widely distributed throughout Indonesia but is the least studied species of marine turtles in the south-east Asian region. This is the first detailed study of the population structure and migration of olive ridleys in Indonesia, which contributes significantly to the regional understanding of the species. We followed the movement of 9 post-nesting female olive ridleys using satellite telemetry from two geographically separated areas; the Papua Bird’s Head Peninsula and the Western Lesser Sunda region. Results showed that each population used different migration pathways and feeding grounds. While all Papuan olives migrated southeastward towards relatively similar foraging ground in the waters of Arafura Seas, the Lesser Sunda turtles moved to different directions. As a consequence for their migration pathways, the two populations would face different threats. During inter-nesting periods, both populations used the entire water column in the vicinity of their nesting beaches, suggested that protection of the nesting beach only would not be adequate to secure these turtles. Expansion to the nearby water is needed to give a better protection. In view of the distance to the nearest shores, the Lesser Sunda olives used a much smaller marine area for their inter-nesting movement, which could be practically and easily managed by only the local district governments. On the other hand, a large inter-nesting area used by Papuan olives suggested the need to undertake a collaborative and coordinative effort between the district, provincial and national government to improve their survival. Apart from their different movement areas which brought them to different threats/ consequences, the Papuan and Lesser Sunda olives populations, which are separated by more than 1000 kilometers and interrupted by many seas, are known to be genetically distinct, representing separate management units; each represents the logical focus for recovery actions. Accordingly, management to restore this population will require local effort to increase survivorship and reduce mortality at the nesting beach and its respective migratory pathways and feeding areas.

Index Terms- Indonesia, Bird’s Head Papua, Lesser Sunda, Post-nesting migration, mtDNA structure, olive ridley.

I. INTRODUCTION

Olive ridley (*Lepidochelys olivacea*) turtles are globally distributed throughout the tropical regions of the Atlantic, Pacific, and Indian Oceans. This species is considered the most abundant sea turtle species (Reichart 1993) and the only species to exhibit synchronous mass nesting in regions of East Pacific and the Northern Indian Ocean, known as arribadas (Pritchard et al. 1997; Shanker et al. 2004a). However, most other nesting areas have supported only small or moderate-sized nesting aggregations (up to several thousand nesting females annually) (Hendrickson and Albert, 1961; Maxwell, 2011) The East Indian and West Pacific (EIWP) region supports multiple olive ridley nesting populations but very few have been investigated for population function and trends such as the Australian populations (Limpus et al. 1997). The majority are yet to be described. The olive ridleys in the Indonesian archipelago are of particular interest because the country’s chain of islands spans between two major oceanic systems and as such is the region where turtles from both basins are expected to meet. Multiple nesting populations are scattered throughout the country but little is known about their population status and dispersal range.

As with other marine turtle species, global genetic studies of olive ridleys indicate limited female-mediated interbreeding between the major breeding aggregations resulting in strong population structure (Bowen et al. 1998; Shanker et al. 2004b). Separate genetic stocks have been identified across its distribution range in the Indian and Pacific oceans including the eastern India coast, Sri Lanka, Andaman and Nicobar Islands (India), Peninsular Malaysia, and Northern Territory and western Cape York Peninsula (Australia) (Bowen et al. 1998; Shanker et al. 2004b; Jensen et al. 2013; FitzSimmons and Limpus, 2014), but regional genetic structuring is relatively weak. Important sampling gaps remain in the east and northeast Indian Ocean, the South China Sea, Arafura Sea and Timor Sea.
The north-eastern Indian Ocean populations, with a combined estimated 1000 clutches laid annually, lie between the large mass-nesting populations on the eastern Indian coast and Mexico and Costa Rica in the Eastern Pacific, with hundreds of thousands of females nesting annually in each location (Marquez 1990). No mass-nesting is known to occur in the EIWP region. There has been only sporadic nesting in the western Pacific, although a small nesting population in the Solomon Islands have recently discovered (Limpus, pers comm). The once large olive ridley nesting populations of Myanmar, Peninsula Malaysia and Thailand have been decimated due to past egg harvests (Limpus, 1990, 1993, 1997). In the extreme, the unique genetic stock that bred in eastern Peninsula Malaysia is now presumed extinct. Occasional nesting is reported in Malaysian Sarawak, some parts of the Philippines (Turtle Conservation Society Malaysia), and in Papua New Guinea. Within Indonesia, sporadic nesting occurs at multiple sites in Sumatra, Java and Sunda Islands, West Papua and East Timor. In Australia, a few thousand olive ridley turtles nest annually, restricted to several areas across the north of the country and western Northern Territory genetic stock appears to be the largest breeding population remaining in the EIWP.

Large scale egg harvests and other anthropogenic threats such as by-catch in fisheries (Frazier et al. 2007) and exploitation (Campbell 2007). (Cornelius et al. 2007) have caused western Pacific populations to decline by as much as 90% relative to the 1970s (Fonseca et al. 2009). The olive ridley populations of the EIWP are subject to similar threats as well entanglement in marine debris and derelict fishing gear (Jensen et al., 2013), entangling turtles from Australian and Indonesian stocks in the Arafura Sea. The West Papuan sites have long been a model of ecosystem-based management for various NGOs (WWF, TNC, CI) and the site in East Java is an Indonesian Government focus area for olive ridley conservation in the region.

Here, we assess two major olive ridley nesting sites within the Indonesian archipelago; the Bird’s Head Peninsula of West Papua (West Pacific Ocean) and the in Lesser Sunda Region (East Indian Ocean) with year-round nesting and estimated density of 400 - 500 nests per year at each site (Adnyana and Hitipeuw, 2008). Using satellite tracking data and genetic analysis we describe the migratory range and of population differentiation these two geographically disjoint populations. This study provides scientific baseline to assess potential impacts of natural and anthropogenic threats to the EIWP olive ridley population and to better understand the dynamics of olive ridley populations within this region in general.

II. METHODS

Satellite telemetry
Five olive ridleys from the Bird’s Head Peninsula (Jamursba Medi and Kaironi beaches) and four from the Lesser Sunda (Alas Purwo and Southern Bali beaches) were outfitted with satellite-linked transmitters during the 2008 and 2009 nesting seasons (Table 1). Three different models of transmitters: a Telonic A-2010 (Telonics Inc. USA), Kiwisat 101 and Fastloc (Sirtrack Co., Ltd., New Zealand) were attached following the procedure described by Balazs et al. (Balazs, et al. 1996) and programmed to transmit geographic location to the Argos system on a duty cycle of 12 hrs on and 12 hrs off. The data were processed using Satellite Tracking Analysis Tool STAT (Coyne and Godley 2005) and the maps generated by Maptool were published on www.seaturtle.org. Minimum distances traveled by tracked turtles was estimated based on great circle distances between subsequent positions along track. The Argos system classifies each position into 1 of 6 location classes (LC’s) as an estimate of accuracy, where LC 3 is ±150 m, LC 2 is ±350 m, LC 1 is ±1000 m, and LC 0 is >1000 m. LC 0 and A and B, which have an unknown accuracy, were not included in our calculations for speeds and distances.

Table 1: Geographic locations (regions), flipper (inconnel) tag, and morphometrics of the post-nesting olive ridley turtles tagged with platform transmitter terminal (PTT) in the Birdhead Peninsula of Papua and the Lesser Sunda turtle rookeries during the 2008-2009 nesting seasons. CCL = the Curved Carapace Length; CCW = the Curved Carapace Width.

<table>
<thead>
<tr>
<th>Region</th>
<th>Geographic Location Latitude Longitude</th>
<th>Flipper Tag ID</th>
<th>Turtle Name</th>
<th>CCL (cm)</th>
<th>Body Weight (kg)</th>
<th>Release Date</th>
<th>Tracked (days)</th>
<th>PTT Model</th>
</tr>
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<td>Bird’s Head Papua</td>
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<td>KS101</td>
<td>Laura</td>
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</table>

Sample collection
Overall, we collected 92 skin tissue samples from olive ridley turtles during the 2008-2009 nesting season from the Lesser Sunda (Alas Purwo of East Java and southern part of Bali), and the Bird’s Head of Papua (Jamursba Medi and Kaironi beaches) (Fig 1). Flipper (inconnel) tags (National Band Tag®, USA) were applied to each sampled turtle to ensure that each turtle was only sampled once. Samples were also collected from hatchlings at a local turtle hatchery in Bali. In this case, clutches were sampled within 2 weeks time to avoid re-sampling nesting turtles, and only

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one hatchling per nest was used in the analysis. Skin samples were collected either from the distal portion of the flippers or the shoulder/neck area of adults and from dead hatchlings and stored in a NaCl saturated solution of 20% DMSO.

**Fig 1**: Sampling sites. The white circles indicate the sites in this study. Genetic samples for Jamursba Medi and Kaironi were pooled. Triangles are sites studied by Jensen et al. (2013), and crosses indicate other known nesting areas.

**Determination of mtDNA haplotypes**

Genomic DNA was isolated from 0.1 g of skin tissue using Qiamp™ DNA Mini Kit from Qiagen®, and stored at -20°C for subsequent polymerase chain reaction (PCR). Successful DNA isolation was confirmed by running 2 µL of genomic DNA on a 1% Agarose gel and visualized with Ethidium Bromide. The samples were amplified by polymerase chain reaction (PCR) using the primers LTE9 (GGGAATAATCAAAAGAGAAGG-3') and H950 (GTCTCGGATTTAGGGGTTT-3') primers (Abreu-Grobois, et al. 2006), designed to target a 780 bp segment of the mitochondrial DNA control region. We ran 25 µl PCR reactions containing 13 µl H2O, 1.5 µl PCR buffer (applied biosystem), 2.5 µl MgCl2 (25 Mm), 2 µl dNTP (1 Mm), 1 µl of each primer (10 Mm), 1.5 µl ampli Taq gold polimerase (applied biosystem) and 2.5 µl of DNA template. The PCRs were run on a 40 thermocycler with an initial denaturing step of 5 min at 94°C, followed by 40 cycles of 94°C for 45 sec, 55°C for 45 sec, 72°C C for 45 sec, and a final extension step at 72°C C for 4 min. PCR products were run on a 1% agarose gel for 30 minutes at 50 Volt to confirm amplification and subsequently sent to Macrogen Inc. (Korea) for forward and reverse sequencing.

Sequences were checked and aligned using Clustal W ((Thompson, et al. 1994)) as implemented in Geneious (version 8.0.4) and blasted against *Lepidochelys olivacea* sequences published in Genbank. New sequences were checked against the sequence reference list maintained by NOAA’s Southwest Fisheries Science Centre in California and naming was done in concordance with the consolidated nomenclature for olive ridley turtles. Population genetic parameters were estimated in DNAsp 4.10 (Rozas, et al. 2003) and Arlequin version 3.5.1.3 (Excoffier and Lischer 2011). Estimates of nucleotide (π) and haplotype (h) diversity, pairwise FST tests (10,000 replicates; Slatkin 1991), exact tests of population differentiation (100,000 replicates; Raymond & Rousset 1995) and AMOVA (10,000 replicates; Excoffier et al. 1992) were used to quantify genetic diversity. In the AMOVA, both sequence-based (ΦST) and conventional FST distance measures were used to calculate within and among population diversity.

**III. RESULTS**

**Satellite telemetry**
Transmissions from the Papuan ridleys lasted between 198 and 389 days (Table 1). All turtles stayed within the inter-nesting area for up to 29 days after attachment of the PTT tags (Fig 2a). Subsequent nesting events did occur but not necessarily at the same beach. For example, turtle Kiki nested and was tagged at Kaironi beach (20 May 2009) and subsequently nested (29 May 2009) on Numfoor Island, 160 km eastwards, and turtle Eva was tagged after nesting at Jamursba Medi beach (5 May 2008) and subsequently nested (15 May 2008) on small sandy island 40 km further to the West. The three turtles released from Jamursba Medi, remained within an area of up to 160 km to the west of their release point, while the two turtles released from Kaironi beach occupied an area of up to 210 km to the east of their release point. None of the tagged turtles used the 120 km coastal area between Jamursba Medi beach and Kaironi Beach. We recorded a total swimming distance of 2925 - 5930 km for the Papuan turtles to foraging areas at approximately 600 – 1060 km distance from the nesting beaches (Fig 2b). The migration routes were relatively similar; all turtles swam south-eastwards towards the Arafura Seas and needed between 34 – 64 days with an average swimming speed of 1.12 km / hr to reach their final destination.

The Lesser Sunda turtles were tracked for 180 – 304 days except for one individual (Lucy), for which the signal was lost after 15 days (Table 1). Immediately after nesting, the turtles returned to sea and remained within an area of up to 160 km from the southern-eastern coast of Java and Bali, with a maximum distance of 6 km off shore (Fig 3a). The water depths in this inter-nesting area varied between -0.5 to -80 m. As with the Papuan olive ridleys, the turtles that nested on Alas Purwo beach were observed to deposit subsequent clutches of eggs on different beaches. For example, turtle Arie which nested and was tagged in Alas Purwo on June 29 (2009), used a beach at 115 km distance to the west for re-nesting (on July 8, 2009), and turtle Dwi re-nested (July 10, 2009) on Perancak (Bali) at 90 km to the east of Alas Purwo. Upon completion of their nesting period, the turtles moved into three different directions; one turtle (Dwi) moving westward in the Indian Ocean, hugging the southern coast of Java, another (Koming) heading north into the Java Sea, and one (Arie) initially migrating in a south-westerly direction but eventually turning 180 degrees to move eastward towards the Arafura Sea (Fig 3b).
Genetic diversity

Screening of polymorphism within the 782 bp mtDNA control region fragment among 44 turtles from the 2 regions revealed 14 distinct haplotypes (Table 2). Of 15 polymorphic sites, 11 were transitions, one site contained both a transition and a transversion and two sites were characterised by inserts. A single cytosine insertion distinguished the Lo-16 haplotype and a thymine insertion was unique to the Lo-26 haplotype. Overall haplotype diversity was 0.87 but varied widely among the 3 populations (h = 0.32 – 0.85) (Table 2). Nucleotide diversity was substantially lower among the SE Java turtles than among those nesting on the Bird’s Head peninsula (π = 0.0004 and 0.0048 respectively; Table 2). No haplotypes were shared between the two regions and, with the exception of two haplotypes (Lo-01 and Lo-04), none were previously identified among other Olive ridley nesting populations within the wider East Indian West Pacific region (Jensen et al. 2013).

Of the 14 haplotypes we identified, 57% occurred uniquely in the Pacific Ocean, and 43% occurred uniquely in the Indian Ocean. Analyses of molecular variance among the populations indicated strong genetic structure (P < 0.001; Table 3). Overall, the proportion of variation distributed among the 3 populations (Bird’s Head Papua, Alas Purwo of East Java, and Bali) was slightly higher (38%) when molecular differences among haplotypes were included than when treating haplotypes as equidistant (30%), indicating some underlying separation of evolutionary lineages. Genetic variation within the stocks was higher than among the stocks only 10.3% of genetic variation was partitioned among regions if considering only haplotype frequencies, versus 61.4% if also considering haplotype divergence. However, this pattern was not consistent within regions. The incorporation of haplotype divergence into the AMOVA made no difference for the Indian Ocean comparisons, and it decreased the proportion of variance distributed among SE Asian MUs. Regardless of the approach, greater genetic variation within versus among MUs was indicated for the Indian Ocean and SE Asia and the opposite was indicated for the Pacific Ocean. The Barrier analysis identified a major genetic discontinuity separating all Pacific Ocean rookeries from those to the west. This phylogeographic break is also evident in AMOVA analyses; partitioning Pacific Ocean MUs from the other 11 MUs explains the greatest amount of genetic variation (68.4%) whereas only 1.54% of sequence variation was partitioned between Indian and SE Asian MUs. Exact tests for divergence of haplotype frequencies among the three rookeries (Bird’s Head Papua, Alas Purwo of East Java, and Bali) revealed that all three pairwise comparisons were significant (P < 0.05, Table 4), indicating that the three populations are genetically different.

Table 2 Frequencies of olive ridley (Lepidochelys olivacea) mtDNA haplotypes among Indonesian rookeries. Haplotype nomenclature follows the naming as maintained by the National Marine Fisheries Service, NOAA.

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<tbody>
<tr>
<td>Lesser Sunda</td>
<td>Alas Purwo (East Java)</td>
<td>12</td>
<td>0.318 (± 0.064)</td>
<td>0.0004 (± 0.0005)</td>
<td>1</td>
<td>10</td>
<td>1</td>
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<tr>
<td></td>
<td>Perancak (West Bali)</td>
<td>12</td>
<td>0.727 (± 0.133)</td>
<td>0.0016 (± 0.0012)</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>6</td>
<td>1</td>
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<tr>
<td>West Papua</td>
<td>Jamabas Medi (Bird’s Head)</td>
<td>20</td>
<td>0.853 (± 0.060)</td>
<td>0.0048 (± 0.0028)</td>
<td>2</td>
<td>7</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
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<tr>
<td>Overall</td>
<td></td>
<td>44</td>
<td>0.871 (± 0.033)</td>
<td>0.0037 (± 0.0022)</td>
<td>2</td>
<td>7</td>
<td>1</td>
<td>3</td>
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Genbank ID IN391465 IN391468 IN391471 IN391478 IN391480 IN391461 IN391463 KC207828 KC207829 KM357630

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Table 3: Partitioning of molecular variance based on haplotype divergence (\(\Phi_{ST}\)) and frequencies (\(F_{ST}\)). \(TrN\) refers to distance method used (Tamura and Nei, 1993)

<table>
<thead>
<tr>
<th></th>
<th>df</th>
<th>(\Phi_{ST}) (TrN)</th>
<th>(F_{ST})</th>
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<tbody>
<tr>
<td>Among populations</td>
<td>2</td>
<td>37.7</td>
<td>30.48</td>
</tr>
<tr>
<td>Within populations</td>
<td>41</td>
<td>62.3</td>
<td>69.52</td>
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</tbody>
</table>

Table 4: P-values of pairwise comparisons among nesting populations based on exact tests of population differentiation derived from haplotype frequencies.

<table>
<thead>
<tr>
<th></th>
<th>Alas Purwo</th>
<th>Perancak</th>
<th>Jamursba Medi</th>
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<tbody>
<tr>
<td>Alas Purwo</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perancak</td>
<td>0.00098 ± 0.0010</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Jamursba Medi</td>
<td>0.00000 ± 0.0000</td>
<td>0.00000 ± 0.0000</td>
<td>*</td>
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Discussion

Many olive ridley rookeries in Indonesia have undergone serious declines over the last few decades (Adnyana and Hitipeuw, 2008). Therefore, understanding the geographical scale of movement is a paramount issue for their conservation management. This is the first report of olive ridley migration study from the Birdhead of Papua and the Lesser Sunda region. These geographically distant rookeries, which are separated by more than 1000 kilometers and interrupted by many seas, such as the Java Sea, Sulawesi, and Maluku Sea, as expected, hosted olive ridley populations which are genetically distinct, representing two separate management units. These two \(L. \text{olivacea}\) genetic stocks that are endemic to Indonesia are genetically distinct to the other seven identified genetic stocks within the Indian Ocean and Australasian region (Fig 4). There still remain numerous potential \(L. \text{olivacea}\) genetic stocks to be resolved. Papuan nd Lesser Sunda olive populations have also different management areas which are indicated by their post-nesting migration movements and each population represents the logical focus for recovery actions. If one of these populations is depleted, restoration via natural colonization is unlikely except over the very long-term (100 or 1000’s generations) (Dethmers et al., 2006). Accordingly, management to restore this population will require local effort to increase survivorship and reduce mortality at the nesting beaches and the respective migratory pathways and feeding areas.

During inter-nesting periods, both Papuan and Lesser Sunda olive ridley turtles used the entire water column in the vicinity of their nesting beaches. This finding suggests that protection of the nesting beach only, as it is today, is inadequate to secure these turtles. Expansion of habitat protection to include the inter-nesting habitat of the adjacent waters is needed to give better protection to the nesting populations. Indonesian law stipulated that marine areas within 12 miles from the beach line are under the jurisdiction of provincial governments. Marine area beyond 12 miles from the beach line is belongs to the national Government jurisdiction. Considering a huge inter-nesting area used by both populations, a collaborative effort should be in place between the district, provincial and national government to improve the survival of the olive ridley turtle. This study has identified that \(L. \text{olivacea}\) within Indonesia does not appear to have a high fidelity to individual nesting beaches. This warrants further investigation.

As expected, after completing their nesting season, turtles from these two genetically different populations moved to separate broad foraging areas. While all Papuan olive ridleys travelled south-eastward to the Arafura Sea, the East Java olive ridleys migrated to the Indian Ocean and the Java Sea. As a consequence, both populations might face different threats during their post-nesting migratory movements. The Arafura Sea has long been known as one of the important fishing areas for demersal fisheries, especially for shrimp in Indonesia. The coastal waters situated between the Province of Maluku and Papua are known to be relatively far from local community areas supports only industrial scale fisheries to operate. Based on the President Decree number 85/1982, shrimp trawl fishing areas are permitted to operate between the 130° E to the North until the 10 m isobath, including the waters around Kei Islands, Tanimbar, Aru and West Papua. Annually, 250 - 526 trawl fishing vessels were recorded to operate in this area (Purbayanto et al., 2004), targeting the panaeids and tiger shrimps. Although the use of Turtle Excluder Device (TED) is compulsory for any trawls fishing in this area, but most, if not all of the crews use the device while fishing as it is considered reducing their prawn capture (Wiadnyana, 2005). As the selectivity of the shrimp trawl is low, capturing different non-target fish species and other animals such as sea turtles. Prasetyo (2006) reported that 116 sea turtles of various species were incidentally captured during the fishing activity of 53 prawn vessels during 2006. They were composed of 112 green sea turtles, 2 olive ridleys, and 2 unidentified species but presumably the loggerheads. Another report specified that in 2005 and 2006, a total of 133 and 26 sea turtles, respectively, were incidentally caught by trawlers fishing in this area (Zaenudin et al., 2007). While in 2005 the species of the captured turtles was not defined, in 2006 they consisted of 14 olive ridley, 8 green, and 4 loggerhead turtles.

Apart from being threatened by trawl fisheries, the Papuan olive ridleys were also threatened by the activity of the longline fishery vessels operated in West Papua (Pacific) water (Zaenudin et al., 2007). Data collected between May and December 2006 by on-board observers who following the trip of 2 vessels from Bitung (North Sulawesi) revealed that 68 sea turtles were “fished” during their first day of hauling time. Proportionally, they were mainly olive ridleys (51) followed by the green (6), hawksbills (5),
loggerheads (3), and the leatherback turtles (3). Considering the olive ridley’s carnivore nature, perhaps, domination of this species incidentally captured by tuna longline fleets operated in this region relate to the use of milkfish, squid and scads as their baits. This finding emphasized the need for promoting fishing gear modification in tuna longline industry, e.g. by using C-hook instead of J-hook as the C-hook is known to reduce the bycatch of sea turtle, notably the olive ridley turtle in Indonesian water (Zaenudin et al, 2007). Additionally, considering their post-nesting migration routes, the Papuan olives are most likely also susceptible to direct take done by traditional hunters of Kei Islanders and Dobo-based turtle hunters (operate in Aru Islands) targeting their plastron for Chinese market. In Kei Islands, there are a group of villages in which their people inherently having a specific communal right called Nufit. The Nufit is the right to capture the Tabob (sea turtles) for subsistence needs. The target species is usually the leatherback turtle (Suarez and Starbird, 1995), but other species, including olive ridley will not be spared (Manuputty and Ingratubun, 2012).

The telemetry results showed that the Lesser Sunda olive ridley turtles used both coastal and open ocean regions within Indian Ocean water. During their coastal movement, the turtle might be captured incidentally by artisanal fishers. A report published by Profauna (2005) revealed sea turtles and their products were massively traded in at least 6 locations; 2 in Central Java (Cilacap Bay and Samas Jogjakarta), 1 in East Java (Puger Banyuwangi), and 3 in West Java (Pangandaran, Pelabuhan Ratu, and Pangumbahan). One of the tracked turtle (named Dwi) was observed end up in Cilacap Bay, the turtle trade center in Central Java which is located a few hundred kilometers at the western side of the nesting beach. Nowadays, although it is prohibited by law, products of olive ridley turtles (formalin-fixed whole body) can be easily observed traded illegally in this bay. Nevertheless, a genetic work needs to be done to ensure the connection of the traded olive ridley and the Lesser Sunda nesting population.

The olive ridley populations of the EIWP are subject to wide spread entanglement in marine debris and derelict fishing gear (Jensen et al. 2013), entangling turtles from Australian and Indonesian stocks in the Arafura Sea. Olie ridley turtles are the most frequently encountered turtle species beach washed and entangled in lost and discarded nets along the western coast of Cape York Peninsula in the Gulf of Carpentaria (Fig 5).

Additionally, similar to the Papuan olive ridleys, the migration pathways of Lesser Sunda olive ridleys also overlapped with the operation of the longline tuna fishery in the Indian Ocean. The interaction between turtles and this fishery was reported, and included only olive ridleys. Observers following the trips of longline vessels in 2006 recorded the incidental catch of 12 olive ridleys by Bali-based tuna fleets and 5 by the vessels based in Pelabuhan Ratu of West Java (Zaenudin et al, 2007). That there was no other turtle species but olive ridleys incidentally captured by this particular fishery in these waters, indicates that these waters are important foraging habitat for the carnivorous olive ridley turtle. These findings indicate the necessity of promoting fishing gear modification to reduce bycatch in the tuna longline industry.

Fig 4 (Left): Nesting distribution and identified genetic stocks of olive ridley turtles, Lepidochelys olivacea, within the Indian Ocean and Western Pacific region. (Modified from FitzSimmons and Limpus, 2014). Solid dots denote quantified nesting populations; crosses denote unquantified nesting populations for the species. Breeding localities for identified genetic stocks are encircled with orange lines. Fig 5 (right): Community Ranger monitoring beach-washed large immature olive ridley turtles, Lepidochelys olivacea, entangled in ghost net on western Cape York Peninsula, north Queensland, Australia.

REFERENCES


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Myth and Media

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Abstract- As Roland Barthes has meticulously explained in his essay ‘Myth Today’, “myth”, according to him, is essentially a type of speech; it is a cohesive “system of communication” through which an effective message is conveyed. “Myth” is a “form”, or rather, a mode of signification into which “society” can be reintroduced through a discourse. This discursive property in a myth assigns it to various “historical limits” and “conditions of use”. As Barthes has reiterated over and over again, there are no “substantial” limits to a myth as the substance that the myth contains loses all its connotations and becomes an empty signifier– a “form” devoid of “meaning”. However, later in the essay Barthes clarifies: “that the form does not suppress the meaning, it only impoverishes it”—if myth is a vessel, then it becomes a form to acquire a new meaning. In this paper, an intricate analysis of modern popular myth and its application in advertising and news narratives are shown. This paper will also explore how myths evolve and transform. Myths are forgotten, unless they are recreated.

Index Terms- Advertising, Myth, Mythical Interpretations, News Narratives, Roland Barthes

I. INTRODUCTION

Saussure postulated semiology as a “vast science of signs” and any semiology asserts a significant association between “a signifier and a signified”. These two terms unite and form a third object— that is the “sign”. If the signifier is empty, then the sign is ful, because it contains a meaning. Reading or deciphering a myth, again, involves this tri-dimensional pattern with a slight alteration: “it is a second-order semiological system” where the older sign in the first system becomes a mere empty signifier in the second. This regression from the meaning to the form records a striking transformation from a “linguistic sign” to a “mythical signifier”. This mythical signifier gives rise to a new meaning which Barthes has termed “signification”. The enrichment of this new signification, hence, evolves out of the conflict between the older and the newer meaning- or, in other words, this new signification is the appropriation of the older meaning. Based on various historical, political, societal and cultural connotations, the older meaning of a myth can be appropriated into a new myth, which is again a conscious construct.

II. DOES THE CORE MESSAGE OF A MYTH REMAIN CONSTANT?

A myth belongs to a certain history. It has a sufficient rational justification at its disposal. As Barthes has aptly put: “a constant game of hide-and-seek between the meaning and the form” defines a myth. Mythical signification is never arbitrary. It is partly motivated and leads to the creation of multiple analogies that give significance to the myth. Even if the core message that a myth carries remains constant, its signification keeps changing as we keep negotiating with its intention. As a result, a modern myth can be used or extended to create a further signification. Myth, hence, is a conscious construction appropriated by contemporary culture. It may corrupt and distort the meaning, but it does not promote or hide anything. It corrupts the meaning to offer myriads of mythical interpretations unlike science, which gives us a time-bound factual data. Myth, therefore, is neither a confession, nor a lie; neither does it flaunt anything, nor does it hide anything.

III. HOW ARE MEDIA TEXTS DIFFERENT FROM FOLK NARRATIVES?

There is a striking difference between the mythical structures of folk narratives and that of the media. The mythical structure in the media texts depend solely on the industrial and institutional demands. These texts “have to be popular in heterogeneous societies amongst audiences with different and often conflicting social interests and experiences. So television narrative must be more open and multiple than the singular folk narrative with its comparatively tight closure” (Fiske, John: Television culture, Routledge, London, 1987, pp.23). Hence, based on their presentations, the significance of these media texts are analysed and shaped by our past experiences. These texts carry essential social messages that determine and manipulate reality. Once we come across a news that exhibits factual data regarding a certain incident or a visual advertisement that regularises a dominant cultural pattern of consumerism, we endeavour to extract the core social or commercial message that the particular news or the advertisement intends to manifest. These “coherent packages of information” contain “a central organizing idea or story line that provides meaning to an unfolding strip of events.” (Gamson, William A., Modigliani, Andre: The Changing Culture of Affirmative Action, Research in Political Sociology, 1987; 3: 137-177; pp. 143.)

However, these mythical narrative forms are not uncontested. They keep changing with time as the purpose and essence of a message changes. This transformation is contextual.
News archives, similarly, preserves history that can be interpreted and reinterpreted. This reinterpretation of a narrative (oral/textual/visual) gives it a mythical structure and that offers a different perspective and insight into the original story.

IV. MYTHS IN ADVERTISING: DOES IT CREATE STEREOTYPES?

Myth is a vital mode of communication through which the societal mechanisms are analysed. Diffusion of myths in contemporary world takes place through mass media as “mass communication is the discourse of society, which defines, organizes and determines life in its social or political manifestations” (Hardt, 2004: 3).

In the modern era of technological advancements, advertising has gained immense attention and popularity so far as modern mythical forms are interpreted. Khavkina L. in her monograph ‘Modern Ukrainian Advertising Myth’ asserted:

“Social and cultural present-day circumstances demonstrated the durability of the mythological communication phenomenon and sustainability of a myth as a text and a discourse in the various areas of social and historical existence related both to the ideological and mental processes and the social, historical and spiritual and intellectual manifestations of the reality. A mythological way of thinking ended up durable and unbreakable not displaced by a scientific thinking and connected to it in a situation of the formation, broadcasting and functioning of such social communication phenomenon as a new social myths indestructible due to the exceptional ability to solve unresolved (Khavkina 2010, 320).”

Advertising often constructs stereotypes in the minds of the consumers and it tends to manoeuvre them into thinking differently. In other words, advertising can create an alternate reality through which our thoughts and beliefs are manipulated. For example, several beauty products assign certain gender roles and complicate the opinions about one’s skin tone. These commercials deliberately create binaries between dark-skinned and light-skinned women and indirectly determine their roles and positions in the society. ‘Fair and Lovely’ is a celebrated beauty product that has been widely acknowledged as one of the best beauty creams in various parts of India. Unfortunately, the brand promotes a distorted idea of ‘beauty’ and its promotional advertisements establish a strange relationship between women and marriage. It subtly portrays how a woman becomes eligible for marriage only when she becomes “fair” and “lovely”. This atrocious prejudice and discrimination against women with a dark skin tone has been normalised across the country.

Contemporary advertising is an interesting area of study in which the presence of various myths can be traced and analysed. Experts are of the opinion that myth serves as “a behavior model”- “the foremost function of myth is to reveal the exemplary models for all human rites and all significant human activities” (Eliade, 1975:8). Hence, when an advertisement is mythified, it reflects the collective human consciousness that has a pervasive impact on the society at large. Myth, thus, has a universal nature and is cultivated in various eras and civilisations. For example, the popular image of a “Warrior Woman” has been reinterpreted in contemporary feminist texts and in the promotion of a popular television drama ‘Desperate Housewives’, the characters have been depicted as women warriors. Thus, we can say, myths “perpetuate ancient archetypes under new interpretations.” (María del Mar Rubio-Hernández in ‘Myths in advertising).

V. “EMOTIONAL BRANDING” IN ADVERTISEMENTS

“Emotional Branding” primarily connects the target audience with the product and thus enables the customer to associate his life experiences with the utility of the product. In several television commercials of “Cadbury Dairy Milk”, we have identified a narrative that instantly connects the audience with the popular brand of milk chocolate. Even Indian commercials such as the famous advertising jingle of an antiseptic cream “Boroline” or that of a brand of coconut oil “Shalimar” have reformulated the traditional Indian sentiments through their narratives. This emotional branding of certain products is culture-specific and encloses a collective human sentiment that has a plethora of representations. These advertisements have undoubtedly turned into myths because through them a strong message is conveyed.

VI. MYTHIFICATION OF PRODUCTS

As Barthes aptly pointed out, some objects such as cars have earned a mythical dimension as they are “consumed in image, if not in usage by a whole population which appropriates them as a purely magical object” (1979: 88). False promises offered by the television commercials to the consumers have probably been responsible for the mythification of certain products- “The promissory note of pleasure issued by plot and packaging is indefinitely prolonged: the promise, which actually comprises the core values of a society. Cultural identities are reinstated to retell the familiar social narratives from a cultural point of view” (Horkheimer & Adorno, 2002: 111). Advertising, thus, reinforces certain myths that are recreated in modern discourses.

VII. MYTHS IN NEWS NARRATIVES

News is undoubtedly a social construction as it endeavours to retell the familiar social narratives from a cultural point of view and reinstates the core values of a society. Cultural identities are constructed through news narratives under the influence of a “dominant cultural order” (Hillel Nossek and Dan Berkowitz in ‘TELLING “OUR” STORY THROUGH NEWS OF TERRORISM’).

The integrity and communication prowess of news reporting should always be taken into consideration but certain news channels often create an illusion of unbiased reporting that secretly favours only the influential people of the nation. As a result, knowingly or even unknowingly, certain news reports give rise to a few misperceptions related to the actual events that the majority solemnly internalises. As news consumers, hence, we are obligated to identify the key myths in broadcast or print media.
VIII. SELECTIVE NEWS REPORTING AND SENSATIONALISING RAPE CASES

Selective news reporting often associates itself with certain social taboos and unnecessarily creates discriminations against people from low caste or minority groups. Contemporary media has a tendency to sensationalise facts in order to cater to a larger audience. For example, the sexual crimes in India offer a grim picture of a dysfunctional society. But often some cases get subsumed beneath other highlighted stories. After the gruesome rape of Nirbhaya, a 12-year-old Dalit child was mercilessly raped in Kushinagar before her parents, a woman was gangraped in Alwar and another 12-year-old child was sexually assaulted by a vicious cleric in Meerut. Unfortunately, these media reports were not followed in detail and given much importance. Why? Because news narratives offer sensational stories to incite their target audience and some stories surprisingly gain a lot of momentum. News narratives also successfully trivialise the violence against the victim by flashing headlines like “six men gangraped an eight year old girl” or “two men raped and mutilated a woman”. Hence, the viewers are often encouraged to turn a blind eye to the sexual perpetrators. The rapists are dehumanised and no more share the spotlight with the victim. Instead, the graphic details are sensationalised to the point that those gory descriptions are scrutinised and analysed everywhere. Most of the news coverages follow this same pattern of reporting. Victims are “subvertly held complicit in their own ordeal” (‘Linguistics of Blame: Rape Reporting Remains Sensationalist’ by Sumedha Pal) as the criminals are absolved from blame and are rendered invisible throughout the narratives.

IX. HEROIC ARCHETYPES IN BRAND STORIES AND NEWS NARRATIVES

Journalists represent a society. Their constructed news stories and their discourse relate to the mechanisms of the larger discourse of the culture of which they are a part. In many media narratives, we have come across the heroic archetypes where a “hero” embodies the ideals, the principles and the values of a society. These heroes have often been worshipped and treated as celebrities. ‘Douwe Egberts’ is a Dutch company that markets a famous tea brand called ‘Pickwick’. This brand once conducted a campaign called ‘Tea Topics’ which showed a series of audiovisual stories featuring customised tea labels. In one such brand story, a frustrated young girl misses her mother’s presence in her life as her mother gets increasingly busy with her smartphone. Pertaining to this growing emotional distance, the girl takes her mother to the woods and gives her a tea bag with a label on which a question is printed: “Could you please turn off your phone for 1 day?” This simple and subtle gesture resolves all the complications that kept them apart. This archetypal role of a “Hero” is played by this young girl who successfully unites with her mother without any animosity or misunderstanding, and this brand campaign enables her to accomplish her goal.

Similarly, as the outbreak of the Coronavirus has wreaked havoc on the global order, the doctors and the frontline health workers have been held in extremely high regard. The news channels are repeatedly celebrating these health care heroes who have risked their own lives to treat the Coronavirus patients.

X. JOURNALISM IS A PERFORMATIVE DISCOURSE

As journalism is regarded as “a performative discourse”, journalists become the storytellers while reporting and investigating facts. It is very interesting to note that these news narratives emphasise “the way journalists shape their identities around meeting the needs of the public.” But, similarly, it also takes into consideration how journalists need the public “to see value in the news being produced. In maintaining this social contract between journalists and their publics, journalists need to demonstrate to an audience that their work is worth the investment” (Conboy and Eldridge 2015). Like for example, recently, various parts of Bengal and Orissa were devastated by the Super Cyclone ‘Amphan’ and the news reporters were the unsung heroes who reported live from the outdoor locations during the storm. Even, the news anchors kept highlighting the video clippings collected from the reporters over and over again. This is how a relationship is established between the journalists and the viewers when the news reporters play a significant role in addressing a plethora of social issues. On countless occasions journalists have exercised their immense performative power in revealing the “true” facts and figures so that the news consumers find their narratives convincing. That is exactly the reason why the viewers find it so shocking when some alien sources provide different information and invalidate the news narrative which the viewers have followed for a long time.

In 2013, hackers in Montana forcefully “broke into the Emergency Alert System of Great Falls affiliate KRTV and its CW station” (POLITICO) and warned the viewers of a zombie apocalypse. The engineers of ‘The Montana Television Network’ started investigating the matter and soon the truth was out. No pictures were flashed during the broadcast. There was only an anonymous male voice that addressed the viewers: “Civil authorities in your area have reported that the bodies of the dead are rising from the grave and attacking the living.” This voice repeatedly warned all the people not “to approach or apprehend these bodies as they are extremely dangerous.”

These hoax stories and fake news circulated mostly on social media, unreliable news channels and tabloids have shaken the viewers’ blind faith in media narratives.

XI. POLITICAL MANIPULATION IN NEWS NARRATIVES

Politics is an integral aspect that explains the power structure of a nation. Television has been actively used “as an instrument of political manipulation” (Viktorija Car in ‘Myths in Media Texts’). Like for example, communist countries before the beginning of the 21st century controlled access to various information gathering tools and television networks. The Communist Party filtered information to satisfy its needs. Countries like Croatia witnessed a massive transformation from a totalitarian economic system to a liberal market economy. The impact of globalism and technological revolution gave rise to multiple undiversified media. Most of the television channels and radio stations launched similar programme schemes catering to the same audience and featuring mainly “cheap talk shows and soap operas” (Viktorija Car in
‘Myths in Media Texts’). This was how news was privatised and even politics was personalised. Today news is nothing but a product sold to its target audience.

XII. POLITICAL ADVERTISING

With the advent of digital media platforms, political advertising campaigns have succeeded in influencing millions of people. Targeted advertising on social media can address a certain segment of active social media users who would probably ignore offline political campaigns. Numerous mobile applications design these advertisement models to allow targeting. The consent of these viewers are consciously manipulated as they are constantly “fed with information to vote for a particular party” (Kiran Chandra). Social media platforms particularly focus on micro-targeting and hence these online political advertisements are circulated extensively before the elections.

Donald Trump’s digital strategist Brad Parscale invested a lot on Facebook advertisements during his political campaign. He carefully chose customized audiences based on their online activities, ethnic affinity, common qualities and mutual interests. The campaign was successful in generating multiple ads and creating 100,000 landing pages.

XIII. CONCLUSION

Myths are appropriated and recreated by different cultural and social factors. Advertising and news narratives have explored various mythical possibilities to manipulate the collective opinion of the people. The basic purpose of conveying a core message is what these media stories aim to serve. “In most media texts all around the world master-myths, like Jack Lule’s seven master myths, can be found: the victim, the scapegoat, the hero, the good mother, the trickster, the Other World, the flood” (Viktorija Car in ‘Myths in Media Texts’). Since the media is extremely powerful and can majorly regulate our lives, it is very important how the media platforms build up these narratives and use the mythical structures. Myth is essentially a “cultural construction” and it is very crucial for the media to be consistent in applying myths in their texts. Controversial or confusing narratives can affect the social attitudes of a particular group of people and that is the reason why these narratives are supposed to be straightforward and somewhat believable. Media narratives, therefore, promote commercial appropriation of modern popular myths.

REFERENCES

A study on patient satisfaction at a Chest Clinic in Sri Lanka

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Abstract- Patient satisfaction is an important and commonly used indicator for measuring the quality in health care. A study was carried out at a Chest Clinic in Sri Lanka. A simple random sampling was used to select 60 patients attending to the clinic. Self-administered questionnaire was used to collect quantitative data and observation was done at the clinic and collected qualitative data. Results showed that the overall mean satisfaction which is, the Human and Non-Human aspect the value was 4.074 which is marginally satisfactory level. The mean satisfactory level for services provided by each category that is for Doctor 4.429, Nurses 4.148, and Minor staff is 4.074 respectively, whereas, Clinic services like responsiveness showed 3.893 which is below satisfactory level. This study elaborates that human resource services (Doctors, Nurses and Minor Staff) and non-human resources (clinic services) affect patient satisfaction. According to the study it could be conceptualize patient satisfaction as dependent variable affect by the independent variables which are services by doctors, nurses, minor staff and clinical services (non-health aspect). This conceptualization has to be proven by further studies on same area.

Index Terms- Patient Satisfaction, Factors affecting

I. INTRODUCTION

Patient satisfaction is an important and commonly used indicator for measuring the quality in health care. Patient satisfaction affects clinical outcomes, patient retention, and medical malpractice claims. It affects the timely, efficient, and patient-centered delivery of quality health care. Patient satisfaction is thus a proxy but a very effective indicator to measure the success of doctors and hospitals [1].

The study done by Kamra, Singh and Kumar De, looked into the factors affecting patient satisfaction and their relationships with respondent demographics for tertiary-level health-care services. The study has revealed, factors which affect patient satisfaction are convenience, affordability, fulfillment of clinical requirements, nursing and staff care, general behaviour of doctors, registration and administrative procedures, infrastructure and amenities, professional behaviour of doctors and the facilities at reception and out-patient department area. It also found that health insurance and various categories of respondent demographics, namely gender, residence, education and occupation are significantly different statistically ($P < 0.05$) with respect to the identified factors [2].

The study done by Fang J, Liu L, Fang P, found that Medical staff’s services were the most important factor affecting patient satisfaction, while demographic characteristics of patients had no significant effect on satisfaction, while Hospital facilities and environment had a lower degree of satisfaction level [3].

A cross-sectional study done in public hospitals in Shanghai, People’s Republic of China to find out patient satisfaction. A 5-point Likert scale rating was used to assess items. The study revealed that an increase in satisfaction in the areas of doctors’ and nurses’ service attitudes, and expenditure and environment which contributes to improve the overall satisfaction levels. Responsible health management departments should pay attention to patient satisfaction and improve the quality of relevant health services [4].

National Programme for Tuberculosis Control and Chest Diseases (NPTCCD) is the central organization of the Ministry of Health headed by the director and is responsible for preventing and controlling Tuberculosis (TB) and other chest diseases in the country. Its mission is to contribute to the socio-economic development of the nation by committing ourselves to create a TB free Sri Lanka by means of formulating policies, planning, coordinating and monitoring of TB and chest diseases control activities in the country [5].

The NPTCCD acts as the center for the technical guidance and the activities of the National Programme for Tuberculosis Control and Chest Diseases are decentralized and it functions through a network of district chest clinics, branch chest clinics and two chest hospitals and in close coordination with regional health services, other general health institutions and community organizations. Central chest clinic at Medical Research Institution is such institution carry out management of TB patients by mode of outdoor clinic setup [6].

II. METHODOLOGY

Objective of this study is to carry out patient satisfactory at a central chest clinic. Study setting was Central Chest Clinic (CCC) MRI Boralle, Sri Lanka. Study design was a descriptive cross-sectional study. Study Population was patients attending at Central Chest Clinic (CCC) MRI Boralle. Self-administered questionnaire was given to patients to collect quantitative data and observation was done to assess the clinic status.
III. SAMPLE SIZE

Sample calculation done according to below formula [7].

\[ N = \frac{Z^2(p)(1-p)}{d^2} \]

- \( N = \text{Sample size} \)
- \( Z = \text{a value} = 5\% = 1.96 \)
- \( P = 0.5 \)
- \( d = \text{Precision} = 15\% = 0.15 \)

\[ N = \frac{1.96^2(0.5)(0.5)}{0.15^2} = 46.68 \]

\[ N = 47 + 47 \times 10\% \text{ (Non-Respondent Rate)} = 47 + 4.7 = 51.7 = 52 \]

Total sample of 60 patients were taken. Simple random sampling was used to select patients.

Data Collection was done by the principle investigator and the data was analyzed using SPSS statistical package. Administrative clearance was taken from relevant authorities and the inform consent was taken from the patients before giving the questionnaire and autonomy was achieved.

IV. RESULTS

Sex Distribution

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>20</td>
<td>33.3</td>
<td>33.3</td>
</tr>
<tr>
<td>Female</td>
<td>40</td>
<td>66.7</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Figure 1 – Sex Distribution
### Ethnicity Distribution

**Table 2 – Distribution of Ethnicity**

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sinhala</td>
<td>54</td>
<td>90.0</td>
<td>90.0</td>
</tr>
<tr>
<td>Tamil</td>
<td>4</td>
<td>6.7</td>
<td>96.7</td>
</tr>
<tr>
<td>Muslim</td>
<td>2</td>
<td>3.3</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>60</strong></td>
<td><strong>100.0</strong></td>
<td></td>
</tr>
</tbody>
</table>

### Religion Distribution

**Table 3 – Distribution of Religion**

<table>
<thead>
<tr>
<th>Religion</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buddhist</td>
<td>46</td>
<td>76.7</td>
<td>76.7</td>
</tr>
<tr>
<td>Catholic</td>
<td>8</td>
<td>13.3</td>
<td>90.0</td>
</tr>
<tr>
<td>Christian</td>
<td>4</td>
<td>6.7</td>
<td>96.7</td>
</tr>
<tr>
<td>Islam</td>
<td>2</td>
<td>3.3</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>60</strong></td>
<td><strong>100.0</strong></td>
<td></td>
</tr>
</tbody>
</table>

### Education Level

**Table 4 – Distribution of Education Level**

<table>
<thead>
<tr>
<th>Education Level</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Schooling</td>
<td>2</td>
<td>3.3</td>
</tr>
<tr>
<td>Grade 1 - 5</td>
<td>2</td>
<td>3.3</td>
</tr>
<tr>
<td>Grade 6 - 11</td>
<td>6</td>
<td>10.0</td>
</tr>
<tr>
<td>O/L</td>
<td>18</td>
<td>30.0</td>
</tr>
<tr>
<td>A/L</td>
<td>18</td>
<td>30.0</td>
</tr>
<tr>
<td>Certificate</td>
<td>2</td>
<td>3.3</td>
</tr>
<tr>
<td>Diploma</td>
<td>6</td>
<td>10.0</td>
</tr>
<tr>
<td>Degree</td>
<td>4</td>
<td>6.7</td>
</tr>
<tr>
<td>Post Graduate</td>
<td>2</td>
<td>3.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>60</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>
Overall Satisfaction level of the services provided by the clinic and each category of staff

Table 5 – Distribution of Satisfactory level according to the services provided by Doctors, Nurses, Minor staff, Clinic Services and overall satisfactory level

<table>
<thead>
<tr>
<th>Category</th>
<th>Mean</th>
<th>Median</th>
<th>Mode</th>
<th>Std. Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctors</td>
<td>4.429</td>
<td>5</td>
<td>5</td>
<td>0.735</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Nurses</td>
<td>4.148</td>
<td>4</td>
<td>4</td>
<td>0.8105</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Minor staff</td>
<td>4.074</td>
<td>4</td>
<td>5</td>
<td>0.9877</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Clinic Service</td>
<td>3.893</td>
<td>4</td>
<td>4</td>
<td>0.9081</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Overall satisfaction</td>
<td>4.074</td>
<td>4</td>
<td>4</td>
<td>0.9081</td>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>

V. Observation

Non-health aspects which are basic amenities like toilets and safe drinking water were limited. The clinic was overcrowded and there was no appointment system. Chairs were less compared to number of patients.

VI. Discussion

The Sex distribution showed 67% females and 33% males and majority were Sinhala People (90%) who attended the clinic. Majority who attended the clinic were Buddhist (77%). The education level showed well as > 86% had education level of Ordinary Level and above. This showed majority had good literacy level.

The satisfaction level was assessed using the Likert Scale in the Questionnaire. The value for Likert Scale was given below

1. Highly Unsatisfactory
2. Unsatisfactory
3. Unsatisfactory or Satisfactory / Medium
4. Satisfactory
5. Highly Satisfactory

Human resource services (Doctors, Nurses and Minor Staff) were assessed with the Likert Scale and the mean satisfactory values were given in table 5. The mean satisfactory levels for services provided by each category as follows, and for Doctor 4.429, Nurses 4.148, and Minor staff is 4.074 respectively. All the values showed above 4 and considered as satisfactory level. General Clinic services like responsiveness showed 3.893 which is below satisfactory level. The overall service in the clinic which is, Human and Non-Human aspect the value was 4.074 which is marginally satisfactory level. These results reflect the similarity to the studies done by Kamra, Singh and Kumar De, Fang J, Liu L, Fang P, and Zhang L et al.

VII. Conclusion

The patients attending for the clinic were Sinhala Buddhist Community and had good education level with Female dominance. Overall service by the Central Chest Clinic showed satisfactory level as the value is 4.074. There was less satisfactory level for clinic services (non-health) aspect (Responsiveness). On observation of the clinic showed overcrowding and basic amenities like toilets and drinking facilities were limited. This could be reason for low satisfactory level. Accordingly, this study elaborates that human resource services (Doctors, Nurses and Minor Staff) and non-human resources (clinic services) affect patient satisfaction. According to these findings following model / conceptual frame work could be worked out and suggested.

Suggested model / conceptual framework as follows
According to this study the Dependent Variable could be defined as Patient Satisfaction, whereas independent variables could be defined as services provided by Doctors, services provided by Nurse, services provided by Minor staff and Clinic services. To validate this model further studies should be carried out.

VIII. RECOMMENDATIONS

- Similar studies should be done in details and in different setting to assess the factors affecting patient satisfaction.
- As the above model is worked out from this study, further researches should be carried out to validate this model.
- After validation, this model could be used to improve patient satisfaction by improving these areas.

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Evolution of Chest CT findings in patients with COVID-19 pneumonia: A retrospective study of the new Pandora’s box from Morocco

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Abstract-
Objectives
To describe the imaging features of hospitalized patients with confirmed COVID-19 infection.
To analyze the evolvement patterns of chest CT images.

Methods: A retrospective study of initial chest CT imaging findings of 34 confirmed patients admitted to our university hospital, between 23 March and 23 April 2020. A follow-up chest CT was performed to analyze the evolvement manifestations of initial CT imaging findings.

Results: Initial and follow-up chest CT images were collected and analyzed. M/F ratio 24/10. The mean age was 55.11±12.8 years. The predominant imaging feature was ground-glass opacification in 30(88%) patients, crazy paving pattern in 18(53%) patchy consolidation in 18(53%) patients, fibrous stripes 16(47%) patients.
The follow-up chest CT examination was performed in 11 from 34 patients (average of 5.8 days). The progression of the lesions was found in 7(64%) patients, including the increasing and the consolidation of ground-glass opacification besides the appearance of crazy paving patterns, and the fibrous stripes. 2(6%) patients presented absorbed lesions. Initial normal chest CT remains normal in one patient, and ground glass nodule appeared in the RUL in one patient.
The second follow-up CT-scan, performed in 3(38%) patients, showed also a progression of the previous lesions in 2 patients, and absorption of the RUL’s ground-glass nodule in one patient.

Conclusion: Chest CT has a key role to play in both diagnosis and follow-up of patients with COVID-19 pneumonia. The imaging features are multiple and can change quickly allowing the evaluation of the severity of this infection.

Highlights:
• Chest High-resolution CT (HRCT) plays a key role in both the diagnosis and follow-up of patients with COVID-19 pneumonia.
• The imaging features are multiple and can change quickly allowing the evaluation of the severity of this infection.

Index Terms- COVID-19; Tomography, X-Ray Computed; Thorax; Pneumonia

I. INTRODUCTION

The outbreak of the 2019 novel coronavirus (2019-nCoV) was first discovered in Wuhan, Hubei province in December 2019. (1) The WHO declared the COVID-19 as a pandemic on March 11, 2020. Since, the disease has spread rapidly across the world causing a global health emergency. (2) As of June 14, 2020, there are more than two million confirmed cases worldwide, including 8.734 cases in Morocco with a cumulative death toll of 212 case. The Coronavirus Disease 2019 (COVID-19), also known as “severe acute respiratory syndrome coronavirus 2” (SARS-CoV-2) is a different branch from the deadly severe acute respiratory syndrome virus ‘SARS-CoV’ identified in 2003 and the Middle East respiratory syndrome virus MERS-CoV found in 2012. (3, 4) The confirmation of the diagnosis of 2019-nCoV infection requires viral nucleic acid testing in throat swabs, using reverse transcriptase polymerase-chain-reaction (RT-PCR) technology which specificity is high, but sensitivity is low. (3, 4) High-resolution chest CT (HRCT), being highly sensitive (98%) compared to RT-PCR (71%) (3), has a key role to play in both the diagnosis and the evaluation of disease severity, in order to help clinicians in the rapid management of COVID-19 pneumonia.
We aim to describe the imaging features of 34 hospitalized patients with confirmed COVID-19 infection in Casablanca and to analyze their temporal imaging changes.
To the best of our knowledge, this is the first African study on temporal evolution of Chest CT findings in patients with COVID-19 pneumonia.

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II. RESEARCH ELABORATION

This study was approved by the Ethics committee of Cheikh Khalifa international university Hospital. Signed informed consent was exempted since patient information was anonymized to ensure privacy.

Population and Examination methods
A retrospective study of initial chest CT imaging findings of 34 confirmed patients admitted to our university hospital, between 23 March 2020 and 23 April 2020.

The inclusion criteria were as follows:
- A nucleic acid testing (NAT) using reverse-transcriptase polymerase-chain-reaction (RT-PCR) was positive in all patients.
- The first High-resolution CT (HRCT) (GE) of the chest was performed after admission to the university hospital of Cheikh Khalifa in Casablanca.

A common chest protocol was followed: A supine position of the patient, arms raised, and a breath-holding during acquisition, including the whole lung volume. layer thickness ranged at 2–5 mm.

All patients wore masks. The machine and the room were completely disinfected after each CT chest examination.

- The follow-up chest CT was performed in 11 patients to analyze the evolvement manifestations of initial CT imaging findings.

Qualitative image analysis
Analysis criteria were the number of affected lobes, the location of the lesions, and the main chest CT features specially ground-glass nodules (GGO), crazy paving patterns, patchy consolidation, and fibrous stripes.

Statistical analysis
Statistical analysis was performed on SPSS 17.0 (IBM Corporation). Measuring data were expressed as numbers and percentage.

III. RESULTS AND FINDINGS

Demographics
CT images of 34 confirmed patients were collected. M/F ratio: 24/10, mean age was 55.11 ± 12.8 years.

CT images analysis
Initial chest CT images were collected and analyzed. 2 (6%) patients had a normal initial chest CT’s, 29 (85%) patients had lesions localized in the peripheral lung. Only one lobe was involved in 9 (20%) patients, however all lobes were involved in 7 (26 %) patients.

Most of the analyzed lesions were seen in the right lower lobe in 27 (79%) patients, followed by left lower lobe in 26 (76%) patients, 13 (38%) patients showed equal distribution between the left upper lobe and the right middle lobe whilst the right upper lobe has the lowest involvement (12 patients 35%). The predominant imaging feature is of ground-glass opacification in 30 (88%) patients, 18 (53%) patients had a crazy paving lesion, 18 (53%) patients had a patchy consolidation, and 16 (47%) patients had fibrous stripes (Fig 2). Pleural effusions were observed in one case (Fig 1). (Table.1)

Fig 1: CT scans in a 65-year-old man with COVID-19 pneumonia showed pleural effusion (the patient died later)
Table 1: Initial chest CT images

<table>
<thead>
<tr>
<th>Number of affected lobes</th>
<th>Patients (n = 34)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 lobe</td>
<td>9 (20%)</td>
</tr>
<tr>
<td>5 lobes</td>
<td>7 (26 %)</td>
</tr>
</tbody>
</table>

Lobar involvement

<table>
<thead>
<tr>
<th>Lobe</th>
<th>Count</th>
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</thead>
<tbody>
<tr>
<td>RUL</td>
<td>12 (35%)</td>
</tr>
<tr>
<td>RML</td>
<td>13 (38%)</td>
</tr>
<tr>
<td>RLL</td>
<td>27 (79%)</td>
</tr>
<tr>
<td>LUL</td>
<td>13 (38%)</td>
</tr>
<tr>
<td>LLL</td>
<td>26 (76%)</td>
</tr>
</tbody>
</table>

CT Chest patterns

<table>
<thead>
<tr>
<th>Pattern</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>GGO</td>
<td>30 (88%)</td>
</tr>
<tr>
<td>Crazy paving pattern</td>
<td>18 (53%)</td>
</tr>
<tr>
<td>Patchy consolidation</td>
<td>18 (53%)</td>
</tr>
<tr>
<td>Fibrous stripes</td>
<td>16 (47%)</td>
</tr>
<tr>
<td>Pleural effusion</td>
<td>1</td>
</tr>
<tr>
<td>No abnormal findings</td>
<td>2</td>
</tr>
</tbody>
</table>

Distribution of the Lesions

<table>
<thead>
<tr>
<th>Distribution</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peripheral</td>
<td>29 (85%)</td>
</tr>
<tr>
<td>Both Peripheral and Perihilar</td>
<td>12 (35%)</td>
</tr>
</tbody>
</table>

RLL= right lower lobe LLL= left lower lobe  
LUL= left upper lobe RML= right middle lobe RUL= right upper lobe

The follow-up chest CT examination was performed in 11 patients from 34 patients after 5 to 8 days. The progression of the lesions was found in 7 (64%) patients, including the increasing of ground-glass opacification and the consolidation besides the appearance of crazy paving patterns, and the fibrous stripes (Fig 3, 4). 2(6%) patients presented absorbed lesions. (Fig 2) Initial normal chest CT remains normal in one patient, and ground glass nodule appeared in the RUL in one patient (Fig 5)
Fig 2: (A1,2) Series CT scans in a 65-year-old woman with COVID-19 pneumonia. (A1) Scan performed on illness days 3 showed ground-glass opacity with intralobular septal thickening (crazy-paving pattern) in the right lower lobe. (yellow arrow) (A2) Scan obtained on illness days 12 showed that the extent of the ground glass opacity increases, and the density decreases in the right lower lobe (yellow arrow) besides the appearance of the fibrous stripes in the left lower lobe. (white arrow)

(B1,2) Series CT scans in a 60-year-old woman with COVID-19 pneumonia. (B1) Scan obtained after 3 days of illness showed a consolidation in the left lower lobe (Red arrow). (B2) Scan obtained after 7 days of illness showed that the extent of the ground glass opacity increases, and the density decreases, with appearance of intralobular septal thickening (crazy-paving pattern) (Red arrow).

The second follow-up chest CT scan, was performed in 3 (38%) patients from 11 patients, showed also a progression of the previous lesions in 2 patients, (Fig 3, 4) and absorption of ground glass nodule located in the RUL in one patient. (Fig 5)
Fig 3: Series CT scans in a 65-year-old man with COVID-19 pneumonia. (A1, B1) Scan obtained on illness days 3 showed CT scan shows consolidation in the left lower lobe subpleural area (Red arrow) and in left upper lobe besides a fibrous stripe (black arrow). (A2, B2) Scan obtained on illness days 7 showed consolidation in the left lower lobe progressed to ground glass patches (B2; Red arrow) and appearance of ground glass patches in left upper lobe (A1; Red arrow). (A3, B3) Scan obtained on illness days 14 showed that the extent of the ground glass patches increased in all lobes, correlated to the clinical deterioration.

Fig 4: Series CT scans in a 62-year-old man with COVID-19 pneumonia. (A1, B1) Scan obtained on illness days 3 showed ground-glass opacity in both left upper lobe and right middle lobe (red Arrow) and consolidation in right and left lower lobes. (white Arrow) (A2, B2) Scan obtained on illness days 15 showed GGO progressed to ground glass patches and consolidation in multi-lobes (Red Boxes) (A3, B3) Scan obtained on illness days 26 showed that the density and the extent of consolidation increased, (Yellow arrow) correlated to the clinical deterioration.
IV. DISCUSSION

COVID-19 is a single-stranded RNA virus, belonging to the same virus family of SARS and MERS, with similar imaging manifestations. It spreads from human to human, through respiratory droplets and contact, with a high incidence and a rapid extent of infection, threatening the global health. (5,6,7) Chest HRCT has an important role in preclinical detection of the COVID-19 pneumonia with high sensitivity allowing a quick diagnosis. This north African study enrolled 34 confirmed SARS-CoV-2 pneumonia patients’ chest CT to analyze their imaging initial features, and to study the temporal imaging changes in 11 patients.

According to Pinggui Lei, (15) several studies proved that the chest CT is perfectly capable to detect the typical pulmonary lesions of SARS-CoV-2, especially ground glass opacities (GGO) and consolidation, at the first week after symptom onset, which was demonstrated in our study. The predominant pattern in our study was ground-glass opacity (88%), as the study of Heshui Shi (17) followed by consolidation in 53% versus 47% found in Shang Wan MD et al. (18) Our results concerning the crazy paving patterns were superior to literature as we found it in 53% versus 19.5% in Vineeta Ojha, (2) and 36.1% in Kunhua Li et al. The paving patterns can be related to the virus-induced diffuse alveolar wall injury, vascular congestion, and alveolar septal inflammation. (7)

Most of the analyzed lesions were seen in the right lower lobe similar to results found in Heshui Shi (17) and Vineeta Ojha. (2) CT features of 2019-nCoV infection presented a predominantly peripheral distribution, with 85% versus 67% found in Shang Wan et al.

In one patient, pleural effusion was observed, which is a poor prognostic indicator in patients infected with MERS-CoV according to previous studies (8) the patient died later.

The follow-up chest CT examination was performed in 11 patients from 34 patients after 5 to 8 days. It showed progression of the lesions in 64%, the extent and the density of ground-glass opacification mixed with the consolidation increased in both lungs in the sub-pleural area, which is consistent with Y.Pan and al (6). Pinggui Lei’s (15) also noted that the consolidation or GGO mixed consolidation increased with increasing the stages of COVID-19 pneumonia. This temporal changing imaging could be explained by the replacement of alveoli by exudates or products of other diseases due to the alveolar wall collapse. (7)

The pulmonary lesions were absorbed in 6%, with the appearance of the fibrous stripe correlated to clinical improvement. As reported by Y.Pan and al (6)

A third follow-up chest CT scan was performed in 3 patients (28%) showed also a progression of the previous lesions in 2 patients as they were clinically deteriorated, and absorption of ground glass nodule located in the RUL in one patient, as its clinical condition improved.

Our study showed that the evolution of Chest CT findings is very rapid; A focal GGO becomes a diffuse bilateral GGO or GGO with consolidation within 1–3 weeks, which is consistent with the literature. (15)
Follow up chest CT allows the monitoring of disease changes, by showing either the progression or improvement of the radiological features, in order to help clinicians in the rapid management of COVID-19 pneumonia.

The limitations of our study were as follows: First, the study was retrospective. Second, a small sample size was enrolled. We propose that a quantitative study of different pneumonia lesions should be considered in the future to compare initial CT features and temporal imaging changes to evaluate disease severity, and a long-term follow-up study is required in the future to evaluate lung fibrosis and the impact of COVID-19 pneumonia on patients' lung function.

V. CONCLUSION

The predominant pattern of COVID-19 Pneumonia in chest CT scans were a bilateral, subpleural, ground-glass opacities, mostly localized in the right lower lobe.

The images change rapidly following a specific pattern, within 1–3 weeks, whether it was a significant progress or absorption.

HRCT plays an important role in both the diagnosis and the evaluation of disease severity.

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We thank Pr Mohamed KHALIS PhD (International School of Public Health, Mohammed VI University of Health Sciences, Hospital, Casablanca, Morocco) for support.

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Effectiveness of Preventive and Treatment Measures For COVID-19: In Special Reference to India

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Abstract- The Covid-19 pandemic is the most crucial global health crisis since the 1918 Influenza (Spanish flu). Coronavirus disease was reported by the World Health Organisation (WHO) China country office as a form of epidemics, on 31 December 2019. Patients from Wuhan city of China’s Hubei province were suffered from lower respiratory tract infections which were treated as pneumonia. WHO declared COVID-19 a Global pandemic which is caused by SARS-CoV-2. A fresh figure of 11,830,885 confirmed cases and 544215 death records till 8th July 2020 across the worldwide signify the severity of coronavirus infection. According to Ministry of Health and Family Welfare, Government of India, a total confirmed case 264944 and death is 20642 since 8th July 2020. Unfortunately, yet no specific drugs and approved vaccines developed but tremendous efforts are on the way to develop the same. At this condition, implementation of an effective preventive and treatment measures is the only option left to against dreaded the virus. The paper aims to examine the various preventive measures and treatment be a potential intervention to mitigate the spread of disease and check whether the recovery rate of COVID-19 patient increased or not in India. Google scholar, Scopus, NCBI Pubmed databases have been searched for relevant articles and information.

Index Terms- COVID-19, SARS-CoV-2, Pandemic, Treatment, Prevention

I. INTRODUCTION

Today, Majority of World Population the entire world is envisaging a severe crisis which is being known as Coronavirus Pandemic 2019. Outbreak of Corona virus came out in late December when, a patient from Wuhan city of China's Hubei province were suffered from lower respiratory tract infections which were treated as pneumonia. Coronavirus disease was reported by the World Health Organisation (WHO) China country office as a form of epidemics, on 31st December 2019. WHO declared COVID-19 a Global pandemic which is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).

SARS-CoV-2, initially named novel coronavirus or 2019-nCoV, is a positive single-stranded RNA virus belonging to the family Coronaviridae. This family includes viruses that cause diseases ranging from the common cold to MERS and SARS [1]. As zoonotic pathogens, coronavirus is present in both humans and a variety of different animal spices (fauna and birds, rear mouse, mice, and other barbaric animals) and typically precipitate infections in respiratory, gastrointestinal, hepatic, and neurologic systems [2, 3].

Government of India are continuously on work to establish the countermeasures to stem possible devastating effects of the pandemic - health organisations working with coordinating the information flow and outstripping directives and guidelines to mitigate the impact of the threat best. At the same time, scientists throughout the world are working tirelessly to collect the information about transmission mechanisms, the clinical spectrum of disease and developing rapidly new diagnostic techniques, prevention and therapeutic strategies. It is not possible to say about the time when the pandemic will reach to its peak because both the virus-host interactions and the mechanism of evolution of the epidemic have many uncertainties. In this consequence, the therapeutic strategies to deal with the disease are only supportive, and prevention expected at reducing transmission in the community is regarded as the best weapon.
The paper aims to examine the various preventive measures and treatment be a potential intervention to mitigate the spread of disease and check whether the recovery rate of COVID-19 patient increased or not in India.

II. EPIDEMIOLOGY

Prevalence of COVID-19

The first case Covid-19 can be traced back to 17th November 2019, according to media reports on unpublished Chinese government data and for about one month after that date, there were one to five new cases reported each day. The South China Morning Post' column stated, “there are 60 confirmed cases by 20th December” [4].

On 31st December 2019, the WHO China Country Office firstly was informed of cases of pneumonia unknown aetiology detected in Wuhan City, Hubei Province of China. Between 31st December 2019 to 03rd January 2020, a total of 44 case-patients with pneumonia of unknown aetiology were reported to WHO by the National Authorities, China. During this reported period, the causative agent was not identified. On, 11-12 January 2020, WHO obtained further comprehensive information on the disease from the National Health Commission, China and concluded that the outbreak is accompanying with exposures in one seafood market in Wuhan City [5]. By 22nd January 2020, 571 confirmed cases of COVID-19 were reported in China, and 95 cases are severely ill, and 17 people had died [6]. Till the end of January 2020, the virus was spread to several countries including in India, Taiwan, USA, Sri Lanka.

Figure 1: Chart showing number of confirmed and death COVID-19 cases in the World (Source: WHO Situation Reports from 31/01/2020 to 5/07/2020) Death, and confirmed infected cases are shown, on respective lines at 5 July, 2020 in the World.
Singapore, France, Germany, UK, Italy, Spain, Thailand, Vietnam, Malaysia, Nepal, Cambodia, Japan, Republic of Korea, Australia, the United Arab Emirates, the Philippines, Canada, and Finland. The WHO, on 30\textsuperscript{th} January 2020, articulate COVID-19 a Public Health Emergency of International Concern [7]. Further, WHO risk assessment on Global level consider it very high as on 10\textsuperscript{th} March 2020, with the majority of cases n=9172 seen in Italy alone (European region), followed by Korea (Western Pacific Region) n=7513 and Iran (Eastern Mediterranean) n= 7161 [8]. As a consequence, WHO declared the COVID-19 outbreak as a Pandemic, on 11\textsuperscript{th} March 2020 [9]. On 24\textsuperscript{th} April, the total confirmed cases were 23,14,621 and deaths 1,98,668, which increased to 11,500,302 and deaths 535,759 on 7\textsuperscript{th} July 2020 (see Fig No. 1).

**India**

The first laboratory-confirmed case of 2019-nCoV, the patient, a student returning from Wuhan, reported in Kerala, India, on 30\textsuperscript{th} January 2020 [10]. As of 09\textsuperscript{th} March, a total of 44 confirmed cases have surfaced in India in which these states were included: Delhi (4), Haryana (14), Jammu (1), Kerala (9), Ladakh (2), Punjab (1), Rajasthan (2), Tamil Nadu (1), Telangana (1), Uttar Pradesh (9), and of these, 16 are foreign nationals [11]. Ministry of Health & Family Welfare (MoHFW), GoI reported a total of 23,077 COVID-19 confirmed cases, 718 deaths, 15,267 cured instances had been reported in 31 states/union territories on 24\textsuperscript{th} April 2020 which has increased to 2,64,944 confirmed cases, 20642 deaths, and 456830 cured cases as on 8\textsuperscript{th} July 2020 (see Fig. No. 2) [12].

**Figure 2: Chart showing number of confirmed and death COVID-19 cases in India**

(Source: WHO Situation Reports from 31/01/2020 to 05/07/2020) Death, Recovered and confirmed infected cases are shown, on respective lines at 05th July, 2020 in India.
In 33 states/UT, the worst hit of COVID-19 Pandemic is Maharashtra, Tamil Nadu, Delhi, Gujarat, Uttar Pradesh, West Bengal, Telangana, Rajasthan, and Andhra Pradesh. Till 7th July 2020, Maharashtra has had 217121 confirmed coronavirus cases so far, and 118558 people have been cured and 9250 deaths [13]. In Maharashtra, Dharavi City, which is Asia's largest slum centre, has the highest number of COVID-19 cases and those who die from it [14].

III. TRANSMISSION

An evaluation of COVID-19 cases suggests that the disease is spread primarily through person-to-person contact, as well as coughing, sneezing, or even exposure to talking drops by people infected with the virus. Fortunately, droplets containing the virus; typically do not float more than six feet and usually do not stay in the air for long. Virus secretion released in respiration from COVID-19 patients passes into the mucous membrane of healthy people. Transmission is also possible if a healthy person touches the surface exposed to infected droplets and then touches his/ her eye, nose, or mouth [15].

IV. COMMON SYMPTOM

The most common symptoms seen in COVID-19 patient are fever, dry cough, and tiredness. Other symptoms that are less common and may affect some patients include aches and pains, nasal congestion, headache, conjunctivitis, sore throat, diarrhea, loss of taste or smell or a rash on skin or discoloration of fingers or toes. These manifestations are usually amiable and begin step by step. Some subjects become contagious but only have very amiable disease [16]. The Chinese Center for Disease Control and Prevention published a report of 72,314 cases, has demonstrated that the severity of clinical symptoms can vary among the individuals [17].

Mostly, 81% of patients were described as mild, i.e. non-pneumonia and mild pneumonia, recover from the disease without needing hospital treatment. 14% of cases were severe, i.e. dyspnea, respiratory frequency ≥30/min, blood oxygen saturation ≤93%, arterial oxygen partial pressure to inspired oxygen fraction <300, and/or lung infiltrates >50% within 24–48 h), 5% cases were critical, i.e. respiratory failure, septic shock, and multiple organ dysfunction or failure (fig. No. 3) [18].

V. TREATMENT

![Intensity of Disease](image)

*Figure 3: Intensity of Disease: In a study, 81% of COVID-19 patients were described as mild, i.e. non-pneumonia and mild pneumonia, recover from the disease without needing hospital treatment. 14% of cases were severe, i.e. dyspnea, respiratory frequency ≥30/min, blood oxygen saturation ≤93%, arterial oxygen partial pressure to inspired oxygen fraction <300, and/or lung infiltrates >50% within 24–48 h), 5% cases were critical, i.e. respiratory failure, septic shock, and multiple organ dysfunction or failure (fig. No. 3) [18].*
There are no specific drugs, and vaccines developed for COVID-19 until now, but some antiviral drugs and other drugs have shown *in-vitro* activity against SARS-CoV-2 and are being used for treatment [19]. The treatment of COVID-19 is solely supportive of the vital organs and symptomatic to relieve the patients.

1. **Antiviral Drug Therapy**

   Antiviral treatment is used for various viral diseases such as influenza. These drugs don't kill a virus but somewhat limits the production of new ones in host cells. Since the SARS-CoV-2 is a new one, therefore scant evidence related to specific antiviral drugs available that may work against it. Guidelines issued by China's National Health Commission for prevention, diagnosis and treatment of SARS-CoV-2 have included antiviral drugs such as lopinavir/ritonavir, interferon α (IFN-α), ribavirin, chloroquine phosphate, and arbidol in the latest version [19]. Doctors and scientists are looking at both existing and experimental antivirals to find effective treatments for this new disease. Some medicines, which are being used in COVID-19, are given below:

   A. **Remdesivir** was initially developed for activity against the Ebola virus. Researchers are testing remdesivir to see how it might help patients with COVID-19, and results of some of these studies are available. The drug appears to be effective in-vitro, in protecting cells against infection by the SARS-CoV-2 (as is true of the SARS and MERS coronaviruses). Still, more investigations are underway to validate its efficacy. It was used in the first case of COVID-19 in the USA at Washington state, in January 2020. The case was critically ill but survived. Of course, activity in one instance does not establish the drug is powerful and active. Another two large randomised clinical trials are initiated in China. The two trials will enroll over 700 cases and are likely to definitively clarify the issue of whether the drug is efficient in treating COVID-19. Studies also are started in the United States, including at numerous Harvard-affiliated hospitals. It is troublesome to foretell when the drug could be recommended for use and manufactured in large quantities, assuming the clinical trials may symbolise that it is effective and trustworthy to treat infections [20].

   B. **Lopinavir/Ritonavir** Lopinavir/Ritonavir primarily used against human immunodeficiency virus (HIV). It used in combination with other drugs in adults and children over 14 days of age who are infected with HIV. Chu et al. reported that lopinavir/ritonavir shown anti-SARS-CoV activity in vitro and in clinical studies [21].

   C. **Ribavirin** is a broad-spectrum antiviral drug that belongs to the nucleoside analogue category. A comparative study conducted on 111 patients with SARS treated with ribavirin monotherapy and 41 patients with SARS treated with lopinavir/ritonavir and ribavirin; patients treated with the combined therapy had a lower risk of acute respiratory distress syndrome (ARDS) and death [21].

   D. **Chloroquine** is a well known and widely used antimalarial drug. Its broad-spectrum antiviral potential was explored in 2006. Chloroquine has SARS-CoV-2 blocking ability at low-micromolar concentration [22].

   E. **Arbidol** is used to treat influenza virus. It also effectively inhibit SARS-CoV-2 infection at a concentration of 10-30 μM *in vitro* [19].

2. **Convalescent plasma therapy**

   Convalescent plasma therapy uses a blood element called plasma, which comprises the virus-fighting antibodies. It is obtained from cases who have recovered from the infection and used in the treatment of COVID-19 patients who are severely ill. This will provide readymade immunity to COVID-19 patients.

   There is no established therapy for Covid-19 in any country of the world, including plasma therapy. Plasma therapy is being investigated with, and there is no data to recommend it as a treatment. It is only at a preliminary experimental stage. If not
practiced accurately, it can generate life-threatening complexities”, said Lav Agarwal, Joint Secretary Health Ministry, Government of India [23].

Several Covid-19 patients medical care centres in India are reported to have started banking plasma from coronavirus recovered patients after its use was said to have shown positive results. In Rajasthan, the first two cases of COVID-19 patients, who were given plasma at Sawai Singh Hospital, has shown signs of improvement [24]. There are some states Maharashtra, Uttar Pradesh, Madhya Pradesh and Rajasthan used plasma therapy trails. Delhi is the first state which started plasma bank for the COVID-19 patient's treatment and now applying on the patients of the same [25].

VI. PREVENTION

To limit the cases of COVID-19, preventive measures are the prime and current strategy in adopted India. As long as the value of R0 is more than 1, the epidemic will continue to grow (COVID-19 is 2.2); therefore, the control measures should be focused on reducing the value to less than 1. Preventive strategies in India are mainly concentrated on quarantine measures and careful isolation of patients. The thorough and appropriate infection spread control measures should be adopted during the diagnosis and clinical care of an infected COVID-19 patient. For instance, droplet, contact, and airborne infection spread precautions should be taken during specimen collection; and sputum induction should be avoided. Lockdown adopted by all countries also falls under preventives strategies. In India, Prime Minister Narendra Modi implemented nation-wide lockdown in four-phase till May: lockdown firstly implemented on 23rd March 2020, and step-wise extended up to 31st May 2020, and in lockdown-3.0 and 4.0 some relaxations have been provided to run daily needs smoothly and to curb the spread of the new virus. Government of India sanctioned INR 15,000 crores COVID-19 Emergency Response and Health System Preparedness Package; INR 7,774 crores for immediate response and rest medium-term support (1-4 years), and issued the Containment Plan for COVID-19 with specially mentions about non-pharmaceutical interventions. (See Appendix -I, Preventive Measures implemented by Government of India on time to time [26]).

The WHO, other organisations and GoI have issued the following comprehensive preventive recommendations:

- Avoid intimate connection with patients suffering from acute respiratory plagues.
- Clean your hands regularly, particularly after meeting with infected personalities or their environment.
- Malinger unprotected touch with farm or wild animals.
- Subjects with manifestations of critical airway plague should keep their distance, close coughs or sneezes with throwaway tissues or clothes and clean their hands.
- Strengthen, in particular, in emergency medicine departments, the employment of strict cleanliness standards for the prevention and control of plagues.
- People who are immunocompromised should withdraw from frequent public meetings.

The most prominent strategy for the populous to undertake is to frequently clean their hands and utilise portable hand sanitiser and avoid touch with their face and mouth after combining with a possibly contaminated environment. Healthcare workers attending for infected people should employ contact and airborne anticipations to include PPE such as N95 or FFP3 masks, eye protection, gowns, and gloves to interrupt synchromesh of the pathogen.

VII. RECOVERY

Those with a mild case of COVID-19 appear to recover within one to two weeks. For severe cases, recovery may take six weeks or more, and there may be lasting damage to the heart, kidneys, lungs and brain. About 1% of infected people worldwide will die from the disease [27]. As a result of adopting preventive and treatment measures, the recovery rate of COVID-19 patients is increased in the successive days (see fig. no. 4) [28].
VIII. CONCLUSION

COVID-19 is a new virus disease. It will not be possible to tell at which peak it will stop. No more drugs and no vaccine has been retracted yet. Implementation and compliance with strict restrictions of social alienate as a preventive measure to clamp and mitigate the spread of COVID-19 will prove to be decisive in the months to come. Up-to-date, evidence-based guidelines for acute management of COVID-19 are obligatory to guide clinicians during the at full tilt transmogrify pandemic. Infectious disease monitoring and in careful, the appropriate detection and advanced warning of disease outbreaks are a function of strength and potential of the Indian health system. The need of the hour is to win the trust of people with a thoughtful approach, and this is possible only when health expenditure is increased as a higher percentage of GDP than before. As new evidence emerges, current and potential treatment options must be frequently re-evaluated to offer the best possible care under such unprecedented circumstances.

Figure 4: Recovery rate among confirmed cases across states with the highest COVID-19 burden (Source: Ministry of Health and Family Welfare, Government of India (MoHFW, GoI))
### Appendix-I: Preventive Measures Implemented by Government of India (Source: ACAPS)

<table>
<thead>
<tr>
<th>Date of Implementation/Extension</th>
<th>Category</th>
<th>Measures</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>25/01/2020</td>
<td>Public health measures</td>
<td>Health screenings in airports &amp; border crossings</td>
<td>screening for travelers from 2019-nCoV affected countries (China) at points of entry</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Strengthening the public health system</td>
<td>Establish In country/ community surveillance through the Integrated Disease Surveillance Programme network (IDSP)</td>
</tr>
<tr>
<td>26/02/2020</td>
<td>Isolation &amp; quarantine policies</td>
<td>Isolation &amp; quarantine policies</td>
<td>Indian citizens are advised to refrain from travel to China. People travelling to China henceforth will be quarantined on return. Indian citizens are advised to refrain from non-essential travel to Singapore, Republic of Korea, Iran, &amp; Italy. People coming from Republic of Korea, Iran &amp; Italy or those having history of travel to these countries may be quarantined for 14 days on arrival to India.</td>
</tr>
<tr>
<td>Movement restrictions</td>
<td>Visa restrictions</td>
<td>Visa restrictions</td>
<td>Existing visas (including e-Visa already issued) of those traveling from China to India are no longer valid for any foreign national travelling from China.</td>
</tr>
<tr>
<td>05/03/2020</td>
<td>Social distancing</td>
<td>Limit public gatherings</td>
<td>Advisory against mass gatherings</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Health screenings in airports &amp; border crossings</td>
<td>Health screens at border crossings</td>
</tr>
<tr>
<td></td>
<td></td>
<td>General recommendations</td>
<td>Indian citizens are advised to avoid non-essential travel abroad. They are further strongly advised to refrain from travelling to China, Italy, Iran, Republic of Korea, Japan, France, Spain &amp; Germany.</td>
</tr>
<tr>
<td>10/03/2020</td>
<td>Movement restrictions</td>
<td>Additional health/documents requirements upon arrival</td>
<td>Incoming travelers having visited Italy or Korea to produce negative COVID-19 health certificate</td>
</tr>
<tr>
<td></td>
<td>Visa restrictions</td>
<td>Visa restrictions</td>
<td>All regular Visas (including e Visas) which have been granted to nationals of France, Germany &amp; Spain on or before 11.03.2020 &amp; where these foreigners have not yet entered India stands suspended. Suspension of all visas except diplomatic, official, UN, employment &amp; project until April 15th</td>
</tr>
<tr>
<td>11/03/2020</td>
<td>Border checks</td>
<td>Border checks</td>
<td>International traffic through land borders will be restricted to designated check posts with robust screening facilities.</td>
</tr>
<tr>
<td>13/03/2020</td>
<td>Public health measures</td>
<td>Health screenings in airports &amp; border crossings</td>
<td>Intensified health inspections at all these entry points. Subject to quarantine if symptomatic.</td>
</tr>
<tr>
<td></td>
<td>Isolation &amp; quarantine policies</td>
<td>Isolation &amp; quarantine policies</td>
<td>Incoming travelers (including Indians) have visited China, Italy, Iran, Republic of Korea, France, Spain &amp; Germany after 15th February, 2020 quarantine 14 days</td>
</tr>
<tr>
<td>14/03/2020</td>
<td>Governance &amp; socio-</td>
<td>Emergency administrative</td>
<td>Invoking use of emergency protocol &amp; funds</td>
</tr>
<tr>
<td>Date</td>
<td>Type</td>
<td>Description</td>
<td></td>
</tr>
<tr>
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<td>------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>15/03/2020</td>
<td>Movement restrictions</td>
<td>Economic measures: Assistance to COVID-19 victims &amp; families of deceased</td>
<td></td>
</tr>
<tr>
<td>16/03/2020</td>
<td>Lockdown</td>
<td>Border closure: closure of selected public institutions such as museums (incl. Taj Mahal) until March 31 &amp; postponement of several local elections</td>
<td></td>
</tr>
<tr>
<td>18/03/2020</td>
<td>Movement restrictions</td>
<td>Visa restrictions: ban of entry for passengers from EU countries, EFTA countries, Turkey, UK from 18 March</td>
<td></td>
</tr>
<tr>
<td>20/03/2020</td>
<td>Public health measures</td>
<td>Isolation &amp; quarantine policies: All asymptomatic individuals who have undertaken international travel in the last 14 days should stay in home quarantine for 14 days, be tested only if symptomatic, &amp; all family members living with a confirmed case should be quarantined. Testing policy: Testing all symptomatic contacts of laboratory confirmed cases, symptomatic health care workers, &amp; all hospitalized patients with Severe Acute Respiratory Illness.</td>
<td></td>
</tr>
<tr>
<td>24/03/2020</td>
<td>Lockdown</td>
<td>Schools closure: Until March 31, 2020</td>
<td></td>
</tr>
<tr>
<td>26/03/2020</td>
<td>Governance &amp; socio-economic measures</td>
<td>Economic measures: Deploy fiscal resources for additional medical facilities, central instruct state government Govt asks distilleries / sugar mills to maximize manufacture of hand sanitizers Relief Package towards responsive Governance in Challenging Times Which Will Provide Relief to Vulnerable Sections</td>
<td></td>
</tr>
<tr>
<td>30/03/2020</td>
<td>Public health measures</td>
<td>Schools closure: Until March 31, 2020</td>
<td></td>
</tr>
<tr>
<td>02/04/2020</td>
<td>Public health measures</td>
<td>Strengthening the public health system adopt community-approach in the battle against the pandemic</td>
<td></td>
</tr>
<tr>
<td>03/04/2020</td>
<td>Social distancing</td>
<td>Limit public gatherings: Advise religious leaders to not hold any congregations/ functions extended the period of completion of election including postponing the date of poll &amp; counting concerning elections to the Council of States, since the electoral process necessarily involves movement &amp; gathering of polling officials, agents of political parties, support officials &amp; members of respective Legislative Assemblies on the poll day, which may put public safety at risk &amp; create public health hazard.</td>
<td></td>
</tr>
<tr>
<td>04/04/2020</td>
<td>Lockdown</td>
<td>Partial lockdown: More lockdown relaxations for Agriculture-Farming sector</td>
<td></td>
</tr>
<tr>
<td>04/04/2020</td>
<td>Public health measures</td>
<td>Awareness campaigns: Manual on Home Made Masks to prevent COVID-19</td>
<td></td>
</tr>
<tr>
<td>09/04/2020</td>
<td>Governance &amp; socio-economic measures</td>
<td>Economic measures: CBDT issues orders u/s 119 of IT Act,1961 to mitigate hardships to taxpayers arising out of compliance of TDS/TCS provisions</td>
<td></td>
</tr>
<tr>
<td>16/04/2020</td>
<td>Public</td>
<td>Other public: MoS Agriculture, Shri Kailash Choudhary inaugurates Pusa Decontamination &amp; Sanitizing Tunnel</td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>Category</td>
<td>Measures</td>
<td>Details</td>
</tr>
<tr>
<td>------------</td>
<td>---------------------------</td>
<td>--------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>17/04/2020</td>
<td>Governance &amp; socio-economic measures</td>
<td>Military deployment</td>
<td>Armed Forces Medical Services deployed</td>
</tr>
<tr>
<td>18/04/2020</td>
<td>Economic measures</td>
<td>Amends the extant FDI policy for curbing opportunistic takeovers/acquisitions of Indian companies due to the current COVID-19 pandemic</td>
<td></td>
</tr>
<tr>
<td>19/04/2020</td>
<td>Public health measures</td>
<td>Strengthening the public health system</td>
<td>Government launches online data pool of critical human resource for combating &amp; containing Covid-19</td>
</tr>
<tr>
<td>21/04/2020</td>
<td>Movement restrictions</td>
<td>Surveillance &amp; monitoring</td>
<td>launches ‘COVID India Seva’, an interactive platform for citizen engagement on COVID-19 Post</td>
</tr>
<tr>
<td>22/04/2020</td>
<td>Public health measures</td>
<td>General recommendations</td>
<td>Advisory against spraying of disinfectant on people for COVID-19 management</td>
</tr>
<tr>
<td>24/04/2020</td>
<td>Movement restrictions</td>
<td>Surveillance &amp; monitoring</td>
<td>COVID-19 GIS Dashboard: This is a location-based information system used to geotag - people who are home quarantined (purple colour dots on map), last location of COVID-19 positive persons (Red Drop Marks), Area Cordonning (Black lines), Lane closure, etc. Once a patient is found to be COVID-19 positive, his/her last location of stay is marked on the dashboard. Similarly, all home quarantined persons are marked on the map. This information is used to generate a heat map which helps classify areas from low risk to high risk. This dashboard is also used to identify epicentres of COVID-19 cases which helps the Health Department to identify locations for immediate spraying of disinfectants.</td>
</tr>
<tr>
<td>25/04/2020</td>
<td>Lockdown</td>
<td>Partial lockdown</td>
<td>MHA allows opening of certain categories of shops. In rural areas, all shops, except those in shopping malls are allowed to open. In urban areas, all standalone shops, neighborhood shops &amp; shops in residential complexes are allowed to open. Shops in markets/market complexes &amp; shopping malls are not allowed to open. It is clarified that sale by e-commerce companies will continue to be permitted for essential goods only.</td>
</tr>
<tr>
<td>26/04/2020</td>
<td>Economic measures</td>
<td>States promotes the concept of ‘Direct marketing’ to facilitate farmers/group of farmers/FPOs/Cooperatives in selling their produce to bulk buyers/big retailers/processors etc.</td>
<td></td>
</tr>
<tr>
<td>27/04/2020</td>
<td>Governance &amp; socio-economic measures</td>
<td>Economic measures</td>
<td>Gov is focusing on easing policy &amp; implementation bottleneck to supply chains of essential items</td>
</tr>
<tr>
<td>28/04/2020</td>
<td>Isolation &amp; quarantine policies</td>
<td>Guidelines issues for home isolation of very mild / pre-symptomatic patients</td>
<td></td>
</tr>
<tr>
<td>29/04/2020</td>
<td>Public health measures</td>
<td>Strengthening the public health system</td>
<td>HCAR, a robot, to assist frontline COVID-19 healthcare warriors</td>
</tr>
<tr>
<td>30/04/2020</td>
<td>Economic measures</td>
<td>Reimbursement of OPD medicines to CS (MA) beneficiaries: Special Sanction in view of COVID-19 reg.</td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>Economic Measures</td>
<td>Public Health Measures</td>
<td></td>
</tr>
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<td>------------</td>
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<td>----------------------------------------------------------------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>01/05/2020</td>
<td>Public health measures</td>
<td>Strengthening the public health system</td>
<td></td>
</tr>
<tr>
<td>03/05/2020</td>
<td>Movement restrictions</td>
<td>Domestic travel restrictions</td>
<td></td>
</tr>
<tr>
<td>04/05/2020</td>
<td>Governance &amp; socio-economic measures</td>
<td>Economic measures</td>
<td></td>
</tr>
<tr>
<td>06/05/2020</td>
<td>Movement restrictions</td>
<td>Visa restrictions</td>
<td></td>
</tr>
<tr>
<td>08/05/2020</td>
<td>Governance &amp; socio-economic measures</td>
<td>Economic measures</td>
<td></td>
</tr>
<tr>
<td>10/05/2020</td>
<td>Public health measures</td>
<td>Strengthening the public health system</td>
<td></td>
</tr>
<tr>
<td>11/05/2020</td>
<td>Governance &amp; socio-economic measures</td>
<td>Emergency administrative structures activated or established</td>
<td></td>
</tr>
<tr>
<td>12/05/2020</td>
<td>Movement restrictions</td>
<td>Domestic travel restrictions</td>
<td></td>
</tr>
<tr>
<td>13/05/2020</td>
<td>Governance &amp; socio-economic measures</td>
<td>Economic measures</td>
<td></td>
</tr>
<tr>
<td>15/05/2020</td>
<td>Public health measures</td>
<td>Other public health measures enforced</td>
<td></td>
</tr>
<tr>
<td>17/05/2020</td>
<td>Governance &amp; socio-economic measures</td>
<td>Economic measures</td>
<td></td>
</tr>
</tbody>
</table>

Additional guidelines on rational use of Personal Protective Equipment (setting approach for Health functionaries working in non-COVID areas)

Railways only accepting passengers BROUGHT & FACILITATED by State Governments.

Extension of Lockdown for a further period of Two Weeks with effect from May 4, 2020

raise awareness for blood donation

Civil Services (Preliminary) Examination, 2020, scheduled on 31st May deferred: Taking notice of the extension of restrictions, the UPSC has decided that it will not be possible to resume examinations & interviews for the present. The Civil Services (Preliminary) Examination, 2020, scheduled to be held on May 31, 2020 therefore stands deferred.

All existing Visas granted to Foreigners, except certain categories, to remain suspended till the Prohibition on International Air Travel of passengers from/to India is lifted

The Government of India & the Asian Infrastructure Investment Bank (AIIB) signed a US$ 500 million “COVID-19 Emergency Response & Health Systems Preparedness Project” today to help India to respond to the COVID-19 pandemic & strengthen its public health preparedness

Adequate health infrastructure & health facilities set up for COVID-19 management. Adequate health infrastructure & health facilities have been identified & set up for COVID-19 management in the country.

Union Ministry of Home Affairs has issued detailed guidelines under the Disaster Management Act, 2005, on restarting manufacturing industries after the lockdown period.

Passenger services on Indian Railways shall be partially restored w.e.f. from 12th May 2020 in a graded manner

special economic package of Rs 20 lakh crore. Finance Minister announce measures for relief & credit support related to businesses, especially MSMEs to support Indian Economy’s fight against COVID-19.

short term & long-term measures for supporting the poor, including migrants, farmers, tiny businesses & street vendors

Interest subvention on Working Capital Loans for Dairy sector due to lockdown

sensor-based service delivery monitoring system in rural drinking water sector under Jal Jeevan Mission. Owing to the current situation of CoVid-19 pandemic, water has to be made available for all.

Structural reforms across Eight Sectors
<table>
<thead>
<tr>
<th>Date</th>
<th>Economic Measures</th>
<th>Surveillance &amp; monitoring</th>
<th>Public Health Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>18/05/2020</td>
<td>Movement restrictions</td>
<td>National Migrant Information System (NMIS) - a central online repository on Migrant Workers - developed by NDMA to facilitate their seamless movement across States. It has additional advantages like contact tracing, which may be useful in overall COVID-19 response work.</td>
<td>Extension of Lockdown up to May 31, 2020; States to decide various Zones &amp; Activities to be allowed in these Zones; Certain activities to remain prohibited throughout the Country</td>
</tr>
<tr>
<td>01/06/2020</td>
<td>Movement restrictions</td>
<td>Indian Railways will start operations of 200 passenger services as listed in the annexure. These trains shall run from 1/6/2020 &amp; booking of all these trains will commence from 10 am on 21/05/20</td>
<td>General recommendations New normal Instructions</td>
</tr>
<tr>
<td>21/05/2020</td>
<td>Governance &amp; socio-economic measures</td>
<td>amended the guidelines on lockdown measures to fight COVID-19, so as to facilitate domestic air travel for stranded persons in India.</td>
<td></td>
</tr>
<tr>
<td>24/05/2020</td>
<td>Economic measures</td>
<td>extension of validity of fee payment &amp; extension of time period for paying fees as mandated under rule 32 &amp; 81 of Central Motor Vehicle Rules 1989</td>
<td></td>
</tr>
<tr>
<td>25/05/2020</td>
<td>Governance &amp; socio-economic measures</td>
<td>Prices of N-95 Masks are getting reduced by the Importers/ Manufacturers/Suppliers of N-95 Masks after an Advisory issued by NPPA</td>
<td></td>
</tr>
<tr>
<td>26/05/2020</td>
<td>Emergency administrative structures activated or established</td>
<td>validity of approval or certifications of hotels &amp; other accommodation units whose project approvals/reapprovals &amp; classification/reclassification have expired/are likely to expire during the period (24.03.2020 to 29.6.2020) are deemed to be extended till 30.06.2020</td>
<td></td>
</tr>
<tr>
<td>29/05/2020</td>
<td>Movement restrictions</td>
<td>IT initiatives to fight COVID-19. SMC has developed SMC COVID-19 Tracker System which includes a web portal &amp; Mobile application named “SMC COVID-19 Tracker” to track people who have abroad or interstate travel history &amp; persons who have come in direct contact with positive COVID-19 individuals.</td>
<td>Surveillance &amp; monitoring</td>
</tr>
<tr>
<td>30/05/2020</td>
<td>Public health measures</td>
<td>Scaling up of COVID testing centres (Hub &amp; spoke model) in National research laboratories &amp; Universities</td>
<td>Strengthening the public health system</td>
</tr>
<tr>
<td>03/06/2020</td>
<td>Movement restrictions</td>
<td>Relaxation in Visa &amp; Travel restrictions to permit certain categories of Foreign Nationals to come to India</td>
<td>Visa restrictions</td>
</tr>
<tr>
<td>04/06/2020</td>
<td>Public health measures</td>
<td>Delhi to conduct contact tracing</td>
<td>Surveillance &amp; monitoring</td>
</tr>
<tr>
<td>13/06/2020</td>
<td>Public health measures</td>
<td>Delhi to ramp up testing</td>
<td>Testing policy</td>
</tr>
<tr>
<td>15/06/2020</td>
<td>Lockdown</td>
<td>Updated clinical management protocol for COVID-19</td>
<td>Strengthening the public health system</td>
</tr>
<tr>
<td>18/06/2020</td>
<td>Public health measures</td>
<td>Total lockdown from 19th to 30th June in Chennai, Thiruvallur, Kanchipuram, &amp; Chengalpattu districts</td>
<td>Strengthening the public health system</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Launch of India's first mobile lab for testing remote parts of the country</td>
<td></td>
</tr>
</tbody>
</table>
References


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Email. namitagpt047@gmail.com

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Evaluation of Ecosystem Services Mangrove Restoration Area in South Malang

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Abstract- Mangrove ecosystems are providers of ecosystem services in the surrounding environment, but have decreased in area throughout the tropics. To reduce the impact of damage, restoration is one of the mangrove conservation efforts, but the restoration program that is carried out is rarely evaluated. This study aims to evaluate the success of restoration by measuring its ecosystem services. The measurement of ecosystem services includes 4 aspects namely regulating, supporting, provisioning and cultural. There are 3 research sites namely Bajulmati and Clungup (restoration area) and Kondang Buntung (reference site). The results show shows the length of the restoration affects the quality of mangrove vegetation. The longer the restoration time the higher the mangrove density. In the 10-year Bajulmati restoration, mangrove density has the lowest value because the station is located near residential areas so human activity can affect the growth of mangroves. The service in supporting the mangrove ecosystem of South Malang is able to store carbon and absorb CO$_2$ well. The biggest carbon storage and CO$_2$ uptake is in the famous butts of natural mangroves. The ability to store carbon and absorb CO$_2$ depends on the diameter of the tree and the density of the mangrove. Regulating services for the mangrove ecosystem in Malang, South, have met the established standards, although there are some parameters that exceed sea water quality standards but can still be tolerated by mangrove vegetation. South Malang mangrove ecosystem provisioning and cultural services make use of firewood and fisheries. While cultural services are maximized in mangrove education tourism activities, so that they contribute greatly to the preservation of mangroves and can improve the economy of the surrounding community.

Index Terms : Mangrove, Ecosystem services, South Malang

I. INTRODUCTION

Mangrove forests play an important role in maintaining the balance of global ecosystems that provide a variety of important ecosystem services to humans and the biota that lives around them[1] such as food, fish habitat, and tourism [2]. Mangrove ecosystems also play a role in climate change [3]. Among them can store the biggest carbon and protect the coast from abrasion and storms [4]. However, anthropogenic factors cause a large impact on the decline in mangrove ecosystems by 30-50% globally [5]. With losses of 0.16-0.39% per year [6]. Decreasing area causes mangrove ecosystems to be degraded [7]. Thus, reducing limitations in providing ecosystem services [2], [8].

To reduce the risk of continued decline in mangrove ecosystems, restoration is an important program that must be implemented [9], [10]. Currently, many restoration programs have begun in coastal areas [11]. The government also recognizes the importance of protecting the mangrove ecosystem. Mangrove restoration activities that are replanting in degraded ecosystems [12], and are expected to restore the functioning of ecosystem services properly. Services available in the mangrove ecosystem are supply services (food and wood), regulatory services (water quality), support services (carbon storage and CO$_2$ absorption) and cultural services (aesthetics and tourism) [13].

II RESEARCH METHODOLOGY

Study area

This research was conducted in January 2020 in the mangrove restoration area of South Malang beach, namely Bajulmati and Clungup and Kondang Buntung (Reference site). Data analysis was performed in the Ecology Laboratory of the Faculty of Mipa, Universitas Brawijaya. The map can be seen in Figure 1.

Figure 1. Study area

Sample Collection

The sampling method uses the transect line method with the quadrant sampling technique [14]. Sampling was carried out at 3 research sites in the restoration area (Bajulmati and Clungup) and Kondang Buntung (reference site), each location is determined by 3 stations based on the difference in mangrove...
planting time. Each station has 3 transects, each with 2 research plots. Determination of the plot size of each study plot is 10 x 10 m for trees, 5x5 m for saplings and 1x1 m for seedlings with 50 m transect distance. Determination of stations is marked using GPS, coordinate data are analyzed and mapped using google earth. The measurement methods for regulating ecosystem services using water quality parameters include, temperature, pH, DO, salinity, conductivity, and turbidity are presented in table 1.

### III RESULT AND DISCUSSION

#### Mangrove Vegetation Structure

The condition of mangrove vegetation can be described in terms of the density of the number of trees per unit area. Mangrove density can be used as an indicator of the level of damage in a mangrove area [16]. The highest total density observed was at Clungup station.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Unit</th>
<th>Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suhu</td>
<td>°C</td>
<td>Thermometer</td>
</tr>
<tr>
<td>pH</td>
<td>-</td>
<td>pH meter</td>
</tr>
<tr>
<td>DO</td>
<td>Mg/l</td>
<td>DO meter</td>
</tr>
<tr>
<td>Salinitas</td>
<td>%</td>
<td>Refraktometer</td>
</tr>
<tr>
<td>Turbiditas</td>
<td>NTU</td>
<td>Turbidymeter</td>
</tr>
<tr>
<td>Konduktivitas</td>
<td>µS.cm⁻¹</td>
<td>Konduktivitimeter</td>
</tr>
</tbody>
</table>

Supporting services are measured by analyzing biomass, carbon storage and CO2 uptake by the allometric equation method for each type of mangrove [15]. Provisioning and Cultural services are analyzed descriptively by interviewing managers and the public on aspects of direct use and tourism activities.

**Figure 2.** mangrove Density

In total there were 9 types of mangroves found at the study site, namely *Rhizophora apiculata*, *Soneratia alba*, *Ceriop tagal*, *Ceriop decandra*, *Aegiceras corniculatum*, *Exoecaria agallocha*, *Bruguiera gymnorrhiza*, *Avicenna marina sand Rhizophora mucronata*. The type that dominates the station average is *Rhizophora sp.* This is related to the ability of the mangrove type compared to other types in adapting to environmental factors [17]. Besides suitable habitat, Rhizophora mangroves have an even distribution because these mangroves are generally viviparous, ie seeds / propagules are able to germinate while the fruit is still attached to the parent tree, so the growth success rate becomes greater [18]. Besides Rhizophora sp. has a much larger form of propagules with far more food reserves, so that mangrove species *Rhizophora sp.* have a higher chance of life and can be spread by sea currents more broadly. Presented in Figure 3:

**Figure 3.** Measurement importance Value Index of Mangrove in each station

#### Regulating ecosystem services

Measurement of regulatory services is carried out by measuring water quality, including temperature, pH, DO, traffic, conductivity and turbidity. Temperature is an important factor to see water quality [19]. Mangroves can grow well in tropical regions with temperatures above (20°C) [20]. Water temperature at the study site in South Malang ranged from 27-380 C (figure 4).

The lowest temperature (27°C) is at the Kondang Buntung location and the highest temperature value (38°C) is at the Clungup station. The highest value exceeds the sea water quality standard based on the Minister of Environment Decree No. 51/2004. But the temperature results are still in the normal range for the mangrove ecosystem and associated biota therein. Some marine plants can tolerate high sea water temperatures [21]. Water temperature also affects other water quality such as conductivity, pH, dissolved oxygen and others [22].

**Figure 3.** Measurement importance Value Index of Mangrove in each station

pH (degree of acidity) is one of the parameters in monitoring water stability [23]. The results of pH measurements at the study site showed a value of 7.2 - 8.13. The pH value of water does not have a significant difference in each area, but there is a decrease in pH at several stations. A decrease in pH indicates an increase in acidity of the water. One factor that affects the pH value is temperature.

According to [24] high temperatures cause changes in water to become acidic. The ideal pH value for sea water ranges from 7-8.5 [25]. At the research location, the pH value is still within the range of the standard quality of sea water based on the Minister of Environment Decree No. 51/2004, so that it is safe for mangrove growth and aquatic fauna. Mangroves grow and develop well in the pH range of 6.2 - 8 [26].

DO (Dissolved Oxygen) increases or decreases due to mixing, water mass movement, photosynthetic activity,
respiration and waste and fluctuations can occur seasonally. Oxygen in waters originates from photosynthesis and direct diffusion from the air. Oxygen loss is caused by biota respiration, oxidation of organic matter both in waters and in sediments [27], [28].

Oxygen is needed by all creatures that live around mangroves such as fish, shrimp, shellfish including microorganisms. DO acts as a regulator of the body's metabolism of organisms to grow and multiply. DO values at the study site ranged from 0.74 to 4.79 mg / l based on Minister of Environment Decree No. 51/2004, DO values are recommended > 5 mg / l, so DO values at the study site indicate that it does not meet sea water quality standards increasing organic waste in the waters and the high decomposition process by decomposers is likely to cause a decrease in DO in the aquatic environment [29].

Salinity is the level of salt in a water that can affect the life and growth of mangroves. Salinity at the study site ranged from 0.1 to 40 o/oo. Based on the Minister of Environment Decree No. 51 (2004), the salinity standard is 33-34 o/oo. The highest salinity is found in the restoration area of the 2014 Clungup station with a value of 40 o / oo, so that it exceeds the threshold, but some types of mangroves can adapt to extreme salinity. Macnae (1968) states that the optimum salinity level for Bruguiera gymnorrhiza is 10-40 o / oo. Exoecaria agallocha also adapts to salinity levels of up to 40 o / oo [30]. The high salinity levels in Clungup 2014 are due to the closest proximity to the sea so that it influences the tides. Meanwhile, the lowest value is found in the natural station, (Kondang Buntung) with a value of 0.1 this is due to mangroves living in estuary areas (estuaries). Eustaria is an estuary where seawater and freshwater meet so that the salinity level is reduced due to the supply of fresh water from rivers and rainwater [31].

The turbidity of the water at the study site ranged from 1.29-98.3 NTU. Turbidity values show significant differences. The lowest turbidity value is found in the famous natural mangrove area butts, which are in the estuary region and are not affected by tides. While the highest value is found in the Clungup mangrove restoration station. This difference can be caused by differences in the number of organic and inorganic particles dissolved in water. Particles can be divided into three types of particles namely soil particles, organic particles and fibrous or fibrous particles the size and type of particles that vary causes different levels of water turbidity.

Conductivity contains ions from natural substances and pollutants produced by humans [33]. Ions contained in water have an electric charge. According to [32] conductivity can come from chloride ions nitrates, phosphates, sulfates, sodium, magnesium, calcium, iron and aluminum. The ions are contained in domestic waste, garbage, and agricultural residues. The large conductivity value causes disruption of aquatic organisms. Aquatic organisms are very susceptible to the ion content of salts dissolved in water [34]. The results of conductivity measurements at the study site showed no significant difference in the restoration area, and were lower in natural mangroves.
Figure 4. Physical and chemical quality of water in the Bajulmati and Clungup, Kondang Buntung restoration areas (Reference site)

Supporting ecosystem services

Observation of Supporting services is measured using parameters of biomass, carbon storage and CO₂ absorption. Tree biomass is calculated using allometric equations by measuring the DBH (Diameter at breast height) at each mangrove tree species found at each restoration and natural location. Based on the calculation results, there is a significant difference in the amount of biomass content between stations. The natural mangrove biomass (famous stump) is higher when compared to mangrove restoration. The content of natural mangrove biomass Kondang Buntung with a total of 117,556 tons / ha, with a total carbon storage of 55,251 tons / ha and CO₂ uptake of 202.7723 tons / ha. Whereas in the 2 restoration areas, the highest amount was found in the Clungup beach, biomass contained in the 15-year restoration with an average value of 30.42565 tons / ha, carbon storage of 14.48158 tons / ha and CO₂ uptake of 53.14741 tons / ha. While the lowest value is at Bajulmati station with an average biomass of 7.92 tons / ha. Differences in biomass content occur due to differences in planting years, mangrove density, diameter of trees at each station and the quality of the environment. The greater the density of mangroves and the diameter of a tree, the greater the value of biomass. However, the diameter of the tree is more influential compared to density. [35] argues that there is a close relationship between tree diameter and biomass value. The longer the restoration year, the better the supporting services.

Provisioning and Cultural Services

One of the environmental services produced by the mangrove ecosystem is the provision of services [36]. Provisioning services in this study were taken by interviewing the surrounding community regarding the direct use of mangrove ecosystems. At Bajulmati Station, the results of interviews conducted by some of the community use the land around the mangrove to become an annual plantation, such as oil palm. In addition, the community uses mangroves as firewood.

Provisioning services also act as providers of fauna habitat. The surrounding community usually, fishing for crabs and clams that live around the mangrove. In contrast to Clungup, utilization is not done directly, this is because Clungup is an area of rehabilitation and conservation of mangroves, management is carried out in principle based on preservation.

Cultural services are defined as cultural, spiritual / religious means, educational values, aesthetics, social relations, cultural heritage values, recreation and ecotourism [37]. From the results of cultural services interviews, the results show that the mangrove Clungup ecosystem is used as an ecotourism for mangrove conservation, namely the CMC (Clungup Mangrove Conservation). Besides traveling, it also builds public awareness of the importance of nature conservation.

In the Bajulmati mangrove restoration cultural services are utilized in terms of tourism. The results of interviews that have been conducted to managers, the natural potential that is now being developed by Bajulmati community groups is the river, cave, and beach. All three of these ecotourism have emerged a long time ago but began to be explored directly and utilized are starting in 2011. Lepen Adventure along the river by utilizing the river flow along Bajulmati to the estuary using a canoe and accompanied by a guide. While planting mangrove...
IV CONCLUSION

This study shows the length of the restoration affects the quality of mangrove vegetation. The longer the restoration time the higher the mangrove density. In the 10-year Bajulmati restoration, mangrove density has the lowest value because the station is located near residential areas so human activity can affect the growth of mangroves. The service in supporting the mangrove ecosystem of South Malang is able to store carbon and absorb CO$_2$ well. The biggest carbon storage and CO$_2$ uptake is in the famous butts of natural mangroves. The ability to store carbon and absorb CO$_2$ depends on the diameter of the tree and the density of the mangrove. Regulating services for the mangrove ecosystem in Malang, South, have met the established standards, although there are some parameters that exceed sea water quality standards but can still be tolerated by mangrove vegetation. South Malang mangrove ecosystem provisioning and cultural services make use of firewood and fisheries. While cultural services are maximized in mangrove education tourism activities, so that they contribute greatly to the preservation of mangroves and can improve the economy of the surrounding community.

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Performance of Commercial Banks in Rwanda.

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Abstract- The purpose of this study was to assess the effect of regulations of central bank on performance of commercial banks in Rwanda using Rwanda commercial banks as the case study. A descriptive design was used and the target population was eleven licensed commercial banks in Rwanda. A census was conducted to obtain secondary data from commercial banks as well as review of information from central bank's annual audited reports for the period 2010 to 2015. The data obtained was processed and analyzed using STATA programming to get progressively point by point results. The study found that capital adequacy regulation affects performance of commercial banks in Rwanda positively and this influence was found to be significant. The study concluded that capital adequacy positively and significantly influences financial performance suggesting that an increase in capital adequacy regulations within a bank will result in financial improvements in the bank. The study recommended that banks should comply entirely with the stipulated regulations since this will ensure a stable banking sector which plays a major role in the economy.

Index Terms- Capital Adequacy Regulation, Financial Performance and Commercial Banks

I. INTRODUCTION

Bank regulations are defined as a form of government or state commands subjecting banking sectors to certain requirements, restrictions and guidelines as formulated by their regulators, such as the Central Bank, in order to ensure market transparency between banking industry and individuals, or between banking institutions and other corporations with which they conduct business. Mentoring has been used as a useful personal development tool globally. Mentoring has been practiced in different cultures for hundreds of years. But it is only recently that mentoring has been (re) discovered by the private sector, and now by the civil society sector, as a mechanism for leadership development (Berger & Bouwman, 2014).

Globally, in USA, Capital adequacy has played a historical role in the bank regulatory processes. However, until recently, this role was largely internalized, with the regulations being utilized (in disparate ways by the different regulators) to assist in evaluating the financial soundness of banking institutions for examination purposes. But, the external significance of capital adequacy as a more formal concern of prudential supervision was becoming apparent. The first visibility came with the efforts of the Federal Financial Institutions Examination Council to have the federal bank regulators formulate a common definition of bank capital (Alkadamani, 2015).

Capital adequacy measures and bank financial performances in Nigeria. The study tends to determine whether it could be said with consistency that getting enough capital can impact positively and significantly on the financial performance of banks in Nigeria. The method used was the augmented Dickson fuller unit root test. The Johnson co integration test was also employed which revealed the existence of the significant long run relationship between bank performance variables and capital adequacy indicators in the Nigerian banking industry. The granger causality tests also revealed that there was a unidirectional causality flowing from the ratio of shareholders’ funds to bank assets, causality also trickled from the ratio of shareholder’s fund to return on assets in the Nigerian banks. The theory used was the earning theory of capitalization, Dynamic theory of profits and wages theory of profit. The study sampled 19 commercial banks whose stocks were quoted on the floor of the Nigerian stock exchange. The study period was 2008-2012. The findings from this study indicates that capital adequacy strongly have an impact on the financial performances of Banks in Nigeria (Baltagi, 2015).

Regionally, in Uganda every financial organization shall have in place an internal capital adequacy assessment process as set out in a guideline issued by the Central Bank that is proportional to their nature, scale, complexity and business strategy. Every financial organization shall have document the internal capital adequacy assessment process which must be approved by the board of directors and updated at least once a year or more frequently as may be required to take account of changes in the business, strategy, nature, scale or complexity of activities or operational environment; and submit the internal capital adequacy assessment process to the Central Bank within four months of its financial year end. Commercial banks are one of the major money related mediators on the budgetary market, filling in as delegates between two gatherings in a monetary exchange, for example, moving assets from abundance capital gatherings (loan specialists) to less capital gatherings (borrowers). In money related market, there is an uncommon instance of assets streaming straightforwardly from the supplier to end clients without going through the monetary middle person, so incredible banks guidelines must be set up for the insurance of the two gatherings (Cornett et al, 2009).

The National Bank of Rwanda will be Rwanda's principle business bank controller and is focused on playing out its capacities liberated from intercession by people; gathering of people or legislative issues. Throughout the years, banking industry in Rwanda has become quickly because of development...
in administrations, for example, portable and organization banking, where clients can execute at whatever point they need to utilize their cell phones without lining up long lines in banking corridors. As indicated by Central bank yearly report, banking industry in Rwanda enlisted execution improvement in the money related year finished June 2018, where the advantages, advances and advances expanded. In Rwanda, Commercial banks are approved and oversees by national bank which regulates them to ensure they follow rules in their undertakings. Every business is depended upon to agree to those rules as compressed by Central Bank of Rwanda round into; requested to develop liquidity, dissolvability and real budgetary systems working (NBR,2015).

Objectives
The study aimed at assessing the effect of central bank regulations on financial performance of commercial banks in Rwanda with the following objectives;

a) To examine the effect of capital adequacy regulation on financial performance of commercial banks in Rwanda.

b) To determine the effect of liquidity Management regulation on financial performance of commercial banks in Rwanda.

c) To find out the effect of credit risk management regulation on financial performance of commercial banks in Rwanda.

II. LITERATURE REVIEW

The central bank regulations on banking sector points out as bank approaches the minimum capital requirements they tend to raise capital to avoid costs which may be incurred in case of breach of set regulatory capital. According to Calem and Rob (2015) Observed that U-formed connection exists between capital and hazard taking for banks. Thus, undercapitalized banks will in general face more challenges. Moreover, sufficiently promoted banks put resources into hazardous portfolio envisioning of higher benefits which can be utilized for proceeded with progress of their capital position (Rime, 2011).

The theories underlying the study are the Buffer Theory of Capital Adequacy which points out as bank approaches the minimum capital requirements they tend to raise capital to avoid costs which may be incurred in case of breach of set regulatory capital. According to Calem and Rob (2015) breaching the regulatory provisions will lead to penalties. Banks prefer to maintain capital in excess of prudential limits to reduce the chances of falling below legal capital requirements. The theory is significant to the investigation since it underpins holding of overabundance capital. Overabundance capital prompts decrease of costs which could bring about punishments if there should arise an occurrence of break of administrative necessity and furthermore bolster activities final product being improved budgetary execution.

Liquidity inclination Theory alludes basically to a craving to have money in your pockets. Liquidity is any type of advantage that can undoubtedly be changed over into money, and cash is viewed as the most fluid resource. Banks, especially business ones, handle for the most part fluid resources that financial specialists can request whenever. Loan fee is a pay for neglecting to hold fluid resources for a predetermined period which is dictated by request and cash supply. As indicated by Keynes, interest for cash is sorted for three reasons; initial, an exchange thought process which is a longing to have money for fundamental exchanges, for example, transportation, wages or installment of crude materials. This theory is applicable to the study in that it emphasizes need for holding optimally levels of money for the precautionary motives.

Bridges, Gregory, and Spalullo (2014) conducted a study on capital adequacy on bank lending, a Bank of England case study. They found that any adjustment in capital sufficiency brings about a change in both capital and loaning that is, an expansion in capital necessity prompts an expansion in the capital proportions of banks and an abatement in credit development. The assessment moreover found that, after change in capital essential development advancement for the most part returns to run of the mill inside 3 years. He contemplated that, banks response to change in capital adequacy shifts depending business cycle, bank size and heading of the modification in capital essential. The above dispute was supported by various makers, for instance, (Francis et al, 2009) who inquired about on bank rule, capital and credit supply: assessing the impact of prudential standards in United Kingdom. They suggested that, the higher the capital essential the lower the bank's optimal credit improvement and the a different way, sway depends upon the level of wealth capitalization.

Nzioki (2011), investigated on impact of capital adequacy on cash related execution of business banks referred to in NSE. He found that, capital plentifulness impacts execution Kenyan bank distinctly. In his choice he suggested that, the more conspicuous the bank capital adequacy the lower the probability of cash related difficulty and liquidity creation. (Aymen, 2013) who found that, in Tunisia capital expect a critical activity in ensuring smooth money related action similarly as affirmation of adventure right now high profit. In 1990s, United States experienced credit crunch which was trailed by number of studies choose the explanation.

Gudmundsson, Kisinguh and Odongo (2013) directed a review to set up the job of capital necessities on rivalry and strength of banks and their discoveries built up positive connections between execution, capital guidelines, and money related dependability. Goretti (2012) explored money related guidelines’ impacts on budgetary execution at DTMs in Rwanda and her decision was that guidelines on DTMs have prompted improvement in their financial performance. Various studies show that the true effect of central bank regulations on the performance of commercial banks is lacking in detail, and that is the reason for this study.

The overabundance capital prompts increment in tasks and this wind up improving the money related execution. The hypothesis is significant to the investigation since it underpins holding of overabundance capital. Overabundance capital prompts decrease of costs which could bring about punishments if there should arise an occurrence of break of administrative necessity and furthermore bolster activities final product being improved budgetary execution.

III. METHODOLOGY
The researcher used a descriptive design contacted on the eleven licensed commercial banks in Rwanda that included I&M Bank Rwanda Ltd (Former Banque Commerciale du Rwanda),
Bank of Kigali Ltd, Guaranty Trust Bank Rwanda Ltd (Former, Fina Bank Rwanda, ex BACAR, Access Bank Rwanda Ltd (Former BANCOR), ECOBANK Rwanda Ltd (ex, BCDI), COGEBANQUE Ltd, BanquePopulaire du Rwanda Ltd, Kenya Commercial Bank Rwanda Ltd (KCBR), Equity Bank Rwanda Ltd, Bank of Africa Rwanda Ltd (Former Agaseke Bank) and Crane bank Rwanda LTD using census. a documentary review of the National Bank of Rwanda audited reports for 2010 to 2015 was also done. The data obtained was processed and analyzed using STATA programming to get progressively point by point results.

IV. RESULTS AND FINDINGS

4.3.1 Core Capital to RWA

The graph above shows the ratio of core capital to RWA and it was above the statutory minimum of 10 per cent including the 2.5 per cent resource protection buffer. Yet between 2012 and 2015, this ratio declined. Capital ratio measures a bank's core equity capital against its total risk-weighted assets which include all the assets the bank holds that are systematically weighted for credit risk. Core capital is a key determinant in a bank’s profitability, it enables financial institutions to engage in more lending because lending is related to the bank’s profitability. It declined in the above period due to decline in the economic activities leading to decline in commercial activities.

4.3.2 Core Capital to Total Deposit Liabilities

The figure above shows the ratio of core capital to total deposit liabilities and it was above the 8 per cent statutory. Aside from a decline in 2011, it had increased but then a slight decline occurred in 2015. the higher the core capital in commercial banks the lower the liabilities simply because commercial banks will be having more capital that will enable them to have less liabilities. There was an increase in the core capital in the table above meaning an improvement in the operations of commercial banks.

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>Number of obs</th>
<th>F(1,64)</th>
<th>Prob&gt;F</th>
<th>R-squared</th>
<th>Adj R-squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>9598993</td>
<td>1</td>
<td>9598993</td>
<td>66</td>
<td>211.55</td>
<td>0.0000</td>
<td>0.9032</td>
<td>0.899</td>
</tr>
<tr>
<td>Residual</td>
<td>1028471</td>
<td>64</td>
<td>16069.86</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
From the ANOVA statistics, the study established the regression model had a significance level of 0.000 which is an indication that there was a significant relationship between the variables. The calculated F value was greater than the F critical value (211.55> 3.991) an indication that there was a significant relationship between capital adequacy ratio and financial performance of commercial banks in Rwanda. The p value which was less than 0.05 indicated that the relationship between the independent variable (capital adequacy ratio) and commercial banks in Rwanda was significant. From the findings, the value of adjusted R squared was 0.899, an indication that there was variation of 89.9% on financial performance of commercial banks in Rwanda due to changes in capital adequacy at 95% confidence interval. This shows that 89.9% of the changes on financial performance of commercial banks in Rwanda could be accounted for by changes in capital adequacy. This shows that the remaining 10.1% of the change in financial performance of commercial banks in Rwanda was accounted for by other factors other than capital adequacy.

V. CONCLUSION AND RECOMMENDATIONS

In a study carried out by Calem and Rob (2015) to assess the connection between capital and hazard taking for banks and found out that that U-formed connection exists between capital and hazard taking for banks meaning that undercapitalized banks will in general face more challenges. Calem and Rob (2015)on the study of prudential limits concluded that Banks prefer to maintain capital in excess of prudential limits to reduce the chances of falling below legal capital requirements while the study by Bridges, Gregory, and Spaltro (2014) conducted a study on capital adequacy on bank lending a case study of Bank of England concluded that that any adjustment in capital sufficiency brings about a change in both capital and loaning that is, an expansion in capital necessity prompts an expansion in the capital proportions of banks while this research concluded that capital adequacy positively and significantly influences financial performance suggesting that an increase in capital adequacy regulations within a bank will result in financial improvements in the bank.

The study concluded that capital adequacy positively and significantly influences financial performance suggesting that an increase in capital adequacy regulations within a bank will result in financial improvements in the bank. The researcher recommended that Banks should to comply entirely with the stipulated regulations and must be supervised by the Central Bank. This will ensure a stable banking sector which plays a major role in the economy. If this sector is stable the economy will grow and the country will prevent financial crisis. Implementing strict regulations will also allow the regulator to identify failing banks and provide remedial action before they fail, and depositors lose their money.

<table>
<thead>
<tr>
<th>Total</th>
<th>10627464</th>
<th>65</th>
<th>9615063</th>
</tr>
</thead>
</table>

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for the degree of Masters of Business Administration- School of Business, University of Nairobi.


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Physio-Chemical Characteristics of Borewell Water Samples of Purnea Town

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Abstract- The quality and quantity of drinking water have received considerable attention recently. Moreover in India, almost 70% of surface and underground water reservoirs have been contaminated by biological, inorganic and organic pollutants. Hence, the present study was conducted to characterize the physicochemical parameters (nature) of ground water in municipal areas of Purnea district town by taking water samples from five selected points (station). The assessed parameters in potable water as prescribed by different agencies (viz. – BIS, ISI, WHO & etc.). The Study reveals that the domestic sewage discharge and improper location of bore wells with respect to the septic tank and sewer pipes will increase the potential threat to the potable water quality.

Index Terms- Potable water, bore well water, sewage discharge, improper location.

I. INTRODUCTION

Water pollution is a serious cum alarming problem as in India almost 70% of surface and ground water reservoirs have been contaminated by biological, inorganic and organic pollutants. However, the ability and quality of drinking water of fresh water has become a scare commodity due to over exploitation.

Much of the health problems in developing countries are largely due to lack of safe drinking water. According to WHO , about 600 cases of diarrhea and 46,00,000 child deaths are reported annually due to contaminated water and improper sanitation. Ground water is particularly safe drinking rural & suburban areas, where population is widely dispersed which completely lacking of infrastructure for treatment of surface water and contaminated water.

The present investigation has been taken to characterize physicochemical parameters of Bore well of five specified points (stations) of municipality area of Purnea town, which once called as “Kalapani”.

The quality of ground water has been compared with the standard desirable limit & quality parameters as prescribed by different agencies is shown in Table -1.

II. EXPERIMENTAL

STUDY AREA

The physiochemical characteristics of ground water of five selected points (station) in Purnea Town viz. Madhubani, Rambagh, Gulabbagh, Line Bazar, Khat and nearby areas of Court Station, Purnea, were studied. Bore well water from these stations was collected in the months of October 2007 to February 2008. The depth of the bore wells ranges from 16 feet to 22 feet in all stations or areas. The sampling stations with their corresponding habitats and bore well sampling depths are summarized in Table- 2.

The samples were collected in a clean 2 liter polythene bottles. The bottles were tightly sealed after sampling and labeled at stations. The colour and temperature of the sample were refrigerated at temperature 4°C – 5°C as per standard procedures.

III. ANALYSIS OF WATER SAMPLES

Analysis of water sample was carried out for various physiochemical parameters viz. Temperature, pH, Total Hardness (TH), Alkalinity, COD, Electrical Conductivity(EC), Calcium and Chloride as per standard procedure.

The electrical conductivity and pH was measured with digital conductivity meter and pH meter respectively. Total hardness (TH) and calcium content by EDTA titrimetric method, alkalinity and COD by open reflux method.

IV. RESULTS AND DISCUSSION

Experimental results of various physicochemical parameters of the underground water samples are summarized in Table -3.

TEMPERATURE

The temperature was found to be in the range between 21°C to 23°C during study. High temperature can enhance the activies of micro organism hence it can increase the can increase the pollution level.

pH

The pH of ground water in the study area is varying between 6.8 to 7.8. It is observed that most of the ground water is alkaline in nature and it is influenced by geology of catchment area.

ELECTRICAL CONDUCTIVITY(EC)

The electrical conductivity of the bore well samples varies from 0.10 to 0.12 ms at 25°C.
**TOTAL HARDNESS (TH)**

The observed TH values were within the limits and fluctuating trends in it’s value were observed in all the five stations. The specified limit for TH as per WHO is 200mg/L.

**CHEMICAL OXYGEN DEMAND (COD)**

The permissible limit of chemical oxygen demand for drinking water or potable water is 225mg/L (ISI 1983) and the observed values are 111 to 195 mg/L of all selected habitat areas are within the desirable limit.

**CHLORIDE**

Chlorides were found to be 70 mg/L to 112mg/L and the highest value (112 mg/L) in the Line Bazar (K.hat) water sample. Higher concentration of chlorides in the ground water may be accounted to seepage of septic tanks and somewhere adjacent position of bore well with respect to septic tanks.

**CALCIUM**

Calcium concentrations were found vary from 70 to 115mg/L. The Ca hardness observed in four stations are above the desirable limits as specified by ISI i.e. 75mg/L.

**ALKALINITY**

It is a quantitative capacity to neutralize a strong acid to a designated pH. The alkalinity determined as phenolphthalein alkalinity and total alkalinity or as methyl orange alkalinity. The reaction which take place can be summed as

(i)\(\text{OH}^{-} + \text{H}^{+} \rightarrow \text{H}_{2}\text{O}\) end point with methyl orange

(ii)\(\text{CO}_3^{2-} + \text{H}^{+} \rightarrow \text{HCO}_3^{-}\) (phenolphthalein alkalinity)

(iii)\(\text{HCO}_3^{-} + \text{H}^{+} \rightarrow \text{H}_2\text{CO}_3\) (methyl orange alkalinity or total alkalinity)

The alkalinity of catchment areas varies in between 90 to 102 mg/L.

**V. CONCLUSION**

Pollution of surface and ground water resources occurs through point and non-point diffusion and degradation of water quality creates water scarcity for human use.

The physiochemical properties of potable water at all sampling stations were analyzed. The results indicate that water quality of bore wells are polluted (having existing concentration of iron) is not best for domestic use. Water quality of some sites is poor and somewhat more contaminated. There are many physiological effects show on the human health such as indigestion, rheumatism, urinary infection and etc.

Moreover, improper location of bore wells with respect to septic tanks and sewer pipes will increase the potential for the leaching of waste water / effluents to the ground water table.

**VI. SUGGESTION**

Awareness among the residents about the adverse effects of sewage contamination rendering the resources not fit use should be brought.

**TABLE-1**

<table>
<thead>
<tr>
<th>PARAMETERS</th>
<th>BIS</th>
<th>ISI</th>
<th>ICMR</th>
<th>WHO</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>HDL</td>
<td>MPL</td>
<td>HDL</td>
<td>MPL</td>
</tr>
<tr>
<td>pH</td>
<td>7.0-8.3</td>
<td>8.5-9.0</td>
<td>6.5-8.5</td>
<td></td>
</tr>
<tr>
<td>TDS mg/L</td>
<td>500</td>
<td>2000</td>
<td>500</td>
<td>2000</td>
</tr>
<tr>
<td>TH mg/L</td>
<td>200</td>
<td>600</td>
<td>300</td>
<td>600</td>
</tr>
<tr>
<td>Alkalinity mg/L</td>
<td>300</td>
<td>600</td>
<td>200</td>
<td>600</td>
</tr>
<tr>
<td>COD mg/L</td>
<td>150</td>
<td>255</td>
<td>150</td>
<td>245</td>
</tr>
<tr>
<td>Ca mg/L</td>
<td></td>
<td>75</td>
<td></td>
<td>75</td>
</tr>
<tr>
<td>Chloride mg/L</td>
<td></td>
<td>250</td>
<td></td>
<td>250</td>
</tr>
</tbody>
</table>

HDL- Highest Desirable Level,  
MPL-Minimum Permissible Level.
TABLE-2
SAMPLING LOCALITIES WITH THEIR CORRESPONDING HABITATS AND BORE WELL DEPTH.

<table>
<thead>
<tr>
<th>S.NO.</th>
<th>SAMPLING LOCALITY(STATION)</th>
<th>HABITAT</th>
<th>BOREWELL DEPTH(in feet)</th>
<th>SOURCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Madhubani</td>
<td>Residential Area</td>
<td>20-22</td>
<td>Bore Well</td>
</tr>
<tr>
<td>2</td>
<td>Line Bazar, K. hat</td>
<td>Residential Area</td>
<td>19-21</td>
<td>Bore Well</td>
</tr>
<tr>
<td>3</td>
<td>Court station, Purnea</td>
<td>Residential Area</td>
<td>18-20</td>
<td>Bore Well</td>
</tr>
<tr>
<td>4</td>
<td>Rambagh</td>
<td>Residential Area</td>
<td>20-22</td>
<td>Bore Well</td>
</tr>
<tr>
<td>5</td>
<td>Gulabbagh</td>
<td>Residential Area cum Marketing Yard</td>
<td>18-21</td>
<td>Bore Well</td>
</tr>
</tbody>
</table>

TABLE-3
Physio-chemical analysis of bore well/hand pumps- water

<table>
<thead>
<tr>
<th>S.NO.</th>
<th>PARAMETER</th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>MADHUBANI</td>
</tr>
<tr>
<td>1</td>
<td>Temp(°C)</td>
<td>22</td>
</tr>
<tr>
<td>2</td>
<td>Ph</td>
<td>7.8</td>
</tr>
<tr>
<td>3</td>
<td>EC(ms)</td>
<td>0.12</td>
</tr>
<tr>
<td>4</td>
<td>TH(mg/L)</td>
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</tr>
<tr>
<td>5</td>
<td>COD(mg/L)</td>
<td>120</td>
</tr>
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<td>6</td>
<td>Chloride(mg/L)</td>
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<tr>
<td>7</td>
<td>Alkalinity(mg/L)</td>
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<td>8</td>
<td>Calcium(mg/L)</td>
<td>70</td>
</tr>
<tr>
<td>9</td>
<td>TDS(mg/L)</td>
<td>800</td>
</tr>
</tbody>
</table>

REFERENCES
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Education and Socio-Cultural Nexus: Challenges for Mother Student in University Life

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Abstract- The history of the formal system of women education is not long in the Nepalese context. The process of formal education started a century ago during the rule of the Rana regime. Nowadays, the girl student number is also going to increase in university in Nepalese context. The main objective of this article is to identify the socio-cultural challenges for mother students in university life. This paper is based on a qualitative research approach. Both primary and secondary data are used in this paper. The case study method is used to collect primary information. The content analysis method is used to collect secondary information. Purposive and snowball sampling method is used to select the cases. Bachelors and masters levels mother students have participated in the cases. With the help of their husband, in-laws, maternal family, and peer motivations they are getting the opportunity of university life. These facts have absolutely disagreed with Walby’s theoretical explanation of patriarchy. The main conflict is related to the expenses of the study. These facts are partially analog to the theoretical explanation of Engels.

Index Terms- Challenges, education, mother-student, patriarchy, socio-cultural

I. INTRODUCTION

Education is a kind of socio-cultural institution of social structure. It is linked with the human society from the beginning of the human civilization (Hensline, 1997). However, it was informal in the beginning, its form and structures are being changed in course of time. People used to go to the some form of religious places to get the education like Church, Gurukul, Mothersah etc. Then afterward people used to invent different types of places for the study and getting knowledge. In course of development, human society invented the different type of institutions like schools, colleges, universities in the society. The French Sociologist Emile Durkehim saw the major function of the education as the transmission of society’s norms and values. He also stated that the society can survive only if there exists among its members a sufficient degree of homogeneity; education perpetuates and reinforces this homogeneity by fixing in the child from the beginning the essential similarities which collective life demands. Without these ‘essential similarities’, co-operation, social solidarity and therefore social life itself would be impossible (Haralambos, 2002).

In Nepalese context, the history of women education is not too long. The process of women education started a century ago during the rule of Rana Prime Minister Dev Shamsher at the initiative of Gangabai. Shamsher helped to prepare the primary level textbook for the school children through Jai Prithvi Bahadur Sing. In 1948 Prime Minister Padma Shamsher opened Padma Kanya Vidhayashram to impart English education to the girls (Jha, 2011). According to the Census of 2011 A.D, there is significant change in the female education in the context of Nepal. For example, 7,111,504 female are literal which is significantly well improved, whereas it is 1,530,957 in western region and 179,621 in Kaski district. Also the total female population who has done post graduation is 39,603 whereas it is 11,909 in Western region and 1,235 in Kaski district (CBS, 2012). In Pokhara, it seems usual for the women to come to campus for higher education for it has flexible and plural cultural as well as social system. Also because of adaptation of the modern concept by the society, women are sent to get the higher education. Pokhara is one of the places in Nepal, which is highly influenced by modernity, so the society seems liberal compared to other parts of the country. Thus many women get opportunity to have campus education. Nowadays, there are many colleges in Pokhara valley, where thousands of women come to get education. In Pokhara Valley, there are some colleges that offer masters’ degree, so it is easy for them to complete their degree in the related fields as per their interest.

It is also a notable conclusion of EFA Global Monitoring Report (2003/04) that more women are going to acquire the mental skills and capability necessary for work life. Besides the well known fact that the involvement of educated women in the labor force aids the development of society, there is also the positive impact this exerts on the women themselves. Thus the relationship between family, education and work are the major influences on women’s futures and on the patterns of incentives and costs facing families in deciding to send girls to school. Educating female has a profound effect on national development as lack of their education has been linked to low birth weight, poor health and high mortality rates in children, high fertility rates, poor family nutrition rates, low life expectancy, poor sanitation and high illiteracy rates etc. Thus the socio-economic importance of female education can thus not be over emphasized. Thus there are too many efforts being made by different government’s steps, the work of NGO and INGO’s to boost female education. But many factors i.e. home, community, school, family size, household income, parents’ education, cultural and traditional beliefs etc. continue to restrict development in female education (Alabi & Alabi, 2014). In this context, this paper is focused to explore the socio-cultural constraints of mother students in university life.

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II. OBJECTIVE AND METHOD

This research is limited to Pokhara and Prithvi Narayan Campus. Pokhara is the urban area of Nepalese society and Prithvi Narayan Campus is the largest campus of Tribhuvan University. The main objective of this article is to identify the socio-cultural challenges for mother students in university life. This paper is based on a qualitative research approach. Both primary and secondary data are used in this paper. The case study method is used to collect primary information. The content analysis method is used to collect secondary information. Purposive and snowball sampling method is used to select the cases. Bachelors and masters levels mother students have participated in the cases.

III. THEORETICAL DISCOURSE

In societies everywhere, cultural institutions and practices, economic processes and political structures are interactive and relatively autonomous. In the Marxist framework, infrastructures and superstructures are made up of multiple levels, and there are various types of transformations from one level to another. Combining the Marxists-feminists and sociological perspectives leads to an understanding of the gender system as a cultural construct that is itself constituted by social structure. One of the ways that society influences each other economically, politically and culturally, is through international labor migration, which also has distinct gender-specific effects (Moghadam, 2005). Marx and Engels believed that the origin of the family is due to the division of labor where wife and children are the slaves of the husband (Ritzer, 2000). An important theme of the work of Marx and Engels was that women were oppressed by men and there was an urgent need of emancipation in the society as well as in the family. They also explained that the first form of oppression that existed in the society was that of women by men in the family. The warring classes of society are the product of modes of production. Through the development of the ages of mode of productions the man acquired more important status and power over the women in the family in course of time. The increased wealth and status of man enable him to overturn the traditional order of inheritance in favor of him (Adams, 2001). Engels (1884) describes the connection between the patriarchal oppression of women in the sense of family and the oppression of the proletariat by the bourgeoisie. Since Marxist believed economy as the superstructure of the society and other fields like religion, culture, education etc. are dependent to it.

Engels (1884) added that the oppression of women to the beginning of private property. The cause of women’s oppression is linked to the type of social organization, specifically the economic order. For Marxist, capitalism or class oppression is the primary oppression. In the view of Marxist feminists, only after the eradication of economic oppression, the emancipation of women is possible. Marxist analysis assumed that women’s submission to men was a result of their absence from the productive process. Consequently, women did not control the property but they were themselves property. So the condition of women in the education is also affected. Women are dominated by men to control over the mode of production and the women are treated as the free labor of the means of production.

IV. RESULTS AND DISCUSSION

Early marriage

The relationship of the marriage is considered as the holy and honored relationship (Prabhu, 1961). The marriage conducted between two persons is not only limited to two persons, it is related to the families, households in the eastern world. So for the honor and prestige, the family decides the marriage between two persons in traditional society (David and Liz, 2002). In some cases the marriage is conducted so early that one can’t think of it. Even in the educated families, the task of the marriage of the female is considered as the vital problem in the family. Also, the impact of the modern world is so heavy in this age that the teenagers are too much affected by the global world and they take decisions so hastily. So, some of the teens get married so early that they are not thinking about the future.

Some of the respondents of case study of this study were married so earlier that they weren’t conscious about the family and children. Some of the respondents were married during SLC which they felt too early that they didn’t have the concept of family and children. The most of the respondents who got marriage earlier got married by their parents but two of the respondents were married as per their own decision. Respondent of the case 1 said that she was married just after SLC examination at the age of 16. At that time, she had no concept about the family, children and husband. She was married so hastily. And she gave birth to their son just after the examination of +2. She had studied about the family planning but she had no idea how to apply it. Similarly, cases 2 and 3 also thought that they were married so earlier. They were all married at the age of 18. They wished that they wouldn’t have married so early, because they felt that they missed their valuable time as the students and the unmarried daughters in the school and
family respectively. They felt that they could have achieved their life goals and objectives if they were not married so earlier. Respondent of the case 4 said that she fell in love with her boy friend and she thought her parents wouldn’t allow hers to marry him. So they eloped from home. At first she thought it would be easy for us to live but then she realized that it was her fault. But they supported each other in the course of life and now hers husband is supporting to continue hers study. She was good at study but she couldn’t pass Bachelor’s level study regularly because she had given birth to the son during +2 levels. So it took more than five years to complete my Bachelor’s degree. Early marriage gets the women to abandon their study as well as career. Early marriage causes early childbirth which limits their capacity and brilliancy. They are bound by their family and household responsibility when they have to give time for the study. The main consequence of the early marriage on the lives of the women is that it prohibits them from entering into the outer world. The family and children become the ultimate goals of the women. Family pressure is the main cause for the early marriage in the traditional society like Nepal, which limits the children in their capability as well as the goal of their life.

V. RUMOR MONGERING IN THE NEIGHBORHOOD

Some of the mother-students said that they were backbitten by their neighbors saying that these mother-students were not aware of the family. The neighbors accused them of being ignorant regarding to their household duties and family responsibilities. Both the cases 1 and 2 said that their neighbors spread rumor that they were not caring the family giving importance to their study. But they also ignored their rumors because of the support from the family. Respondent of the case 5 said that some of her neighbor backbit regarding hers study in the Master’s level. They accused her of preferring education more rather than her family and children. But she didn’t care about that remark at all. Since the society is traditional and patriarchal, it is a great issue for some of the neighbors and the family members that women go out and focus on study instead of giving time to the family and children. The mother-students are the ones who faced the society day by day, so they also have to face different challenges regarding the neighbor’s issue. But most of the respondents are not affected by the neighbor’s rumors and backbiting because the society is being advanced and nuclear as well as individualistic.

VI. TO FOLLOW THE VALUE OF THE FAMILY

Most of the respondents still felt that they had no right over their fertility right. Most of them didn’t use contraceptive because their family didn’t want it and the family wanted to have a child. Some of the respondents didn’t know about her marriage and they were married earlier than they knew about the marriage and family. Like the respondents of the cases 1 and 2 married earlier but they were not asked about their will. They were married just after the completion of SLC examinations. The parents pressurize their daughters to be married if they receive the proposal from the well established and well positioned family. If a man with government, job proposes for the marriage, the family try to fix up the date for the wedding as soon as possible. Also the respondent of the case 4 knew about her marriage just a day before her wedding ceremony. Her family had already fixed up her marriage without having her consent. It made her be devaluated in the family. At that time she felt that being a daughter in the Nepalese society is to give up her free will and obey the parents’ decision. Also most of the respondents didn’t consult with their husband as well as to the family regarding the gap between the two children thinking that it was the fate of the women in the society or family to bear child after the marriage. They thought that it was compulsory to bear child after the marriage. Case 6 said that she had borne a daughter after one year of marriage. Her family members were very happy and now they want to give birth to another child possibly a son after some years. Some of the respondents found it uncomfortable regarding choice of family planning especially those who got arranged marriage. Case 7 said that she felt very hard at first to talk about family planning and contraceptive. She thought student life had finished after the marriage. But she was so lucky that she got opportunity to join the Master’s degree. Most of the respondents feel that, after the marriage, the women have to bear the child. Most of respondents felt that it was the fate of the women to have the child. According to them, because of their family, culture and society they had their baby before the post graduation. Some of them thought that they had their first child at the right age according their family. As Acharya (1979) concluded that the tendency of giving more priority to marriage and motherhood prevails in respondent’s family. Although they are educated women, they are not out of the cultural and social boundary. Most of the mother-students felt that it was very difficult to talk to the husband and family about the family planning during the early period of marriage in the arranged marriage. Some of the mother-students who got married in the early age also reiterated that they had no concept of the children and family at the time of marriage. It is seen that, the theory of patriarchy is relevant in this case that women are used to make only home. They are prohibited to be free from the bondage of society and culture to make their own decision.

VII. COMPULSION TO BEAR THE CHILD

Women are obligated to bear the child after marriage. If she is not able to have the child after marriage, she is treated as a barren lady and discrimination starts in the family as well as in the society. It is not only limited to the rural areas but it is also the same in the urban areas. The educated women are also not out of touch. The women who study in the Master’s level, are either married or are about to marry because they are in their matured age. Mid twenties is considered as the right age for the marriage for the women in Nepal. In this study, most of the women express that they are not free to choose to bear babies on their own. They also think that they have to bear the child just after the marriage. Not according to the cultural aspect only but also according to the health issues, some of them thought that it was the right age to have the child. Case 7 said that it is the fate and compulsion of the women to bear the child after marriage, so it is not odd for her to have a child just after the marriage. Case 9 said that she and her husband consulted to use contraceptive to avoid the child birth during their first year of marriage, but because of the pressure of the family and backbiting of the neighbors they had their child and
now they are using contraceptive to stop another child for the time being. Similarly, case 10 said that she wanted to bear the child after finishing her Master’s degree, but it didn’t work for her in the family and she had to have the child. After the child birth, she couldn’t complete Master in Nursing (MN). But she has changed her subject in the Master’s level; and she took up Sociology as the major subject and she is about to complete her degree next year. Similarly, Case 11 said that she was married while she was studying in +2. At first she tried to use contraceptive to avoid the child bearing, but it was not easy as she thought because of the family pressure.

So, in some cases women are considered as the source of the child and family and society expect the children from the couple after the marriage. First the women had to give importance to have child after the marriage rather than her career and future goals. So, in this sense, the women are bound in the culture and family and she can’t pursue her own life goals and perspectives. As argued by Acharya (1979) marriage and motherhood are the ultimate goals for girls. Their main purpose is to marry and bear child for the family and society and it gives satisfaction to them.

VIII. COORDINATING ROLE IN CULTURAL ACTIVITIES.

Since Nepal is culturally and socially rich country, it has different festivals and familial ceremonies. Every caste has their own type of festivals and ceremonies as well. And there are different life time ceremonies like birth, marriage, death etc. Nobody can go beyond their culture in some extent (Jamison, 1996). One has to give his time to these activities somehow. The mother-students are busy in their home, not only in the household and family responsibility but also to the cultural practices. Some of the respondents like the cases 12, 13 and 14 said that they had to involve in the different ceremonies, festivals in the role of coordinator and mediator being the daughter-in-law. Since, they are the daughters-in-law; they are the main part of these activities. They have to actively involve and participate in the festivals and ceremonies. So, they have to be ready and prepared for the different programs like that. These mothers also thought that they should give time to the family and cultural practices. Because of these many issues, they have to give up their classes sometime and couldn’t study well in the home as well. It can be concluded that women are considered as the homemaker in the society of Nepal as argued by Walby (1990) theorists of Patriarchy. It seems women are bound to the family and culture and they can’t make their own decision regarding their lives and profit.

IX. CHALLENGES OF ECONOMIC EXPENSES

Since some of the respondents depend on their husbands in the context of economical expenses of the study along with household expenses. Sometimes, it gives conflict to the couple; like the respondent of the case 15. She used to have verbal conflict with her husband while she was studying and wasn’t working. That’s why she joined the job just after the examination of her Master’s degree had finished. Case 15 also said that she was fully supported by her husband during the Master’s level in the first year. But it became the issue of conflict in the family, so she joined the school as a teacher as soon as the second year examination was over. She was feeling better and they didn’t have conflict because of the issues of the educational as well as other expenses. Similarly, case 16 was hesitated to tell about the economic dependence on the husband, because she also felt hard to tell about that. In more than one meeting, she rarely talked about the relationship with husband about the economic dependence and conflict in the family.

It is the economic dependency of the women which creates conflict in the family. So, it can be considered as the source of power as argued by Marxists. Economy makes great impact in the other structures of the society. Those mother-students, who have job, don’t have this type of problem in the family. They have different type of problem. As Ollenburger and Moore (1992) wrote that the Marxists believe that the economic dependence is part of the system that maintains marriage, the family and mothering. Also Walby (1990) argued that the women are freely employed in the home and even in the employed sector, she is paid less to make women dependent to the male and patriarch.

X. CONCLUSION

In Nepalese society, the university education system has been practiced since the Rana regime. Although there are too many challenges for the women to get university education after the marriage and being a mother, they are getting this opportunity. Many women are coming to the universities and campus to complete their study even after being a mother. With the help of their husband, in-laws, maternal family, and peer motivations they are getting the opportunity of university life. These facts have absolutely disagreed with Walby’s theoretical explanation of patriarchy. Many women come to the campus even during pregnancy showing their bulging figure on the campus. Although there are too many conflicts in the family in the sense of getting the power of resources and capital in the family, they were allowed to get an education. This change is occurred due to the rapid growth in awareness through socio-cultural transformation processes. The main conflict is related to the expenses of the study. That’s why mothers are willing to get the job just after finishing the study. These facts are partially analog to the theoretical explanation of Engels.

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A comparative study of burnout among nurses in public and private hospitals at Karbala city

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² Adult Health Nursing Department/ College of Nursing – University of AL-Ameed /Iraq

Abstract- Introduction: Nurses' burnout is considered to be one of the most critical problems in the 21st century health care. There has been much research on burnout in nurses, presumably because of the intense nature of their contact with patients. Methodology: Quantitative design (comparative study) has been carried out to A comparative of burnout among nurses in public and private hospitals at Karbala city. To compare Nurses' Burnout between public and private hospitals . The study has been carried out in Private and public Karbala city hospitals Accidental sampling (200) of nurses who work in private and public hospitals in which Distribution of the study sample in which (100) nurses in private and ( 100) nurses in public hospitals . The data were collected through adopted instrument Maslach burnout, that validated and reliability by (Maslach, 2001). The data collected by self-reporting . Data were collected from Jun 22nd to October 26nd 2019. The analyzed data have been conducted through application of descriptive statistics (frequencies, percentages, mean of scores Standard deviation) and inferential statistics (ANOVA). Results of study: the study showed that private nurses(75%) sometime with emotional exhaustion while (59%) of public nurses sometime with emotional exhaustion regarding Personal Accomplishment the study indicated that (69 %) of private nurses always personal accomplishment as well as public nurses (46%) of them always personal accomplishment in addition (73%) of private nurses sometime Depersonalization while (67 %) of public nurses also sometime Depersonalization .Conclusion: It can be concluded from the present study that burnout is higher in nurses working in government hospitals than those working in private hospitals. The findings of the present study have implications for policy makers, hospital administrators, researchers and nurses themselves. There is need to plan and chalk out various intervention strategies for coping up with this serious problem. Recommendation: Choice of a suitable strategy to decrease nurses' burnout level through training courses for the nurses, To decrease nurses burnout, farther studies should be conducted to determine the factors associated with it, and To establish the causation of burnout syndrome; health education interventions during pre-employment training program for prevention of burnout syndrome; and periodic screening during work for early detection and management of burnout among health-care professionals.

Index Terms- comparative, burnout , public, and private.
Study design: Quantitative design (comparative study) has been carried out to A comparative of burnout among nurses in public and private hospitals at Karbala city.

Setting of the study: The study has been carried out in Private and public Karbala city hospitals.

Sample of the study: Accidental sampling (200) of nurses who work in private and public hospitals in which Distribution of the study sample in which (100) nurses in private and (100) nurses in public hospitals, selected according to certain criteria which include: both genders male and female, both working shift, at least one year of experience in hospital.

Methods and instrument of data collection: The data were collected through adopted instrument Maslach burnout, that validated and reliability by (Maslach, 2001). Data were collected from Jun 22nd to October 26nd 2019. The instrument consist of two parts Part I: Socio-demographic data. This part consists of (7) items which are (gender, age, level of education, marital status, years of experience, Economic status, Work Days in week, Training session). Part II: This part includes the nurses’ burnout, as followed by Maslach burnout interview after modification (Maslach, 2001). This part involves (34) items (appendix L), distributed into three sub-domains, which are:

A: Emotional exhaustion: This dimension includes (10) items.
B: Personal accomplishment: This dimension includes (14) items.
C: Depersonalization: This dimension includes (10) items.

Permission: An approval to conduct the study is obtained from hospitals, also the researcher get introduced himself to the participants and explained the purpose of the study in order to get oral.

Statistical Data Analysis Approach: The data of the present study are analyzed through the use of Statistical Package of Social Sciences (SPSS) version XX. The following statistical data analysis approaches are used in order to analyze and evaluate the results of the study: Descriptive Data Analysis Approach Such an approach consists of the following: Statistical tables (Frequencies and percent) which are: Mean of scores (MS) A mean of score less than (1.66) is considered never. A mean of score = (1.67-2.33) is considered sometimes. A mean of score greater than (2.34) is considered always. Inferential Data Analysis ANOVA.

III. RESULTS

The study reveals that the high percentage of both private and public participant at age groups (20 to 30) years (72%) in private hospital and (84%) in public hospital. In addition, the table shows that the high percentages of participant in both private and public are female, (68%) in private and (65%) in public. The result reveals that high percentage of study married in both private and public (51%) in private and (50%) in public also the study shows that the private nurses (43%) college graduated regarding public the nurses (46%) institute graduated, (84%) of the private nurses and (88%) of public nurses are within (1 to 10) years of experience. (49%) of private nurses and (46%) of the public nurses; it enough some time of economic status reveals work days in week both private and public nurses are work (4 to 6) days in week (71%) in private and (83%) in public, regarding the number of the Training session the study shows that majority of study sample for both private and public are within (1 to 5) sessions, (69%) in private and (78%) in public, also the result of study indicated both private and public work from 6 to 10 hours per day (41%) in private and (80%) in public, regarding work outside the half of nurses in private (52%) do not work outside the workplace while public nurses most of them (67%) don’t work outside the workplace, the study results showed that (43%) of private nurses are work in surgical wards and (44%) of public nurses are work in medical wards table (1).

<table>
<thead>
<tr>
<th>Table (1) Socio-Demographic Characteristic of the Study Sample</th>
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<td>Demographic Data</td>
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<td>31 to 40</td>
</tr>
<tr>
<td>41 to 50</td>
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<tr>
<td>female</td>
</tr>
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</tr>
<tr>
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<tr>
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http://dx.doi.org/10.29322/IJSRP.10.07.2020.p10399
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Also The study show that private nurses( 75%) sometime with emotional exhaustion while (59%) of public nurses sometime with emotional exhaustion regarding Personal Accomplishment the study indicated that (69 %) of private nurses always personal accomplishment as well as public nurses (46%) of them always personal accomplishment in addition (73%) of private nurses sometime Depersonalization while (67 %) of public nurses also sometime Depersonalization . table (2).

Table (2) Distribution of the Study Sample by their Overall burnout

<table>
<thead>
<tr>
<th>Burnout domains</th>
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<th>Public</th>
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<tr>
<td></td>
<td>Freq.</td>
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<td>mean</td>
<td>sd</td>
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<td>Emotional Exhaustion</td>
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<td>31</td>
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The study shows that there is significant association between nurses burnout and some variables in demographic data of the study sample. Age, marital status, Education level, Economic status, Years of experience, Work Days in week and Work outside at P-value equal or less than (0.05) While Gender, Training session, Hours in day and Work outside shows there is significant association at P-value (0.05) with nurses burnout.

Also the results show that there is no significant association between nurses burnout and some variables in demographic data such as Gender, marital status, Education level, Economic status, Training session, Hours in day, Work outside, Work Days in week and Work outside. While Age shows there is significant association at P-value equal or less than (0.05) with nurses burnout.

Table (3) mean differences (ANOVA) between the overall burnout (Private) and their Demographic Data

<table>
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Cut off point (0.66), Never = (1-1.66), sometimes = (1.67-2.33), always= (2.34-3) sd, stander division.
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<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
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Table (4) Mean differences (ANOVA) between the overall burnout (public) and their Demographic Data
### IV. DISCUSSION

#### Part I: Discussion of the Study Sample Demographic Data:

The study shows that the high percentage of both private and public participant at age groups (20 to 30) years (72%) in private hospital and (84%) in public hospital. In addition, the table shows that the high percentage of participant in both private and public are female, (68%) in private and (65%) in public regarding marital status the study reveals that high percentage of study married in both public and private (51%) in private and (50%) in public. Also, the study shows that the private nurses (43%) graduated regarding public the nurses (46%) institute graduated, (84%) of the private nurses and (88%) of public nurses are within (1 to 10) years of experience, (49%) of private nurses and (46%) of the public nurses it enough some time of economic status reveals work days in week both private and public nurses are work (4 to 6) days in week (71%) in private and (83%) in public, regarding the number of the Training session the study shows that majority of study sample for both private and public are within (1 to 5) sessions, (69%) in private and (78%) in public also the result of study indicated both private and public work from (6 to 10) hours per day (41%) in private and (80%) in public, regarding work outside the public nurses in private (52%) do not work outside the work place while public nurses most of them (67%) don’t work outside the work place, the study results shows that (43%) of private nurses are work in surgical wards and (44%) of public nurses are work in medical wards. Rashedi, et al., 2014, they studied the burnout among nurses in Iran and they find that the majority of the nurses are married. Shakhawan (2014), in Iraq studied the prevalence of nurses burnout in Rania District hospitals at Sulemani governorate this study find that the majority of the study sample are institute graduated. Roghaye Abedi-Gilavand, et al., 2019, they studied the Burnout Among Nursing Staff in Ziaeian Hospital in Iran and they find that the Most of the subjects were female, married, had a bachelor’s degree, worked as a nurse, and had less than 5 years of work experience.

#### Part II: Distribution of the Study Sample by their Overall burnout

The study shows that private nurses (75%) sometime with emotional exhaustion while (59%) of public nurses sometime with emotional exhaustion regarding Personal Accomplishment the study indicated that (69%) of private nurses always personal accomplishment as well as public nurses (46%) of them always personal accomplishment in addition (73%) of private nurses sometime Depersonalization while (67%) of public nurses also sometime Depersonalization. Rashedi, et al., 2014, they use a cross-sectional descriptive-analytical design was used. The sample consisted of 194 nurses working in five hospitals of Hamad University of Medical Sciences in Iran, who completed the Maslach Burnout Inventory (MBI) as well as a socio-demographic questionnaire. And they find that the majority of the nurses are moderately burned at the emotional exhaustion and depersonalization sub domains while at the personal accomplishment sub domain the nurses are burned out at mild level. Bakfer, et. al., 2000, studied the Effort-reward imbalance and burnout among nurses, their results revealed that sample of nurses reported moderate level of Emotional exhaustion, moderate level of depersonalization, and low level of personal accomplishment. This findings are consistent with previous nursing studies in Greece, Germany, Poland and the United States.

#### Part III: mean differences (ANOVA) between the overall burnout (public) and their Demographic Data:

The study results indicate that there is significant association between nurses burnout and some variables in demographic data of the study sample, Age, marital status, Education level, Economic status, Years of experience, Work Days in week and Work outside at P-value equal or less than (0.05). While Gender, Training session, Hours in day and Work outside shows there is significant association at P-value (0.05) with nurses burnout. The present finding agree with Queiros, et al. (2013) who study burnout among nurses, an interactionist approach, This cross-sectional study was conducted on 1,157 participants in city of Porto (Portugal) study aimed to identify predictors of burnout among nurses working in hospitals the study has shown the results of hierarchical multivariate regression analysis for the variables (age, Institution years and marital status) predicting the three burnout dimensions. While finding Gender disagree with Queiros, et al., (2013). Also the study result disagree with Alfuqaha, et al., (2018) who is study Burnout among nurses and teachers to evaluate burnout among nurses and teachers in Jordan, and to explore the differences between them the study conducted on 240 participants: 120 nurses and 120 teachers the study has shown that there is no
significant association between burnout in nurses based on their experience also the study shown that there is no statistically significant difference in the level of burnout in nurses based on their education level. Also the study result agree with Sabbah. et al., (2012) that examine the psychometric properties of the Maslach Burnout Questionnaire (MBI-HSS) for validation of use in Lebanon, and to describe burnout and associated factors amongst nurses in Lebanon this conducted on 200 nurses the who is find in their study that no relationship between the nurses burnout and their Shift duty, Work overload and economic.

Part IV: Mean differences (ANOVA) between the overall burnout (private) and their Demographic Data

The study results indicate that there is no significant association between nurses burnout and some variables in demographic data of the study sample Gender, marital status, Education level, Economic status ,Training session, Years of experience, Hours in day , Work outside ,Work Days in week and Work outside. While Age Shows there is significant association at P-value equal or less than (0.05) with nurses burnout the study result disagree with Massoudi. et al., (2008) who is study The influential factors on burnout among nurses working in private hospitals in Tehran was carried out using a descriptive-analytic method. This study conducted on 505 nurses were participated in the study from different private , they found in their study there are significant relationship between nurses burnout and Gender, marital status, Education level, Economic status and Training session, also the result of this study agree with Azeem. et al., (2014) Who studied Role of Stress and Burnout among Nurses in the Private Hospitals to explore the levels of role related stress and burnout among nurses working in the private hospitals. Where they found Age significantly related to emotional exhaustion and depersonalization.

V. CONCLUSIONS

It can be concluded from the present study that burnout is higher in nurses working in government hospitals than those working in private hospitals. The findings of the present study have implications for policy makers, hospital administrators, researchers and nurses themselves. There is need to plan and chalk out various intervention strategies for coping up with this serious problem

VI. RECOMMENDATION

Based on the study results and conclusion, it is recommended the following:

1. Choice of a suitable strategy to decrease nurses' burnout level through training courses for the nurses.
2. To decrease nurses burnout, farther studies should be conducted to determine the factors associated with it.
3. To establish the causation of burnout syndrome; health education interventions during pre-employment training program for prevention of burnout syndrome; and periodic screening during work for early detection and management of burnout among health-care professionals.

REFERENCES


AUTHORS
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Second Author – Haitham Ibrahim Faris, Adult Health Nursing Department/ College of Nursing – University of AL-Ameed /Iraq. Email: Haitham.Algazali@alameed.edu.iq
Abstract- Carica papaya is used in traditional system of medicine to treat various hepatic disorders and it has recently been used to treat paracetamol stimulated liver damage in rats in India. This present work was to examine the activities of ethanolic extract of Carica papaya leaves in preventing liver damage caused by acetaminophen (the major active ingredients) triggered liver injury in rats. Oxidative stress was induced in wistar strain albino rats by administration of a single dose of acetaminophen 2.0g/kg before the administration of the extract and this causes an increase in the activity of marker enzymes, total protein and bilirubin and was significantly restored by the leaf extract. At (200-500) mg/kg, there was a reduction in serum enzyme levels when compared with toxicant group. But the ethanol extract at an oral dose of 200mg/kg exhibited a significant protection against acetaminophen induced liver damage. Vitamin E was used as a standard reference which exhibited significant hepatoprotective activity. The histopathological examination of liver provided supportive evidence. Conclusively, the work provided an acceptable explanation of Carica papaya in the treatment of disease-related liver damage.

Index Terms- Acetaminophen, Carica papaya, Hepatotoxicity, Hepatoprotective activity

I. INTRODUCTION

Carica papaya is a tropical, herbaceous plant more commonly known as pawpaw whose original home is South America where other closely related species such as carica candamarcensis, carica monoica and carica cauliflora. It reaches about 4 -5 m tall and generally produces only one unbranched, soft fibrous stem supporting a crown of large-lobed leaves on long petiole [1]. Due to high demand for therapeutic drugs from natural products, greater attention has been shifted to pawpaw plants containing health protective constituents, which are essential in preventing diseases and maintaining a state of well-being [2].

In recent years, there has been a particular interest in the antioxidants and health benefits of phytochemicals in pawpaw leaves and seeds. Pawpaw leaves and seeds have been known for a large range of purposes including nutrition, medicine, beverages and industrial use. Carica papaya plants produce natural compounds (annonaceous acetogenins) in leaf bark and twig tissues that possess both highly anti-tumor and pesticidal properties. It was suggested that a potentially lucrative industry based simply on production of plant biomass could develop for production of anti-cancer drugs [3].

Carica papaya leaf tea or extract has a reputation as a tumor-destroying agent [4]. The papaya fruit, as well as all other parts of the plant, contain a milky juice in which an active principle known as papain is present. Aside from its value as a remedy in dyspepsia and kindred ailments, it has been utilized for the clarification of beer. The juice has been in use on meat to make it tender [5].

Fresh, green pawpaw leaf is an antiseptic, whilst the brown, dried pawpaw leaf is the best as a tonic and blood purifier [6]. Chewing the seeds of unripe pawpaw fruit also helps to clear nasal congestion [7]. The green unripe pawpaw has a therapeutic value due to its quality. The tea prepared with the green pawpaw leaf, promotes digestion and aids in the treatment of ailments such as chronic indigestion, overweight and obesity, arteriosclerosis, high blood pressure and weakening of the heart [8].

Paracetamol (called acetaminophen in the USA) is one of the most commonly used non-narcotic analgesic and antipyretic agents. It has relatively weak anti-inflammatory activity. Paracetamol is reported to be selective inhibitor of Cox 3 (cyclooxygenase). Although some reported evidence show that paracetamol has significant anti-inflammatory action [9]. Paracetamol toxicity is one of the most common causes of poisoning worldwide. Paracetamol was the fourth most common cause of death following self-poisoning in the United Kingdom in 1989; [10], yet it is still one of the most common analgesic and antipyretic drugs often used around the world to treat pains and mild feverish conditions.

As far as this is true, it is also one of the major cause of liver damage such as liver necrosis. Toxic doses of paracetamol cause a serious potentially fatal hepatotoxicity. These toxic effects occur when the liver enzymes catalyzing the normal conjugation reactions are saturated, causing the drug to be metabolized by the mixed function oxidases. The resulting toxic metabolized, N-acetyl-P-
benzoquinone imine (NAPQI), is inactivated by conjugation with glutathione, but when glutathione is depleted, the toxic intermediate accumulates and reacts with nucleophilic constituents in the cell. This causes necrosis in the liver and also in the kidney tubules. This work examined the protective activity of pawpaw leaf extract, against acetaminophen-induced liver damage in adult Wistar rats.

II. MATERIALS AND METHODS

A total of forty adult rats with an average weight of 200 g were used for the experiment. They were acclimatized to laboratory conditions for 2 weeks and were fed with a standard pellet and drinking water. The rats were divided into eight groups of five rats each and were given the following treatment.

Group I: Control.
Group II: Induced with Acetaminophen standard only (2g/kg body weight, orally).
Group III: Carica papaya ethanolic leaf extract only (200mg/kg body weight, orally).
Group IV: Induced with 2g/kg acetaminophen standard and treated with 200mg/kg vitamin E standard
Group V: Induced with 2g/kg acetaminophen standard and treated with 200mg/kg ethanolic leaf extract.
Group VI: Induced with 2g/kg acetaminophen standard and treated with 300mg/kg ethanolic leaf extract.
Group VII: Induced with 2g/kg acetaminophen standard and treated with 400mg/kg ethanolic leaf extract.
Group VIII: Induced with 2g/kg acetaminophen standard and treated with 500mg/kg ethanolic leaf extract.

A. Administration of Extract and Acetaminophen

The normal control (Group I) received only distilled water daily for 7 days. Group II were induced with Acetaminophen standard only (2g/kg body weight, orally). Test groups animals (Groups V-VIII) were given an oral doses of 200mg/kg, 300mg/kg, 400mg/kg and 500mg/kg of the ethanolic extract, respectively, for 7 days. These test group animals (Groups V-VIII) were first administered acetaminophen (2g/kg body weight, orally) before the administration of the extract. Group IV received standard drug vitamin E (200mg/kg) for 7 days. Group III received only the extract at 200mg/kg b.w, orally for 7 days.

Animals were sacrificed 24 hours following the last treatment, blood was collected, allowed to clot and was separated at 2500 rpm for 15 minutes and biochemical investigations were carried out both in the serum and liver. Liver was analyzed and histopathological studies were carried out.

B. Enzyme Assay

The levels of Alanine aminotransaminase(ALT), Alkaline phosphatase(ALP), Aspartate aminotransaminase (AST), Albumin and Bilirubin in the serum were determined by colorimetric method (21) using Randox diagnostic kits (USA). Pyruvate solutions of varied millimolar concentrations were used to prepare a standard curve from which AST activities were computed as described by [11]. Alanine aminotransaminase (ALT) assay was carried out as described for AST except that 200Mm DL-Alanine replaced L-Aspartate in the procedures.

C. Histological Studies

The liver tissues were analyzed by fixing in 10% formalin, dehydrated in gradual ethanol 80% and cleared in xylene and embedded in paraffin. Sections were prepared and then stained with hematoxylin and eosin dye for photomicroscopic observation.

D. Statistical Analysis

All data were presented as Mean ± standard deviation. One-way analysis of variance (ANOVA) and Duncan test was carried out to test any significant differences between their means. P values equals .05 (P=.05) were considered statistically significant.

III. RESULTS

The results in Table 1 shows a significant increase (P=.05) in the serum levels of the hepatic enzymes of group II acetaminophen treated rats compared with control (Group I) and other Groups III-VIII which received Carica papaya ethanolic leaf extract and vitamin E standard. Hepatic damage induced by acetaminophen was observed from this study (Figure 2). There was a significant increase (P=.05) in the marker enzymes; ALP, ALT, AST also in Albumin, Bilirubin in acetaminophen treated rats (Table 1).
IV. DISCUSSION OF RESULTS

Table 1: Effects of ethanolic leaf extract concentrations of Carica papaya on Serum, ALT, AST, ALP, Protein and Bilirubin levels on intoxicated rats given 2g/kg acetaminophen

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<th>BLB (mg/dl)</th>
<th>ALP (U/L)</th>
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</tr>
<tr>
<td>5</td>
<td>Toxicant+200mg/kg leaf extract</td>
<td>9.00±0.58</td>
<td>0.20±0.06</td>
<td>75.33±7.86</td>
<td>27.67±1.20</td>
<td>51.33±4.67</td>
</tr>
<tr>
<td>6</td>
<td>Toxicant+300mg/kg leaf extract</td>
<td>9.25±0.75</td>
<td>0.25±0.06</td>
<td>96.00±9.97</td>
<td>34.75±2.29</td>
<td>67.00±1.96</td>
</tr>
<tr>
<td>7</td>
<td>Toxicant+400mg/kg leaf extract</td>
<td>8.00±0.41</td>
<td>0.25±0.06</td>
<td>117.00±12.07</td>
<td>26.75±5.04</td>
<td>62.50±3.48</td>
</tr>
<tr>
<td>8</td>
<td>Toxicant+500mg/kg leaf extract</td>
<td>9.75±0.25</td>
<td>0.35±0.06</td>
<td>110.00±7.35</td>
<td>41.75±4.11</td>
<td>56.25±7.47</td>
</tr>
</tbody>
</table>

Values are expressed as $\bar{x} \pm SD$, n=5. Means followed different superscripts are significantly different ($P=.05$) from one another.

Table 2: Effects of various leaf extract concentrations of Carica papaya on Liver, ALT, AST, ALP, Protein and Bilirubin levels on intoxicated rats given 2g/kg acetaminophen

<table>
<thead>
<tr>
<th>Group</th>
<th>Treatment</th>
<th>Protein (g/dl)</th>
<th>BLB (mg/dl)</th>
<th>ALP (U/L)</th>
<th>ALT (U/L)</th>
<th>AST (U/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Control</td>
<td>4.13±0.43</td>
<td>0.003±0.003</td>
<td>25.00±3.51</td>
<td>13.75±2.39</td>
<td>15.25±2.25</td>
</tr>
<tr>
<td>2</td>
<td>Toxicant</td>
<td>3.25±0.25</td>
<td>0.03±0.01</td>
<td>36.50±3.50</td>
<td>11.00±1.00</td>
<td>8.00±2.00</td>
</tr>
<tr>
<td>3</td>
<td>Leaf extract only (200mg/kg)</td>
<td>4.57±1.16</td>
<td>0.01±0.003</td>
<td>25.00±8.66</td>
<td>7.00±1.53</td>
<td>13.67±1.86</td>
</tr>
<tr>
<td>4</td>
<td>Toxicant+Vit.E (200mg/kg)</td>
<td>4.60±0.87</td>
<td>0.02±0.003</td>
<td>27.50±3.23</td>
<td>6.25±1.32</td>
<td>10.50±0.50</td>
</tr>
<tr>
<td>5</td>
<td>Toxicant+200mg/kg leaf extract</td>
<td>4.73±1.10</td>
<td>0.01±0.003</td>
<td>33.33±3.33</td>
<td>9.00±1.00</td>
<td>11.67±1.67</td>
</tr>
<tr>
<td>6</td>
<td>Toxicant+300mg/kg leaf extract</td>
<td>6.30±0.17</td>
<td>0.02±0.003</td>
<td>17.50±3.23</td>
<td>13.25±1.38</td>
<td>13.00±1.78</td>
</tr>
<tr>
<td>7</td>
<td>Toxicant+400mg/kg leaf extract</td>
<td>5.65±0.20</td>
<td>0.008±0.003</td>
<td>25.25±3.68</td>
<td>11.75±1.03</td>
<td>9.50±0.29</td>
</tr>
<tr>
<td>8</td>
<td>Toxicant+500mg/kg leaf extract</td>
<td>5.45±0.58</td>
<td>0.02±0.005</td>
<td>27.00±3.63</td>
<td>15.75±2.17</td>
<td>14.25±2.14</td>
</tr>
</tbody>
</table>

Values are expressed as $\bar{x} \pm SD$, n=5. Means followed different superscripts are significantly different ($P=.05$) from one another.

Table 2 shows a significant reduction ($P=.05$) in the levels of these hepatic enzymes in the liver of group II acetaminophen treated rats compared with control and other groups (III-VIII). Treatment with extract (200mg/kg b.wt to 500mg/kg b.wt), after experimental liver damage resulted with marked reduction of marker enzymes levels in the blood circulation and a significant elevation in the liver.
compared with group II acetaminophen treated rats. Administration of acetaminophen led to degeneration of liver vitality, fibrosis and necrosis on histological observation of the liver of acetaminophen –treated rats (Figure 2). The treatment of the rats in groups V-VIII with ethanolic leaf extract of *Carica papaya* after acetaminophen exposure restored the damaged features of the liver by obviously reducing the levels of hepatic enzyme markers in the serum and reversing histopathological changes of degeneration with evidence of revitalization (Figure V-VIII). The administration of *Carica papaya* ethanolic leaf extract in group V-VIII rats after acetaminophen exposure significantly restored all the chemical processes and histological changes produced as a result of acetaminophen exposure. It can be deduced from this study that group V rats treated with 200mg/kg *Carica papaya* ethanolic leaf extract was more effective than other groups. It also shown that this 200mg/kg *Carica papaya* ethanolic leaf extract was more effective than vitamin E standard which was used as a standard reference and known to exhibit significant hepatoprotective activity.

The structure of the liver was well preserved in group III rats following exposure to ethanolic leaf extract of *Carica papaya* only (Figure 3). The features and the structures of the liver section on histological observation in group III that is; *Carica papaya* treated rats only appeared to correspond to the group I (control). Similarly, the values of marker enzymes in group III were also found to be normal compared with the values obtained from the group I (control) and group III (*Carica papaya* extract only) as shown in (Figure 3, Table 1 and 2).
Fig. 3: Liver cells of rats given 200mg/kg Carica papaya leaf extract (Plant only)

Fig. 4: Liver cells of rats given 2g/kg acetaminophen treated with 200mg/kg vitamin E

Fig. 5: Liver cells of rats given 2g/kg acetaminophen treated with 200mg/kg Carica papaya leaf extract
Fig. 6: Liver cells of rats given 2g/kg acetaminophen treated with 300mg/kg Carica papaya leaf extract

Fig. 7: Liver cells of rats given 2g/kg acetaminophen treated with 400mg/kg Carica papaya leaf extract

Fig. 8: Liver cells of rats given 2g/kg acetaminophen treated with 500mg/kg Carica papaya leaf extract
During the past years, the scientists have been engaged in the development of hepatoprotective agents from medicinal plants which perform a significant part in the management and treatment of liver disorders. *Carica papaya* leaf extract has a reputation as a tumour-destroying agent [4] and has also known to exhibits both anti tumour activity and immunomodulatory effects [12]. The quantitative phytochemical analysis of leaf extract of *Carica papaya* revealed the presence of some bioactive compounds such as flavonoids, alkaloids, saponins, total phenolics and tannins [13]. However, the hepatoprotective, anti-inflammatory, medicinal effects of *Carica papaya*, are as a result of the phytochemicals present.

The increase in the enzyme activity serum signifies damages to the liver enzymes. Nevertheless, damage to the liver cells makes the liver cells (hepatocytes) membrane water-permeable allowing some of the enzymes to leak out into the blood circulation. Generally, any impairment to the liver will cause elevations in blood of transaminases. However, the presence of elevated transaminases, (ALT and AST) indicates liver damage [14]. Different studies showed previously that overdose of acetaminophen in mice and rats can cause severe and extensive necrosis cell in the centrallobular area in the liver and increased serum enzymes levels in rats which is in line with the outcome of the present work [15,16]. Necrosis or liver injury discharges the enzyme into blood circulation, raising the levels of serum enzymes and hence can be measured in the serum. ALP is a marker enzyme for the plasma membrane and endoplasmic reticulum [17], it is occasionally employed to assess the integrity of plasma membrane of liver [18]. The significant increase in ALP activity (Table 1) after administration of extract may be due to disruption of liver plasma membrane. Increased in the levels of serum enzymes indicates cellular leakage and loss of functional integrity of cell membrane in liver [19].

[20] reported that the mechanism of hepatotoxicity of paracetamol has been studied extensively. The toxicity occurs because of its reactive metabolite, N-acetyl-p-benzoquinone imine (NAPQI). NAPQI exerts its toxicity mainly through its oxidative effects on cellular proteins sulphydryl compounds are among the most important endogenous antioxidants. Glutathione (GSH) is the main intracellular non protein sulphydryl and it plays an important role in the maintenance of cellular proteins and lipids in their functional states. NAPQI binds to GSH, forming a conjugate which results in conversion of GSH to GS-G (oxidized form of glutathione). When GSH is lowered, the toxic effects of oxidative insult are well pronounced, resulting in increased membrane and cell damage. At this point, others protein and non-protein sulphydryl groups present in the cell provide an important alternate protection [21].

In this study, acute liver damage was instigated by administration of acetaminophen at an orally dose of 2.0g/kg. Administration of acetaminophen led to a significant (p<0.05) increase of hepatic enzymes in the serum when compared to group I (control). There was a significant (p<0.05) regeneration of these enzyme levels in the liver on administration of the leaf extract in a dose dependent manner and also by vitamin E at a dose of 200mg/kg (Table 1 and 2). The high levels of hepatic enzymes in the serum of acetaminophen-induced hepatic injury became significantly reduced by the extract due to its membrane stabilizing activity and its antioxidant property. Thus, the leakage of intracellular enzymes was prevented. This agrees with the fact that serum levels of transaminases return to normal with the healing hepatic parenchyma and the regeneration of hepatocytes [22].

The findings from the work were further confirmed by histopathological study of the liver. The histopathological examination clearly reveals that the liver sections from the group III given only 200mg/kg *Carica papaya* ethanolic extract (Figure 3) showed no significant morphological change when compared to the group I (control) (Figure 1). Liver section from the group I showed normal lobular structures with a normal hepatic cells and a well- preserved nucleus. It also showed neither portal inflammation nor any morphological changes.

Liver sections from the rats given acetaminophen only (Figure 2) showed chronic inflammation, hepatocellular necrosis, massive fatty changes, nuclear form of enlargement and cytoplasmic inclusion fibrosis, compared to control group (Figure 1) and all other groups (Figures 4-8). Treatment with 200mg/kg *Carica papaya* extract only, 200mg/kg Vitamin E, and (200-500) mg/kg doses of *Carica papaya* leaf extract revealed that the hepatic cells from these groups have no significant differences when compared to control group, showing maximum hepatoprotective and therapeutic effects. Furthermore, the results showed that the group III (200mg/kg *Carica papaya* extract only) and group V (2g/kg acetaminophen +200mg/kg *Carica papaya* extract) were more effective than other doses of the extract and Vitamin E standard.

These morphological changes in the liver cells of rats given only acetaminophen might be due to oxidative stress resulting from toxicity of acetaminophen on the hepatic cells. The reversal and restoration of all the biochemical enzymatic assays and histological alterations caused by acetaminophen which was restored by the administration of *Carica papaya* leaf extract. This might be due to antioxidant property of the extract which healed and preserved the hepatic tissue from possible acetaminophen-induced oxidative stress which could lead to hepatic damage as observed in Figure 2.

**V. CONCLUSION**

Thus, in conclusion, *Carica papaya* ethanolic leaf extract can be regarded to be an effective hepatoprotective and therapeutic agent that brings remedy or restores the damage caused by acetaminophen (the major active ingredient in paracetamol) to the liver function. Hence the extract can be used in drug formulations and to provide a synergistic effect with other hepatoprotective drugs and thereby preventing the hepatocellular diseases.

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Trade Credit and Performance of Wholesale and Retail Businesses in Kenya

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Abstract- In Kenya most businesses do not have enough internal finances to re-invest in their businesses and therefore they seek external finances which they obtain from various sources and it is not clear which source of finance contribute most to their improved performance and hence this study. Purposely this study was to determine the effect of sources of finance on the performance of wholesale and retail businesses in Kenya. The specific objective was; to identify the effect of trade credit on performance of wholesale and retail businesses in Kenya. The population of the study was all the 1.56 Million businesses in Kenya. The target population of the study was 510,000 licensed businesses in the selected counties. The accessible population was the 310,000 licensed businesses in the six selected counties by operational wholesale and retail trade. Simple random techniques were used to collect a sample of 384 respondents. Secondary and primary data was used to provide information which was quantitative or qualitative. Through a structured questionnaire data was collected and these questionnaires were dropped and later picked as the method gave respondents enough time to think about their responses carefully without interference. Determining of the reliability of the questionnaire was done by using Cronbach Alpha. The study made use of Statistical Package for Social Sciences (SPSS) version 22.0 to aid in coding, entry and analysis of quantitative data. By using regression and correlation analysis data was analyzed and this helped to test the connection between the independent and dependent variables. Data was analyzed by use of descriptive and inferential statistics and then presented through figures, tables, percentages, arithmetic means, standard deviations and tabulation to show differences in frequencies. The findings of the study revealed that there was a statistical significant relationship between the independent variables and the dependent variable. Businesses preferred to use simple credit over hire purchase as in the simple credit there was no interest that was charged. The study concluded that there was no one source of finance that fully contribute to the performance of the businesses in Kenya. The study recommended further research to be conducted to determine the other factors that influence performance of businesses other than the sources of finance.

Index Terms- Trade credit, performance, wholesale and retail businesses

I. BACKGROUND OF THE STUDY

Wholesale and retail trade sector is one of the key sector that have been outlined by vision 2030 for transformation of the Kenyan economy to a trade competitive economy. In 2015 the GDP of the Kenyan economy improved to 5.6 from 5.3 in 2014 and one of the key contributor to this growth was the wholesale and retail sector (KNBS economic survey, 2016). In the current global economy, all business enterprises are progressively being regarded as very powerful engines for economic empowerment and development for most economies in the world (Apalia, 2017). According to White, Maru and Boit (2015) all businesses play a key role in economic growth by providing a source of innovation and in creating new products. Economies throughout the world are now days turning their attention to small and medium business enterprises due to the recognition as the powerful engines that drive the economic development of a country through job provision, contribution to GDP and tax provision among other things (Kangala, 2016). According to Nderitu and Githinji (2015) in the recent decades small and medium business enterprises are proofing to be the primary engines of the performance of any economy in the world.

Small and medium business enterprises are now days being viewed as important players in even and equitable economic development (Muriithi, 2017). According to the Kenyan small and medium finance survey (2018) small and medium business enterprises up to date continue to create jobs and highly boost the gross domestic product of any country, but these business enterprises they still face challenges that hinder their growth and development in one way or the other. The significant contributions of small and medium business enterprises contribute to GDP, entrepreneurial skill development, employment generation and innovation to many developing economies (Quaye & Sarbah, 2014).

According to Muriithi (2017) small and medium business enterprises are the engine that drives world economies and push for industrialization for both developing and developed economies. Small and medium business enterprises are the centerpiece of any economy in the world however limited access to finance may adversely affect the business operations and seriously limit their development and growth (Nderitu & Githinji, 2015). According to Quaye and Sarbah (2014) access to credit and finance continue to pose a barrier to small and medium business operations and development in any given country. According to Mamba (2011) small and medium business enterprises are the vehicles that ensure increased industrial production and exports improvement.

According to Kangala (2016) there is no doubt that access to finance is of crucial importance for the ongoing and sustainable growth and profitability of small and medium business enterprises.
Promotion of the wholesale and retail trade sector in Kenya is very important for attaining the national goals and vision 2030 (Wambui, 2015). According to Sitharam and Hoque (2016) a very strong small and medium business enterprises contributes highly to the country’s economy, contributing to the gross domestic product (GDP) by reducing the level of unemployment, reduction in poverty levels and promotion of entrepreneurship activities. Any business enterprise is very important engine for job creation, innovation, poverty eradication hence main driver for economic growth and development (Katua, 2014; Emad, Suhail & Jabbar, 2014). Small and medium business enterprises are important for rapid technological development and provision of job opportunities in any country (Njeru, 2013).

One of the major causes of failure for small and medium business enterprise is limited access to finances (Njagi, Kimani & Kariuki, 2017). Small and medium business enterprises are very important and are the backbone of emerging economies and are a key source of income for most people in the country (Economic survey report, 2017). It is clear that finance helps catalyze savings and deploy capital into investments (Muriithi, 2014). However, accessing the right type of finance at an affordable cost is the fundamental financing difficulty for most of the business enterprises (Quaye & Sarbah, 2014). Sourcing finance is one of the big problems hindering start up and growth of business enterprises, in that the type of finance determines success of the business (Njeru, 2013). According to Njagi et al., (2017) when a wrong mix of funds are used then the performance of the business is adversely affected.

Small and medium business enterprises encounter many problems which make them perform poorly and reduce their growth (Kamunge, Njeru & Tirimba, 2014). Finance is very important for the betterment and development of any business enterprise (Kamau, 2011). According to Akinyi (2014) finance is very crucial to any business and is totally seen as the life-blood of any kind of business enterprise and no business unit can do well without enough monetary resources for investing. According to Muturi (2012) Increasing the rate of economic growth depends heavily upon having the financial resources which are highly required for investment. Finance is usually an important aspect that contributes to development of business enterprises, whether at their initial stage or at their subsequent stages in life (Onyiego, Namusonge & Waiganjo, 2017).

There are many kinds of financing sources that can be adopted for financing small and medium business enterprises and it is important for the business to choose the correct and appropriate financing sources to solve the financial difficulties (Kangala, 2016). Increasing the rate of economic development depends heavily upon having the finance required for investment (Rosana & Muturi, 2014). Financing is very much considered for the any business growth since it enables the firms to market their goods and services, expand production capacity, and sustain sufficient operating cash flow (Grover& Suominen, 2014). Business enterprises should always raise finance in the most efficient and effective means to enjoy tax allowances, low cost of funds, liquidity and reduce overall risk of the business (Kenduwo, 2014).

Financing Challenges for small and medium business enterprises

The vital role played by the small and medium business enterprises both in developing and developed countries continue to be noticed as the core driver of these economies (Wangui et al., 2014). According to Yoshino and Taghizadeh (2016) small and medium business enterprises are recognized as the backbone of the Asian economy where by they make up more than 98% of the Asian enterprises 38% of the GDP, 66% of the labour force and 30% of the total exports. Despite the vital role by these small and medium business enterprises they however face several challenges ranging from limited access to finance, under developed sales channels, low level of financial inclusion which are just some of the factors behind the slow growth and development of these ventures (Wanambisi & Bwisa, 2013).

Small and medium business enterprises in India play a very significant role in employment creation and industrial development (Yadav & Tripathi, 2018). Despite the critical role played by small and medium business enterprises in India lack of access to relative cheap and effective source of finance has been identified as a major factor hindering economic contribution in terms of growth and development (Abdulaziz & Andrew, 2013). According to Varsha, Ujjawal, Ajit and Khan (2019) small and medium business enterprises are the driving stone of any economy both the developed and developing. In India small and medium business enterprises are faced with challenges like unavailability of raw materials, lack of improved technology, unstable government policies, lack of skilled work force, no proper clarity in business tax rates and lack of funding (Muriithi, 2017).

According to Wangui, Njeru and Tirimba (2014) small and medium business enterprises are seen to be the key driver of the economic and social development in most of the African countries as these business enterprises account for more than 90% of all the businesses and over 80% of the new jobs in many countries. In Ghana small and medium business enterprises account for 90% of the total business units, 85% of the manufacturing employment and 70% of the GDP but despite all these critical contribution by these small and medium business enterprises are crucial in improving economic growth and eradicating poverty (Taiwo, Temiotepe & Agwu, 2016). In Nigeria small and medium business enterprises are faced with challenges like inadequate capital and inaccessible credit facilities with lack of access to relative cheap and effective source of finance identified as a major factor hindering economic contribution in terms of growth and development (Abdulaziz & Andrew, 2013).

According to Muriithi (2014) in Kenya small and medium business enterprises are the backbone of the Kenyan economy and they account for more than 80% of the workforce and contribute over 40% of the GDP. Despite the big contribution to the economic development, these business enterprises are unable to grow and become big ventures due to various challenges like financial constraints, poor management skills, inadequate information, poor technology, lack of collaterals required to take bank loans, delay in processing the loans and corruption, high cost of repayment, short repayment period and high processing fees in getting the funds (Wangui et al., 2014).
According to Ombongi and Wei (2018) business enterprises in Kenya do not only have a share in the GDP but also provide a large portion of the employment openings where they provide 85% of the Kenyan employment. Even though small and medium business enterprises are big contributor of the Kenyan economy they face challenges that hinder their growth and some of the challenges are unfavorable government policies, weak financial institutions and access to finances as a major problem (Wangui et al., 2014). The small and medium business enterprises in Kenya are faced with problems like lack of sufficient collateral, regulatory rigidity, gaps in legal framework, lack of information from both the the businesses and banks with the major challenge being identified as lack of access to finance (Onyiengo, Namusonge & Waiganjo, 2017).

According to Janet and Ngugi (2014); Muriithi, (2017); Githire and Muturi, (2015) most small and medium business enterprises do not celebrate their third anniversary. Business enterprise failure may lead to social crimes with high probability of insecurity, low liquidity in the economy and losses of jobs and this result to threatening economic development and Kenya realization of vision 2030 (Janet & Ngugi, 2014). For business enterprises to effectively and efficiently carry out their set operations there is need for adequate finance (Oteng et al., 2015). According to Wangui et al., (2014) without adequate finances no business entity can achieve its set goals.

According to Njeru (2013) access to appropriate finance sources is an important factor for the survival and growth of any business enterprise. Wangui et al., (2014) clearly shows that finance is the backbone for growth and development of the business enterprises for both developing and developed countries. Access to finance in Africa is the major challenge facing small and medium business enterprises hence the main hindrance to growth and development and this limit the survival of these ventures (Muriithi, 2017). An important question then arises on what sources of finance significantly contribute to the best performance of the wholesale and retail businesses in Kenya. Then this study aimed at determining the effect of sources of finance on performance of wholesale and retail businesses in Kenya.

**Finance sources for wholesale and retail businesses in Kenya**

Wholesale and retail trade sector as outlined in vision 2030 is one of the powerful sectors to improve the Kenyan economy through provision of products and creation of employment. Small and medium business enterprises have been recognized as a greater contributor to the Kenyan economy offering both employment and platform for innovative ideas (Wambui, 2015). The small and medium business enterprises offer about 75% of the general employment and contributing about 18% of the GDP in the Kenyan economy (Kangala, 2016). Businesses in Kenya serve as live blood to the poor; create employment opportunities, generate income and contribute to economic growth (Mukoma & Masini, 2015). According to Wangui et al., (2014) small and medium business enterprises play the role of job creation, alleviating poverty and promoting industrialization.

According to Katua (2014) small business enterprises have been accepted as the core engine of economic growth and poverty eradication in the world and created 80% of the jobs in Kenya. Kenyan wholesale and retail trade sector is growing in its importance; as small and medium business enterprises are estimated to account for 20% of GDP and 80% of employment hence business enterprises have the scope to catalyze further industrialization in Kenya (Phyllis, 2016). According to Mwangi and Maranga (2015) in Kenya businesses are big contributors for economic growth and good financial performance of these entities is always very important and it is critically attributed with their economic contribution in one level or the other. Improved access to finance has high probability of benefiting business enterprises of all sizes (Kangala, 2016).

The availability of finance has been highlighted as a major factor in the development, growth and successfulness of any business enterprise (Abdulaziz & Andrew, 2013). Different businesses differ in their financial decisions and behavior and then use different financing methods, it is important for every business to choose the best source of finance (Njeru, 2013). Wholesale and retail trade sector as stated in vision 2030 is one of the key sectors in economic development as the sector may be more efficient in provision of jobs, innovation and provision of goods and services and for this reason the government of Kenya pays a special attention to the development of more efficient wholesale and retail businesses in the country. In Kenya businesses are divided into agriculture, trade, manufacturing and provision of services. This really shows a clear confirmation that Kenya business enterprises are mostly engaged in all sectors of the economy and then seen to have a big economic contribution and they support a large number of live hoods (Kangala, 2016). The government of Kenya has specified a number of key sectors that will prove instrumental in reaching its goals and mostly a middle income economy by 2030. In this plan, the government has aimed to create robust diversified and competitive small and medium business enterprises.

According to Abdulaziz and Andrew (2013) financing methods used by businesses may vary from internal financing sources like owners personal savings and retained profits or informal sources which may include informal money lenders and rotating savings and credit associations or formal external sources which may include bank loans and loans from other financial institutions or outside sources which may include financial assistance from family and friends, trade credit, angel investors or venture capitalist. For example in Kenya most startup business enterprises are financed through bootstrapping (internal equity financing) which means that the entrepreneur has to use personal savings at the beginning, which is only possible if the start-up does not require a big investment and if no financial investment has to be covered by third parties (Njagi et al., 2017).

According to Njeru (2013) 60% of small and medium business enterprises are financed by internal equity finances (self financing) in terms of personal savings and retained earnings. According to Onyiengo et al., (2017) most of the business enterprises at the initial stage prefer using internal equity financing in terms of personal savings due to the inability to secure loans from banks. Mostly the advantage of this approach is that the trader will have full control of the business (lack of co-owners), while on the other hand, the demerit is that the trader can be in some kind of isolation if he/she is young and less experienced and there is no help from experienced partners and business contacts.

In both developed and developing countries the government have recognized that small and medium business enterprises may be very much constrained from accessing external financing which may negatively affect the business ability on achieving the set
objectives. Due to this many government initiatives and programs have been implemented to ensure easier access to financing (Abdulaziz & Andrew, 2013). For example the Government of Kenya has placed a lot of emphasis on development of small and medium businesses as a means of encouraging self-employment, poverty reduction and accelerating economic growth. According to KNBS Economic survey (2017) the Uwezo fund was established in the year 2014 with the main objective of expanding access to finance for the youth and women businesses. The Uwezo funds aims to expand access to finances and promotion of women and youth and persons living with disability.

Women enterprise fund is one of the flagship projects under the vision 2030 and in the year 2015 the government loans disbursed through women enterprises increased from 169 Million to 524 Million from 2014 (KNBS Economic survey, 2016). The Kenyan government value the very high worthiness of the small and medium business sector to her economic development and for this reason the government has initiates finance schemes such as youth and women fund and Uwezo fund with a view to finance small and medium business enterprises (Njagi et al., 2017). The Uwezo microfinance is regulated by the central bank of Kenya under the micro finance Act of 2006. The organization specializes in providing financial services to micro, small and medium enterprises nationwide. Uwezo funds and MFIs offer financial solutions and improve the livelihood of the citizens.

According to Abdulaziz and Andrew (2013) Majority of the formal financial institutions consider small and medium business enterprises as highly risky and commercially unviable, thus hindering from accessing credit and worse case is in the rural areas where most small and medium business enterprises are located. According to Mamba (2011) small and medium businesses in Africa and Kenya in particular require long term source of finance for them to grow. It is hard for the small and medium business enterprises to access finances from the financial institutions since they lack proper financial records as a requirement (Njagi et al., 2017). Banks do not provide enough support to small and medium business enterprises (Chimaleni et al., 2015). Most banks in Kenya require small and medium businesses to provide collateral that includes land title deeds, motor vehicle log books, guarantees, listed shares, as well as cash in the form of deposits since these collateral is limited to most businesses use of bank loans is difficult with these business enterprises (FSD Kenya & Growth Cap, 2016). In Kenya about 70% of the small and medium business enterprises get their initial capital by borrowing from family, friends and relatives (Njeru, 2013). According to Kamau (2011) in Kenya mostly small and medium business enterprises rely on borrowing from family, friends and relatives or self-financing as their main source of finance.

Majority of the small and medium business owners are too poor to enable them accumulate substantial savings for investments in income generating projects in order to break away from the vicious circle of poverty therefore they need external finance (Rosana & Muturi, 2014). According to Njeru (2013) in Kenya more than 90% of new business ventures are financed by informal sources of finance. Informal finances has the merit of flexibility and convenience, few restrictions and more affordable compared to formal financing (Muturi, 2012). In Kenya there is relatively strong competition between banks, Micro finance institutions (MFIs) and deposit taking Micro Finance Banks, (MFBS) to support and finance business enterprises in Kenya (FSD Kenya & Growth Cap, 2016). According to Mwenga (2014) small and medium businesses in Kenya are provided with financial services by a range of institutions; banks, non-bank financial institutions, savings and credit cooperatives (SAACOs), microfinance institutions and alternative sources.

Insufficient access to long-term finance for small and medium business enterprises has forced most business enterprises in Kenya to rely on high cost short term finances (Njagi et al., 2017). According to Muriithi (2014) Personal income, Bank loans, Venture capital, Leasing, Sale of shares, Government loans and Microfinance loans are used to finance most small and medium business enterprises in Kenya, but commercial banks find it difficult to finance these small and medium business enterprises as they consider them as high risk clients. The government of Kenya channels financial assistance to small and medium business enterprises through reputable MFIs and other financial institutions in an effort to reduce poverty (Apalia, 2017). According Abdulaziz and Andrew (2013) countries with less developed banking and financial systems have pronounced use of trade credit to support their businesses. In Kenya small and medium business enterprises make use of trade credit to finance their operations (Kapkiyai & Mugo, 2015).

II. STATEMENT OF THE PROBLEM

Despite the critical role played by the wholesale and retail trade sector in the Kenyan economy in terms of growth and development through creation of employment, contribution to GDP, alleviation of poverty and provision of tax revenue among many other importance there are many factors that challenge the business growth and survival in the sector. Finance has been cited by many researchers as the major constraint which limit the ability to drive the economy growth and development as expected (Njeru, 2013, Wangui et al., 2014, Muriithi, 2017 and Ombongi & Wei, 2018).

According to Muturi (2012) in many African countries the informal financial sector co-exist with the formal financial sector. The implication is that the informal financial sector can not meet all the financial needs of a business hence the need to seek finances from the formal financial sector. According to Muriithi (2017) most of the business enterprises in Kenya lack adequate internal finances and the implication therefore is that business enterprises do not have enough internal finances to meet the business needs at different levels of growth and development, hence they seek external finances. Most of the business units in Kenya do not have enough internal finances for financing the business activities hence they seek extra finances from external sources (Wangui et al., 2014).

According to Ombongi and Wei (2018) business enterprises do not have enough internal finances for re-investment in their business and then they have to seek external sources of finance to supplement the internal finances. This clearly shows that for effective growth and development of any business enterprise use of both internal and external finances must be witnessed. However it is not clear which source of finance contribute to a better performance of the wholesale and retail businesses hence the need for this study. An important question then arises on what sources
of finance significantly contribute to the best performance of the wholesale and retail businesses in Kenya. Then this study aimed at determining the effect of sources of finance on financial performance of wholesale and retail businesses in Kenya.

Considering previous studies done on influence of sources of finance on business performance for example Njagi et al., (2017) studied on capital structure and financial performance of small and medium business enterprises in Embu county, Kenya. The findings of the study implied that sources of finance affects the financial performance of the business. Their study only collected data from only one town and used a small sample size of 60 SMEs hence these findings may be difficult to generalize to the Kenyan economy. Ndemi and Mungai (2018) using a sample size of 88 SMEs studied formal credit financing and financial performance of small and medium business enterprises in Nanyuki town, Kenya. The study identified a positive association between formal financing and financial profitability of SMEs. Onyiengo et al., (2017) using a sample size of 320 SMEs studied the effect of access to finance on financial performance of SMEs in Mombasa county Kenya. The results of the study showed that access to finance has a significant effect on financial performance of the business. This study had a gap as it had a limited scope since it only collected data form one county.

Mwangi and Maranga (2015) using a sample size of 40 SMEs studied the effect of capital structure on the financial performance of small and medium enterprises in Thika sub-county, Kenya. The findings of the study showed no significant effect of capital structure on financial performance of the business. Most of the previous studies considered had a gap in the scope of study, yielding conflicting results where some studies showed positive effect while others were negative also the sample used in some studies was small in size. This study filled this gap by considering more sectors of the economy which included wholesale and retail sector. The study also increased the study area by considering six counties other than a town or sub-county or one county. More so from the previous studies it is not clear which source of finance contributes most to the improved performance of wholesale and retail businesses in Kenya and hence this study was conducted to fill these gaps.

Objectives of the study

Generally this study was aimed at determining the effect of sources of finance on the performance of wholesale and retail businesses in Kenya.

Specific Objectives

The study was guided by following specific objective. To identify the effect of trade credit on the performance of wholesale and retail businesses in Kenya.

Theoretical Framework

The study was guided by the following theories;

The trade-off theory

The developers of this theory were Modigliani and Miller (1958). This theory describes the concept that a company makes a choice on how much debt and how much equity to use by weighing the costs and benefits and balancing them out. The important part of this theory is to explain the fact that business units are usually financed partly with debt and partly with equity. The theory shows that there are merits of debt which may include tax benefit but on the other hand there are costs of debt which may be costs of financial distress including bankruptcy costs of debt. The marginal benefit of any increases in debt mostly decreases as debt increases, while the marginal cost increases. According to Myers (1984), the firm target capital should consider the benefits and costs of debts.

The target is determined by balancing debt tax shields against costs of bankruptcy. This theory is important as it helps the finance managers to make viable decisions when financing the business to ensure that benefits of the debt are more than costs. Trade off theory predicts a positive relationship between leverage and the profitability of the firm as bankruptcy costs decreases when the profitability of the firm increases. According to this theory many firms prefer to use debts due to the benefits like tax shields associated with them. The implication of this theory is that any firm has a specific maximum amount of debt. The empirical relevance of the trade off theory has been questioned. Myers (1984) suggested that if this theory was true, then firms in the real world ought to have much higher debt levels than we observe in reality. Large firms tend to have a greater diversification of activities that implies less likelihood of bankruptcy. According to trade off approach large firms tend to increase their level of debt so as to increase the debt tax shields. The usefulness of this theory to this study was testing the effect of debt financing on the financial performance of wholesale and retail businesses in Kenya.

Pecking Order Theory

Donaldson in 1961 suggested Pecking order theory and it was modified by Stewart Myers and Nicolas Majluf (1984). According to this theory firms are financially constrained due to the information asymmetry between managers/ owners and investors and then firms adopt a hierarchy in selecting sources of finance. According to this theory firms have to rank their sources of finances (Njagi et al., 2017). Depending on this theory firms have three main sources to fund the financial needs which are internal funds, debt and new equity. The theory claims that mostly firms prefer to use firstly internal finances such as excess liquid assets or retained earnings (Abdulaziz & Andrew, 2013). If it is necessary to turn to external finance firms use debt with little or no risk, which usually corresponds to short term debt and in the last place, firms will select external equity (Njagi et al., 2017) .

According to Abdulaziz and Andrew (2013) puts it that finances contributed internally are preferred by business enterprises since they are usually very cheap and easier to arrange for by giving a short notification. If internal financing is not sufficient to fund investment projects, external funding may be sourced and if they do, in order to minimize costs the managers have to choose debt before using equity. According to Njeru (2013) internal finances are preferred to firms because they are cheaper and easier to get at a short notice. This theory observes that businesses follow a hierarchy of financing and prefer internal financing first; debt is preferred over equity as equity would mean bringing external ownership into the company. The POT may fail...
to hold for some business units where information asymmetry is an important problem (Njagi et al., 2017).

POT is important as it signals to the public how the company is performing. This means if the company finances itself internally it means it is a strong company and if the company has external financing then this shows high level of confident that the company has high chance of satisfying its obligations (Wahome, 2017). According to this theory firms prefer equity when they perceive that its relative cost is low otherwise debt finance would be appropriate. (Njagi et al., 2017) observed that managers or business owners will use those financial tools that appear to be more favorable in the moment they need financing. Managers or business owners seek equity finance even when growth opportunities do not exist, so that such cash flow can be used for perquisites rather than for enhancing firms’ value.

Manager wants free cash flows to invest in unprofitable project that generate cash so that salaries or perquisites may be enhanced rather than service debts. This means managers and business owners will use the financial tools that appear to be more favorable in terms of cost in the moment of financing the business (Njagi et al., 2017). If pecking order theory applies then it means that higher profitability will always corresponds to a very lower level of debt ratio. Pecking order theory shows a negative relationship between leverage and profitability. The critique of Pecking order theory is that it does not explain the influence of taxes and financial distress. The theory assumes that there is no target capital structure. The firms choose capital according to the following preference order; internal finance, debt finance and then equity finance. This may not be the case for most business enterprises as they may lack retained earnings (Abdulaziz & Andrew, 2013). The theory was useful to this study by testing the effect of internal equity financing on performance of the wholesale and retail business enterprises in Kenya.

**Conceptual Framework**

According to Mugenda and Mugenda (2003), a conceptual framework is a model that gives an in-depth explanation on the connections between the dependent and predictor variables. The purpose of a conceptual framework is to assist the reader to quickly see the proposed relationship between the independent and dependent variables (Memba, 2011). In this study the dependent variable; the performance of business and it contains element indicators that show the performance which include profit, ROA and ROE. The independent variables of the study was sources of finance which included formal loans, trade credit, Internal equity finances (Internal finances) and informal finances. The moderating variable was the business size which was (Assets and number of employees).
Trade credit

Trade credit is where the supplier delivers goods and services to their customers and payment is made at a deferred date (Vicente, 2012). Trade credit is an agreement between the supplier and the trade customers to delay payment of goods or services after they are delivered or provided (Abdulaziz & Andrew, 2013). It is where by the supplier agrees to provide raw materials or final products and the payment is made on a later date (Njagi et al., 2017). The credit period is normally determined by the institution
allowing the credit, and as agreed upon by both parties (Vicente, 2012). Trade credit amount may be determined by the type of products, where if they are fast moving or which have high turn over may need a shorter credit term, since the products which have slow turn over take long to generate cash flows may then need longer credit terms, the financial capability of the seller also influences the amount of credit the debtor should receive, buyers credit worthiness is also a very important factor in determining the credit amount and period of payment (Kapkiyai & Mugo, 2015). With the use of trade credit, borrowers might encounter capital market imperfections in the form of asymmetric information and transaction cost (Quaye & Sarbah, 2014).

Suppliers give credit to business enterprises hoping that the business will make profit and will have high ability to pay back (Njeru, 2013). Trade credit is a very vital external source of working capital financing and mostly it is a short term credit extended by the suppliers of goods and services in the usual course of the business to a debtor in order to increase sales. According to Mwangangi (2013) trade credit may have features like there are no formal legal instruments or acknowledgement of a debt, it is normally an internal arrangement of the buyer and the seller, it is a spontaneous source of financing and it is very expensive source of finance if the payment is not made within the agreed discount period. Trade credit is said to have merits like reducing the capital requirement, it is easy and automatic source of short term finance, it helps the business to focus on its core activities and it is also said not to require any negotiation or formal agreement between the creditor and the debtor (Waithaka & Njeru, 2015).

Trade credit is important mostly to the businesses with low probability in getting external funding through credit institutions such as banks (Kapkiyai & Mugo, 2015). According to Waithaka and Njeru (2015) trade credit is a very important alternative financing to bank loans for any business unit in any economy. Trade credit can be applied by firms to increase sales volumes and thus profitability but can cause liquidity problems if not efficiently managed (Mwangangi, 2013). The main reason why firms sell on credit is to expand their sales and maintain the market share (Omondi, 2014). If the firm sells on credit it incurs incremental production and selling costs, administration costs such as credit investigation and supervision costs and collection costs such as bad debts increases (Kapkiyai & Mugo, 2015).

When the buyer buys the goods on credit one has the advantage of not paying for the goods immediately and then the available cash can always be retained for other short term business needs (Njagi et al., 2017). Suppliers usually have more information on customers and they tend to give them credit more as compared to banks (Waithaka & Njeru, 2015). Credit to the buyer by the supplier informs the buyer that the seller really trust the buyer and has high confidence that the buyer will always pay their bills when due and this makes the buyer to continue purchasing (Kapkiyai & Mugo, 2015). When sellers give goods on credit they don’t receive cash immediately and this may reduce their cash flow for some time (Njagi et al., 2017).

More so when sellers give goods on credit they may need to obtain some reports on the credit worthiness of the customer (Waithaka & Njeru, 2015). A seller who sells goods on credit has an advantage over the competitors who do not offer credit because the seller may make more sales hence increasing the profit margin of the business and also have high probability of retaining many customers (Njagi et al., 2017). Trade credit is mostly given without interest charges so long as the buyer pays their balance on time. Mostly businesses that operate on credit terms may extend to their customers different types of discounts to encourage them pay for the goods promptly this not the case with the banks (Waithaka & Njeru, 2015). Trade credit is a very important source of financing for firms.

According to Abdulaziz and Andrew (2013) firms increase the level of trade credit used when their alternative sources of finance are limited. The supplier by using the trade credit has an advantage over traditional and more formal systems of financing (Njagi et al., 2017). The supplier can be able to investigate the credit worthiness of their clients and has better ability to monitor and enforce repayment of credit. The supplier has a cost advantage over financial institutions in offering credit to a buyer (Waithaka & Njeru, 2015). The delayed payment can allow the buyer to verify the quality of the products (Njagi et al., 2017). The suppliers are said to have advantage of information acquisition and this may be true since the supplier may visit the buyers premise more often than any other financial institutions would and to the supplier this information is of low cost and quickly accessible (Waithaka & Njeru, 2015). When trade credit is compared with formal loans then the creditor is said to have advantage of controlling the buyer since the financial institution have limited powers over the buyers, unlike the supplier who may threaten to cut future supplies in the event the borrower action indicates reduced chances of repayment (Kapkiyai & Mugo, 2015).

The supplier is also said to have advantage in salvaging value from existing assets since incase the buyer defaults in repaying for the goods supplied the supplier takes the supplied stock and resale thus saving the assets of the buyer. This will be at a lower cost than a financing institution since they will require to sale the collateral assets to pay off the firm’s loan. The supplier also has the advantage of an established network for resale of the good recovered. The liquidation advantage derives from the ability of the supplier to extract greater liquidation value from the inputs collateralized in case of default (Mwangangi, 2013). Trade credit may involve the open accounts or simple credit where if the supplier is satisfied with the credit worthiness of the buyer the goods are dispatched as requested by the buyer (Waithaka and Njeru, 2015). Trade credit amount may be determined by the type of products. If the products are fast moving or which have high turn over may need a shorter credit term. Since the products which have slow turn over take long to generate cash flows may then need longer credit terms. The financial capability of the seller also influences the amount of credit the debtor should receive. Buyers credit worthiness is also a very important factor in determining the credit amount and period of payment (Kapkiyai & Mugo, 2015).
III. RESEARCH METHODOLOGY

Research Design

Kombo and Tromp (2006) explain research design as the glue that puts all the components in a research project together. The study made use of descriptive research design. Descriptive design is a method of collecting information by distributing a structured questionnaire to a sample of individuals or interviewing the individuals. This research design is appropriate for answering questions on the current state of affairs (Stangor, 2011). A descriptive research design attempts to describe things like attitudes, values, possible behaviours and characteristics and it also allows for collection of large data which enables the researcher to generalize the findings to the large population (Mugenda and Mugenda, 2003).

A research design is the glue that holds all of the elements in a research project together. A design is used to structure the research, to show how all of the major parts of the research project work together to try to address the central research questions (Kombo & Tromp 2006). Orodro (2003) defines research design as the scheme outline or a plan that is used to generate answers to research problems. A research design can be regarded as an arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance with the research purpose. It is the conceptual structure within which research is conducted. It constitutes the blue print for the collection, measurement and analysis of data (Kothari, 2003). A research design is a plan showing how the problem under investigation will be solved. The function of a research design is to ensure that the evidence obtained enables the study to answer the research question as unambiguously as possible.

The study design adopted for this study is descriptive survey design. The descriptive design is a method of collecting information by inter-viewing or administering a questionnaire to a sample of individuals (Orodro, 2003). It can be used when collecting information about people’s attitudes, opinions, habits or social issues (Orodro & Kombo, 2002). Descriptive design is appropriate since it answers questions on the current state of affairs as it provides a “snapshot” of thoughts, feelings, or behaviors at a given place and time (Stangor, 2011). The design was used because it was appropriate in the collection of original data about selected units in the problem areas and offers making descriptive assertions about a large population relying on pre-existing information. Since the design uses one or more variables to collect data and then attempts to explain the status of the variables, it was used to describe the relationship between sources of finance and financial performance of business enterprises in Kenya.

Research philosophy

Research philosophy is a belief about how data about a phenomenon should be gathered, analyzed and used (Jackson, 2013). The fundamental question in any field of study concerns what constitutes acceptable knowledge in that field. Ihuah and Eaton (2013) noted research philosophies to include: positivism, epistemology and Constructivist among others. The main philosophy that guides social scientist researchers is positivism. Epistemology poses questions on what is the relationship between the knower and what is known (Jackson, 2013). Constructivist philosophy sees the world as constructed, interpreted and experienced by people in their interactions with each other and with wider social systems. It believes that the truth and meaning do not exist in some external world but are created by the subjects interactions with the world meaning that it is constructed but not discovered. The purpose of inquiry is to understand a particular phenomenon not to generalize to a population (Antwi & Hamza, 2015).

Positivism is a philosophy of science that seeks facts of social phenomena with little regard for the subjective status of an individual (Ihuah & Eaton, 2013). Positivism says that reality exist external to the researcher and must be investigated through the rigorous process of scientific inquiry. It believes that the world is independent of our knowledge of it, “it exist out there”. The study adopted the positivist philosophy which advocates for an objective interpretation of reality using hard data from surveys that are structured, formal, and have a specific and detailed plan (Antwi & Hamza, 2015). The data collection focuses on gathering hard data in the form that enable evidence to be presented in quantitative form. Researchers who work from this perspective explains in quantitative terms how variables interact, shape events and cause outcomes (Ihuah & Eaton, 2013). In positivism philosophy the research and researcher are independent of one another and this research can be measured using a questionnaire (Ihuah & Eaton, 2013).

Study population

Population refers to the whole group of individuals, events or objects taken from general population having similar observable features (Kombo & Tromp, 2006). Target population refers to the entire group of individuals or objects from which the study seeks to generalize its findings (Mugenda & Mugenda, 2003). The population of the study included all the 1.26 Million licensed small and medium business enterprises in Kenya (KNBS Economic survey, 2017). The target population was drawn from all the 560,000 licensed business enterprises in Nairobi County, Mombasa County, Machakos County, Makueni County, Kajiado County and Kitui County (KNBS County statistical abstract, 2017). However the major focus was on the accessible population of 310,000 licensed businesses in the wholesale and retail trade in the six counties. The accessible population is that proportion of the target population that the researcher can access easily and conveniently. The business enterprises in the six counties were selected because these counties were convenient for the researcher to get the information that was required.

Sampling Frame

A sampling frame is the list of all the items where a representative sample is drawn for the purpose of research (Mugenda and Mugenda, 2003). The sampling frame constituted all the 310,000 licensed wholesale and retail businesses in Nairobi County, Mombasa County, Machakos County, Makueni County, Kajiado County and Kitui County (KNBS County statistical abstract, 2017). See attached Appendix V. The businesses in...
wholesale and retail trade sector were selected because the sector had high failure according to KNBS economic report 2016. The sector was made up of 57.1% of licensed businesses in Kenya (KNBS Economic survey, 2017). Hence the researcher could get enough required information from the sector.

Sample and Sampling Technique

This section outlined the sample and the sampling technique used to get the sample. The section was divided into two parts: part one the sample size and part two comprised of the sampling technique. A population is a group of individuals, objects or items from which samples are taken for measurement. Population refers to an entire group of persons or elements that have at least one thing in common. Population refers to a large group from which a sample is taken (Kombo & Tromp, 2006).

Business enterprises are scattered across the length and breadth of the country with most of them located in the urban centers. The target population will be drawn from all licensed small and medium business enterprises in Kenya. The wholesale and retail trade activities are enmeshed in a wide range including but not limited to agricultural sector, business enterprises, fabrication, manufacturing, micro financing, cyber cafés among others conducting their businesses locally and internationally. The firms operate in varying markets, in the urban, rural, local, national, regional and international settings. They exemplify different levels of skills, capital, sophistication and growth orientation, and operate in the formal or the informal economy.

The target population will be representative to registered business enterprises in the country by operational wholesale and retail trade. Data was collected through a structured questionnaire and the questionnaire was administered using drop and later pick method. The study used a sample of 384 wholesale and retail businesses from the selected counties. Using a simple random sampling technique the study selected six counties which was used to provide the sample frame for this study. Using excel random sample the following six counties were selected for this survey. The proposed six counties include Nairobi county, Mombasa county, Machakos county, Makueni county, Kajiado county and Kitui County.

<table>
<thead>
<tr>
<th>Sector</th>
<th>Accessible Population</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wholesale trade</td>
<td>103,719</td>
<td>128</td>
</tr>
<tr>
<td>Retail trade</td>
<td>206,181</td>
<td>256</td>
</tr>
<tr>
<td>Total</td>
<td>310,000</td>
<td>384</td>
</tr>
</tbody>
</table>

Source: KNBS County statistical abstract 2017

Data Collection Instruments

Instruments involve designing, developing, pilot testing, validation and compilation of final instrument. The researcher made use of questionnaires for the collection of data from owners or managers of wholesale and retail businesses under study. Anonymity of the respondents was ensured and this increased the chances of getting honest replies. The questionnaires allow the researcher to collect variety of information cheaply (Mugenda & Mugenda, 2003). The researcher also used secondary data methods to collect information on wholesale and retail businesses.

The secondary data was obtained from written information which includes review of journals and literature relevant to the subject matter of this research. The sources also included newspapers, magazines and official policy documents of the Kenyan government that are relevant to the study. Other sources will be electronic search which will include internet websites. According to Hamilton, (2010), secondary data relies on experts conclusions about a particular focused on the accounts of the past that were created by other people.

Data Collection Procedure

Data collection refers to gathering of information to prove some facts (Kombo & Tromp, 2006). Before the start of data collection, an introduction letter authorizing data collection was obtained from the university and then used to process a research permit from NACOSTI. The drop and later pick method was used in administration of the questionnaire as it gave respondents enough time to think about their responses carefully without interference. Drop and later pick method also helps to collect data from a large representative sample (Chimaleni et al., 2015). Prior to data collection, an introduction letter authorizing data collection was obtained from the department and then processing of a research permit from NACOSTI using the online process was done.

The study used two categories of data which included primary and secondary data. The processing of data means editing, coding, classification and tabulation so that they are agreeable. Primary data was collected using researcher administered questionnaires to sampled business enterprises. The drop and later pick method was used and this allowed the respondents to give their responses in a free environment. The researcher trained three research assistants on all issues pertaining to the data collection procedures and techniques before they could carry the data collection process during the process of the study. The research assistants helped in assisting the researcher in gathering the necessary information which was used in responding to the research question. Secondary data on financial performance was retrieved from the financial statements of the business enterprises.

IV. FINDINGS AND DISCUSSION

Response Rate

Response rate refers to number of the questionnaires completely filled by the respondents against the total questionnaires administered (Njagi et al., 2017). The researcher issued a total of three hundred and eighty four questionnaires (384) where a total of three hundred and fourteen (314) responses were received, translating into 81.8% response rate. However, fourteen questionnaires were poorly done and so they had to be discarded from being used for analysis, hence the correct filled questionnaires used were three hundred (300) that led to a vivid and subjective analysis that translated to a higher outcome of...
78.1%. This high rate of response was attributed to the use of self-administered questionnaires and respondents were also assured high level of confidentiality. Mugenda and Mugenda (2003) puts it that a response rate of 50 percent is adequate, 60 percent is good and 70 percent is excellent. Njeru (2013) considered that 50% to 75% is sufficient for data analysis. Based on this assumption, the response rate of 81.8% in this study was therefore very good and was considered useful to make conclusions for the study.

Table 4.1: Response Rate

<table>
<thead>
<tr>
<th>Responses</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responded</td>
<td>314</td>
<td>81.8</td>
</tr>
<tr>
<td>Did not Respond</td>
<td>70</td>
<td>18.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>384</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Table 4.1 shows high response rate. This was associated with the procedures of data collection, where the researcher pre-notified the potential participants of the intended survey, utilized a self-administered questionnaire where the respondents completed and immediately after, they were picked. Follow up calls were also made to clarify queries in the questionnaires. These findings were in line with Njeru (2013) where the study observed that use of self-administered questionnaires give respondents enough time to provide well thought responses and there is always high response rate. Njagi et al., (2017) studied on equity financing and financial performance of small and medium enterprises in Embu town, Kenya and the study administered 60 questionnaires out of which 41 questionnaires were collected fully filled and returned. The response rate was 68.3% and this high response rate was attributed to the use of self-administered questionnaires to collect the data.

Background Statistics

This section summarized the characteristics of the general data statistics. The results of the tests on the differences in means of all predictor variables were considered on dependent variable and the moderating effect of size of business on the effect of sources of finance on performance of wholesale and retail businesses in Kenya. Their respective mean, range, standard deviation, kurtosis, minimum and maximum values were considered. Descriptive statistics were also used to describe the basic features of the data in the study and the key trends of the variables over the period. They provided simple summaries of the measures. Descriptive statistics such as graphs, key categorizations and percentages were used to analyze the data.

Location of Respondent

The researcher sought to determine the number of respondents and their location for an easier survey and a more knowledgeable approach on the credit environment and the scale management of the research. From the Table 4.5 below, it was evident that most Respondents occurred in the main cities and town. The study showed that high numbers of the wholesale and retail businesses were found in Kitui, Nairobi and Mombasa. The results were as presented in Table 4.8 below.

Table 4.8: Respondent’s location

<table>
<thead>
<tr>
<th>County</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nairobi County</td>
<td>53</td>
<td>17.7</td>
</tr>
<tr>
<td>Mombasa County</td>
<td>51</td>
<td>17.0</td>
</tr>
<tr>
<td>Machakos County</td>
<td>48</td>
<td>16.0</td>
</tr>
<tr>
<td>Makueni County</td>
<td>47</td>
<td>15.7</td>
</tr>
<tr>
<td>Kajiado County</td>
<td>43</td>
<td>14.3</td>
</tr>
<tr>
<td>Kitui County</td>
<td>58</td>
<td>19.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>300</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

A total of three hundred respondents answered the research questionnaires well. Nairobi county represented 17.7 percent, Mombasa county had 17.0 percent, Machakos county had 16.0 percent, Makueni county had 15.7 percent, Kajiado county had 19.3 percent and lastly Kitui county that had 19.3 percent. This response rate was too high and it agreed with Njeru (2013) that many businesses are located in town centers.

Registration Status

The researcher sought to establish the registration status of the business enterprises. It was established that (95%) of the businesses were registered hence were in a position to obtain financial assistance from any financial institution. The information was obtained from the data presented in Table 4.9.

Table 4.9: Registration status of the business

<table>
<thead>
<tr>
<th>Status</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registered</td>
<td>285</td>
<td>95</td>
</tr>
<tr>
<td>Not Registered</td>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>300</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Out of the considered three hundred businesses the registered enterprises were two hundred and eighty five, this was sufficient enough for giving meaningful data analysis. These findings show that many of the businesses were registered and this was associated with the fact that it is a requirement by law for registration of business enterprises. These findings agreed with Njeru (2013) that many businesses are registered due to the requirement of the law. The implication in terms of sources of financing is that majority of the business enterprises depend on private sources of capital, either in form of debt from commercial banks or internal equity from savings, family or friends, Thus, these businesses do not access public sources of financing that are associated with listing in the stock exchange.

Form of ownership

The researcher sought to establish the different forms of ownership. This ownership included sole proprietorship,
partnership and company among others. The data presented in Table 4.7.

**Table 4.10: Form of ownership of the business**

<table>
<thead>
<tr>
<th>Form</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sole proprietorship</td>
<td>285</td>
<td>95.0</td>
</tr>
<tr>
<td>Partnerships</td>
<td>15</td>
<td>5.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>300</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

It was established that sole proprietorship was 95% and partnership was 5%. However there was no company or any other form of businesses among the wholesale and retail businesses. These findings agreed with Njagi et al. (2017) where it was revealed that 90% of the businesses were formed through sole proprietorship while 7% represent partnership kind of business and limited companies represented 3% of the businesses. The most preferred form of businesses in both studies was seen to be sole proprietorship. This could be highly attributed to the ease in legal requirement during formation, small amount of capital requirement and exercising full control of the business while least preferred form of business was limited companies which was associated with the long and expensive procedures when forming companies.

The study also agreed with Njeru (2013) where most of the business enterprises are seen to be sole proprietorships as they require few legal formalities to form and the capital requirement is also low when compared to other forms of business units. Hence many small and medium business enterprises are usually started as sole proprietorships; the study also found that many businesses were said to be owned by individuals not group. The findings of this study also agreed with the findings of the KNBS economic survey (2017) that most of the licensed business enterprises are operated by the owner where their survey found a high percentage of 92.2% sole proprietorship. According to this survey most of the businesses were operated and owned by individuals who were in retail businesses of buying and selling of goods independently.

The results also agreed with Kimunyi (2015) who studied factors influencing performance of small and medium tea firms in Mombasa county, Kenya. From their findings, the study found that majority of the respondents 52% showed self owned and self run businesses, those who indicated self owned and family run were 25%, 19% of the respondents were said to be self owned and employees run while least indicated third party owned and employees run were only 4%. This means that most of the business enterprises are sole proprietorships.

**Length of operation**

Establishment of the period of operation for the business was also sought by the study. The data was presented in Table 4.11.

**Table 4.11: Length of operation for the business**

<table>
<thead>
<tr>
<th>Length of operation</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 5</td>
<td>45</td>
<td>15.0</td>
</tr>
<tr>
<td>5 – 10 years</td>
<td>216</td>
<td>72.0</td>
</tr>
<tr>
<td>Above 10 Years</td>
<td>39</td>
<td>13.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>300</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

It was noticed that (72%) of the businesses had been in operation for 5-10 years. This number had operated long enough to give reliable information on performance of wholesale and retail businesses. These results agreed with Musamali and Kipkirong (2013) that older firms do not fail at high rate than the younger firms since the older firms have high access to finance due to the high assurance that they give to the lenders on their financial sustainability. More so the older firms are considered to have established good relationship with lenders and are observed to have high probability of accessing funds from the lenders. The study also agreed with Njagi et al. (2017) where it was revealed that majority (46%) of the businesses have been in existence for a period of 2-5 years, while 44% of the businesses have been in operation for a period of 6-10 years.

Businesses that had been in operation for a period of less than a year were 7% and those above 10 years of operation are 3%. This indicates that 46% of the businesses are in the early stages of growth while 44% of the business units have exceeded the infancy stage of growth. According to Kangala (2016) it is clear 39% of the respondents indicated they had worked for 6-8 years, 34% had worked between 8-10 years, 15% indicated between 3 to 5 years and 12% had over 10 years. Results implies that majority of the respondents had worked long enough in their designated positions in the firm hence were in the best position to give accurate information need in the study.

**Business location**

The researcher sought to establish the location of the businesses to ascertain whether they were within the central business district (CBD) or not. The nearness to CBD would imply proximity to information about financial services (Njeru, 2013). Those near the CBD had high chance of being aware of the presence of loans leading to acquiring the same as opposed to those far from the CBD. The responses were presented in Table 4.12.

**Table 4.12: Proximity of the business from CBD**

<table>
<thead>
<tr>
<th>Length of operation</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Near CBD</td>
<td>168</td>
<td>56.0</td>
</tr>
<tr>
<td>Far from CBD</td>
<td>132</td>
<td>44.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>300</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

It was however established that most (56%) of the businesses were located within the CBD. This implies that high numbers of the businesses were within the CBD hence able to access loans and thus give more reliable information concerning...
the effect of loans on performance. The findings agreed with Njeru (2013) where the study stated that businesses near towns or within towns have high chances to get financial information.

**Number of employees**

The researcher sought to establish the number of employees for the business and it was found that 95% of the business enterprises under the study had 1-9 employees. The results were presented in Table 4.1

<table>
<thead>
<tr>
<th>Number</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-9</td>
<td>285</td>
<td>95.0</td>
</tr>
<tr>
<td>10-49</td>
<td>15</td>
<td>5.0</td>
</tr>
<tr>
<td>50-100</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Over 100</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>300</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

It was found that 95% of the businesses under the study had 1-9 employees. This means that most businesses were small or medium and thus requiring more financial support. These results agreed with Caroline and Muturi (2015) that many businesses are established as family businesses and may not seek growth plans. Njeru (2013) found that most of the small and medium business enterprises had between 1-5 members of staff and those which were found to have more than five members were roughly 25%. The results also agreed with the findings of KNBS economic survey (2017) which found out that most of the business enterprises employ 1-9 employees and this was supported by a high percentage of 92.2%.

**Effect of trade credit from suppliers on performance of wholesale and retail businesses**

The researcher sought to establish the usage of trade credit by the wholesale and retail businesses. The results were presented as follows in Table 4.26.

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>189</td>
<td>63.0</td>
</tr>
<tr>
<td>No</td>
<td>121</td>
<td>37.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>300</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

From Table 4.26 it was reported that a total of 63% of the respondents had used trade credit to finance their businesses while 37% had never used trade credit to finance their business. This explains why some businesses did not seem to be interested on formal loans since they could get goods on credit from their suppliers and then pay later.

<table>
<thead>
<tr>
<th>Type of trade credit</th>
<th>Amount borrowed (Ksh)</th>
<th>Proportion of trade credit</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hire purchase</td>
<td>950,000</td>
<td>0.044</td>
<td>4.4%</td>
</tr>
<tr>
<td>Simple credit</td>
<td>1,120,000</td>
<td>0.052</td>
<td>5.2%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,070,000</strong></td>
<td><strong>0.096</strong></td>
<td><strong>9.6%</strong></td>
</tr>
</tbody>
</table>

From Table 4.28 it was reported that simple credit made 5.2% of the financial support on wholesale and retail traders while the hire purchase contributed 4.4%.

The researcher further considered establishing the linear regression model on the trade credit and performance of the business. The results were as per Table 4.29 below
The linear regression analysis models on the dependent variable which was performance of wholesale and retail businesses in Kenya and independent variable which was trade credit, showed the coefficient of determination (R²) and correlation coefficient (R). The results showed that there was some degree of association between the trade credit and the performance of wholesale and retail businesses in Kenya. The results of the linear regression indicated that R²=0.531 and R=0.584. Where the R= 0.584 showed an indication that there was a linear relationship between trade credit and the performance of the wholesale and retail businesses. With the R²=0.531 it means that the independent variable could only explain 53.1% of variability of dependent variable. The adjusted R²=0.504 shows the independent variables improves the model by 50.4%.

These results agreed with Waithaka and Njeru, (2015) who argued that mostly businesses that operate on credit terms may extend to their customers different types of discounts to encourage them pay for the goods promptly this not the case with the banks thus increasing their performance. Chimaleni et al., (2015) found that trade credit positively affect the financial performance of businesses and the study recommended the use of trade credit so as to realize high levels of profits hence high financial performance and their findings were in agreement with those of this study. The study also was in agreement with Kapkiyai and Mugo (2015) where their study found that trade credit and financial performance of small scale business enterprises was positively related and trade credit was seen to positively affect liquidity, profit margin and returns on assets.

Muganda et al., (2016) also established that trade credit financing affect the financial performance of businesses and the study recommended the use of trade credit so as to realize high levels of financial performance hence it was in agreement with the findings of this study. Martin and Filip (2016) found an inverse relationship between small and medium business financial performance and usage of trade credit and their study revealed that this relationship may be due to the costs associated with trade credit, hence their study was in disagreements with the findings of this study.

Table 4.30: ANOVA (F-Test) Analysis for trade credit

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>Df</th>
<th>Square</th>
<th>F</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>56.322</td>
<td>1</td>
<td>66.476</td>
<td>39.221</td>
<td>39.221</td>
</tr>
</tbody>
</table>

a Predictors: trade credit
b Dependent Variable: Performance of wholesale and retail businesses

Table 4.31: Coefficients for trade credit

<table>
<thead>
<tr>
<th>B</th>
<th>Std. Error</th>
<th>Beta</th>
<th>T</th>
<th>Sig.</th>
<th>T</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>M0</td>
<td>B</td>
<td>Beta</td>
<td>T</td>
<td>Sig.</td>
<td>B</td>
<td>Beta</td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>.1344</td>
<td>.222</td>
<td>.132</td>
<td>.000</td>
<td>.000</td>
</tr>
</tbody>
</table>

For example, in Table 4.31, the linear regression model for performance of wholesale and retail businesses was as follows

\[ Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \epsilon \]

Where;

\[ Y = \text{Performance of wholesale and retail businesses in Kenya} \]

\[ \beta_0 = \text{Is the Y intercept (constant) whose influence on the model is insignificant.} \]

\[ \beta_1, \beta_2 = \text{The slope which represents the degree with which the performance of the business changes as the independent variable (trade credit) changes by one unit variable.} \]

\[ \epsilon = \text{Standard Error term} \]

\[ X_1 = \text{Hire purchase} \]

\[ X_2 = \text{Simple credit} \]

Performance of wholesale and retail businesses in Kenya

\[ Y = 1.334 + 0.384 X_1 + 0.852 X_2 + \epsilon \]

From the regression results, simple credit had the highest contribution on the performance of wholesale and retail businesses (\( \beta_2 = 0.852 \)). This means that a unit increase in simple credit resulted into one unit increase in the performance of the business. With (\( \beta_1 = 0.384 \)) it means that unit increase in hire purchase resulted into one unit increase in performance. The findings showed that there is statistical positive association between trade credit and performance wholesale and retail businesses. These results were in line with Kapkiyai and Mugo (2015) who showed that there was positive relationship between small and medium business financial performance and their study revealed that trade credit had a significant effect on performance of wholesale and retail businesses in Kenya.
between trade credit and the financial performance of small and medium businesses in Kenya. The results also agreed with Chimaleni et al.,(2015) who found that trade credit positively affected liquidity, profit margin and returns on assets. However, the study disagrees with Martin and Filip (2016) who observed an inverse correlation between trade credit and the performance of small and medium businesses.

**Summary of the findings**

Purposely this study was to determine the effect of sources of finance on financial performance of small and medium sized enterprises in Kenya. The specific objective was to identify the effect of trade credit on financial performance of wholesale and retail businesses in Kenya. The findings of the study suggested that the Trade credit had a statistical significant relationship with the performance of the business.

**Trade credit and financial performance of wholesale and retail businesses**

Trade credit significantly predicted the performance of wholesale and retail businesses in Kenya. The correlation results indicated that there was a positive correlation between trade credit and performance of wholesale and retail businesses in Kenya. There was also a positive correlation between trade credit and size of the business. The study also found that traders preferred using simple credit over hire purchase due to high interest rate that was charged for the use of hire purchase.

**Conclusions**

Wholesale and retail businesses have become the important force of sustained, rapid and healthy development of Kenyan economy. Access to finance has been singled out as one of the major challenges impeding the survival and growth of many businesses. There are many different types of financing sources that can be used for financing business enterprises. The ability of a business enterprise to develop, grow and be sustainable relies heavily on their capacity to access and manage finance. However, accessing the right type of finance at an affordable cost to start and grow the business is the fundamental financing difficulty for most of the business enterprises.

It is important for businesses to keenly choose the correct and appropriate financing sources to solve the financial difficulties. The multiple regression results indicated that the trade credit; trade credit positively predicted the performance of wholesale and retail businesses in Kenya. The results of the linear regression resolved that there was a strong linear relationship between finance source and the performance of wholesale and retail businesses in Kenya. The study made conclusions that the trade credit had the highest effect on the performance of wholesale and retail businesses in Kenya. When the hypotheses were tested in the regression model, the independent variables were found to have a significant association with the performance of wholesale and retail businesses in Kenya.

All wholesale and retail businesses in Kenya should apply the four variables and sub variables used in the study so that faster growth for each business could be realized. More so government finance schemes such as Uwezo funds and other micro-credit schemes, where collateral security is not a major demand should be established by the government and business individuals to be familiarized with them. Such schemes usually charge interest rates lower than that charged by banks and other financial institutions. Individuals choose the informal financial institutions as the source of their capital providers because it has a simple administrative procedure, fast loan disbursement where the loan is given on time as required. The study findings would contribute knowledge to assist in the business growth. Not much had been done on the four variables on sources of finance and performance of wholesale and retail businesses in Kenya. Most of the studies on had been focusing more on working capital and growth of SMEs. Thus the findings of this study would contribute a lot in filling knowledge gaps by focusing on the effect of sources of finance and performance of wholesale and retail businesses.

Trade credit had a positive relationship with the performance of the businesses. Mostly businesses preferred simple credit over hire purchase due to the high interest rate charged. The size of the business moderated the relationship between sources of finance and performance wholesale and retail businesses. The study concluded that there was no one source of finance that fully contribute to the performance of the wholesale and retail businesses in Kenya. The study recommended further research to be conducted to determine the other factors that influence performance of wholesale and retail businesses other than the sources of finance.

V. **Recommendations**

The following recommendations were made based within the study

**Trade credit and financial performance of wholesale and retail businesses in Kenya**

The study showed that most wholesale and retail businesses were not interested on loan since they were in a position to get goods on credit from their suppliers and then pay later. This was an easy way of acquiring goods at a low interest. However the repayment period was less than a month and there was a limit to the amount of goods which could be given by the suppliers. This study recommends that; suppliers should increase the amount and variety of goods given on credit to the wholesale and retail traders so that they can increase their profit margin. The suppliers should also increase the repayment period. The study also recommended that additional research be conducted in order to determine the major factors that influence performance of wholesale and retail businesses since is not only the sources of finance that affect the performance of a business. This would enable these firms control these factors in order to ensure that profitability is high realized and maximized.

**References**


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Internal organizational factors and financial performance of cooperatives in Rwanda: A case of Zigama CSS

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Abstract- Although financial institutions and cooperatives have been present in Rwanda since 1970s, Saving and Credit Cooperative Societies have not significantly performed well to impact on people lives as it was initially expected due to different challenges. ZCSS was established since 1998 with the mission to uplift the wellbeing of its members. To achieve this mission, ZCSS is to collect savings from and provide loans to its members at an affordable interest rate. The main purpose of this study was to establish how internal organizational factors influence financial performance of cooperative in Rwanda. The study was guided by three specific objectives, namely, to determine the effect of liquidity management factor on the financial performance of ZCSS, to assess the influence of capital strength factor on the financial performance of ZCSS and to determine the effect of credit management factor on the financial performance of ZCSS. The study made use of correlation research design. The target population comprised of 193 employees from which 103 were selected using stratified random sampling technique as the sample elements. The research used structured questionnaire to gather primary data. The data gathered cleaned, entered into SPSS version 21 and analyzed using tables, charts, frequencies, means and standard deviation. At the same time, correlation, regression analysis and analysis of variance conducted to provide further data analysis. According to the findings, the internal organizational factors were found to have R2=0.572, R2=0.557 and R2= 0.383 on ROA, interest margins and ROE respectively. Therefore, internal organizational factors were found to influence the financial performance of ZCSS. In line with these results, the researcher recommended that other microfinance institutions should mobilize savings (minimum monthly saving) from their members to strengthen their capital base for the long-term sustainability and introduce a solidarity fund. Further, the management should pay keen attention to the liquidity management and credit worthiness because these were found to have significant effect on financial performance of cooperative banks.

Index Terms- Internal Organizational Factors, Financial Performance, Credit and Saving Society, Cooperative Bank, Zigama CSS

I. INTRODUCTION

Credit and Savings Cooperatives Society refers to an association of people with common objective or drive coming together in order to transform their lives economically and socially. These credit associations are part of the larger financial sector and play key role in providing credit, savings and other services in Rwanda. The first cooperative society to be established was in 1944 in Rochdale, a village in England. This was formed by the Rochdale pioneers at a time of industrial revolution in Britain (KNFC Website). However, Savings and Credit Cooperative (SACCOs) first appeared in 1846 in South Germany Europe when it was experiencing crises in agriculture associated with draught (Birchall, 2004).

In fact, evidence shows that most of the now big and famous organizations in developed countries begun small. They only grew big and even became multinationals later but their base history is that they were small or medium enterprises and most banks started as microfinance institutions. In Africa, SACCOs are said to have begun in Ghana in 1952. Since then, SACCOs have turned out to be key players in Africa in promoting financial inclusion especially for the low-income earners and to the marginalized due to rural location, poverty, literacy levels among others. They play a transformational role of bringing about economic and social self-reliance to majority living in rural areas as well as supporting their financial (ACCOSCA, 2009).

In Rwanda, the creation of SACCOs, microfinance institutions and cooperative societies are part of the strategies in the country for mobilizing savings for the community. They have also been put in place to aid the government, agents and policy makers in improving access to finance in Rwanda. To this effect, the advent of these financial institutions was in the light of making all Rwandans have access to finance more easily, more affordable and with more financial service usage. All of these financial institutions have been rightly referred to as microfinance institutions due to their capital base, market share, service provision and their targeted clientele. According to Abraham (2011), microfinance can be regarded as the facilitation of services, which are financial in nature. Some of these financial services include deposit taking, savings, loans creation, and insurance in relatively smaller units targeting low-income clients. The microfinance sector is considered relatively younger in

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Rwanda compared to other parts of Africa. The microfinance sector growth in Rwanda, which can be traced to small self-support peasant cooperatives (e.g. tontines-ROSCA or ibimina) would only accelerate after the formation of Banques Populaires du Rwanda or Union des Banques Populaires du Rwanda (UBPR) in 1975.

In 2008 December, a meeting was held at the national level to pave way for effective inclusion of the rural residents into the financial systems. This national dialogue passed a strategy for the integration of the population in the rural areas into the financial realm by creating at least one COOPEC for each Umurenge (sector) all over the country. By the closure of the same, the sector accounted for 125 MFIs.

These included one hundred and eleven COOPECs, eleven SA and three limited liability companies. Globally, cooperative banks have a crucial part to play in the economic stimulus of the country as well as distribution of growth (Barney, 2011). Banks as well as cooperatives channels funds from depositors to (small) investors hence linking economic players of the nation. Cooperative banks are instrumental to building a nation by the services they offer such as credit provision and safeguarding the funds contributed from members (Capone, 2010). For this reason, studies seeking to improve cooperative banks performance have increased tremendously (Capone, 2010; Barney, 2011; Cook & Heiser, 2011).

However, various factors affect the performance of these organizations. The factors can be categorized as external or internal factors. For external factors, the organization may not have full control of them and hence can do little to improve its performance. Organizational internal factors are those factors that are within an organization, in this case a cooperative bank, that influence the organizational performance. According to Capone (2012), the management decisions play a bigger part in determining the internal factors in an organization. Cook and Heiser (2011) explain that these internal factors can be manipulated by the management in order to enhance the performance of the organization. According to Daft and Marcic (2016), internal organizational factors are those factors that are within an organization and can affect the performance of the organization. These factors represent the strength or weakness of an organization. They include the resources that are available within the organization setting. Some of these factors include capital, human resource, technology, assets and liquidity, among others.

Zigama Credit and Saving Society (ZCSS) is a saving and cooperative providing financial service with a cooperative status. It is a cooperative whose members are mainly from three security institutions. These include, The Rwanda Defence Force (RDF), Rwanda National Police (RNP), and Rwanda Correctional Services (RCS). It was incorporated in Rwanda under Law 31/1988 of the 12th October 1988 on the Organization of Cooperative Societies. It is licenced by the National Bank of Rwanda (BNR) Instructions no. 06/2002 governing Micro-Finance Institutions. For more than 25 years now, ZCSS has been playing a significant role in transforming its members’ lives and uplifting their living standards. It has been doing this by providing savings services as well as providing credit to the members at competitive interest rate.

**Problem Statement**

Although financial institutions and cooperatives have been present in Rwanda since 1970s, Saving and Credit Cooperative Societies have not significantly affected people lives as it was initially expected. It was expected that Rwandan would have been included in financial services by 2020. The level of financial inclusion achieved by 2018 was 89% showing that 11% of the Rwandan people are excluded in accessing financial services. (MINECOFIN, 2019). In light of this, the presence and flourishing of SACCOS in Rwanda have not been able to accomplish much in comparison to other conventional financial institutions like commercial banks. According to BNR (2019), the financial sector is still dominated by banks with 66.1% of total financial system assets while MFIs and SACCOS contribute only 6.4%. These statistics show that, despite the fact that SACCOS cover wide geographical areas compared to banks including the rural areas, they are still lagging behind in their performance. SACCOS are established to cater for particular needs of its members, but this has encountered different challenges that have negatively influenced the financial performance of the SACCOS.

These challenges have been highlighted in literature for example by Mvula (2013) who presents various concerns that affect performance of savings and credit cooperatives in Malawi. Some of the issues he points out are insufficient capital, poor loan portfolio management, governance related factors, unprofitability, liquidity problems and noncompliance. Further, Mmari and Thinyane (2019) discuss the main factors that affect financial performance of savings and credit unions and other microfinance institutions like cooperative banks as weak regulatory framework, limited services and products, insufficient marketing strategies and poor public image. However, the effect of interest rate charged and the rate of loan repayment on Sacco performance is yet to be established.

Regardless of the significant role and contributions of SACCOS in provision of financial services to those previously excluded, they are facing diverse challenges which eventually end up affecting their financial performance. The main challenges affecting the effective performance of ZCSS is in relation to internal organizational factors. This study therefore investigated some internal organizational factors, namely, liquidity management, capital strength and credit management effect on financial performance of cooperative banks in Rwanda taking a case of ZCSS.

The main objective of this study was to determine the effect of internal organizational factors on the performance of cooperative banks in Rwanda taking a case study of ZCSS, Rwanda. The specific objectives guiding the research were:

i) To determine the effect of liquidity on the financial performance of ZCSS, Rwanda.

ii) To assess the influence of capital strength on the financial performance of ZCSS, Rwanda.

iii) To determine the effect of credit worthiness on the financial performance of ZCSS, Rwanda.

**II. LITERATURE REVIEW**

As described by Robinson (2001), microfinance is considered as the provision of financial services in smaller units targeting the low-income earners and the marginalized. These
financial services include savings services, credit provision, insurance, money transfer and other services. A microfinance institution therefore provides similar financial services to a commercial bank only that it is geared towards providing such to their members. In addition, it provides such financial services with more flexible terms and conditions as well as at more affordable costs. The objective of such microfinance services is to serve the financial needs of those who have been excluded by banks due to their salary status or their lack of collateral. The financing services provided enable micro and small as well as the medium enterprises to grow their business operations by providing additional capital and technical advice. Other members could seek such financial assistance to be able to meet immediate and emergency family cases related to food, health or education. Therefore, microfinance has become a practical means for the low-income earners to secure their economic status and living conditions. It smooth out the fluctuation of income for poor households and enable them to manage their limited resources (Robinson, 2001).

Further, microfinance provide a safe means for the management of finances for the poor and the rural residents. Through the savings services, the microfinance institutions mobilize their members to keep some savings out of their income for the future need. This saving facility enable the poor and other members to keep safely some finance for future use. This in itself enable households to manage their finances better. One of the driving force of the micro financing is the realization that the members have variety of financing need and demands. It has been recognized as an effective tool in fighting poverty and in promoting the living conditions of many rural residents (Basu et al., 2000). However, MFIs and cooperatives can provide financial services to their members if the institutions are financially sustainable (Wanyama 2008). Various factors affect the financial performance of these institutions. These factors can be grouped into external factors and internal factors.

According to Daft and Marcic (2016), internal organizational factors are those factors that are within an organization and can affect the performance of the organization. These factors represent the strength or weakness of an organization. They include the resources that are available within an organization setting. In contrast to the external factors, an organization has much control of the internal factors. Therefore, there is need for effective management of these factors, which can greatly influence the financial performance as well as their operational performance of organizations. Cook and Heiser (2011) explain that internal factors are experiences within an organization and that the commercial banks can be able to manipulate them to perform and these factors are unique in every bank. This research concentrated on liquidity, capital strength and credit worthiness as the selected internal organizational factors.

Liquidity

As stated by Aver (2008), to measure liquidity, the cash and cash equivalent are used and divided by the total asset. The result of this shows high liquidity if the ratio is greater than one and low liquidity if the ratio is less than one. Maintaining high liquidity is important for banks, which could help them in times of dire need. This enables banks to avoid costly borrowing at such time of needs. Insufficient liquidity has led to many financial institutions to fail in their operation and in some case resulted in closure of the said banks (Bibow, 1995). However, it is worth noting that holding liquid assets represent an opportunity cost for the bank of possible greater return. Aver (2008) established out that a positive and statistically significant correlation exists between bank liquidity and bank performance. Yet, in the time of economic instability, banks may opt to hold more liquid assets to cover for any possible risks associated with the instability. Derbali (2011) in his findings noted that there exists negative link between bank liquidity levels and its performance.

According to ZCSS treasury management (2019), the function of liquidity management is assumed by the treasury department. This department has the following objectives. First, it is mandated to organize and manage the available funds efficiently in order to increase profit following the laid down regulatory requirements. Secondly, to follow up on any investments of the surplus funds to ensure that the fund leaps maximum returns while maintaining low cost of the fund. Third, the department has an objective of maintaining a healthy investment portfolio. Fourth is to minimize returns from forex operations and lastly, to minimize non-performing investments. ZCSS therefore invests its surplus funds in the Treasury bonds, Term deposits, Forex market or investment in shares (Capital market).

According to Betty (2008), one of the main components, showing the availability of cash in an organization is the working capital. The working capital in fact tracks the changes of current asset against current liabilities. In response to the general sales levels. The treasury department will offer the way forward whenever there are any changes in the regulation on the working capital as well as on the cash requirements. In order to ensure that sufficient cash is always there for usage to meet daily operations, ZCSS treasury department should remain focused in its functions and objectives.

Capital Strength

According to Cook and Heiser (2011), capital is one of the major factors within the bank internal operations that influences the performance of the bank. If it is adequately managed, the capital in a banking institution can enhance the financial performance of the bank. According to Chandler and McEvoy (2010), capital can be seen as the owner’s contributions in terms of funds. These contributions are availed to support the banking operations and also preserved to be a reserve to go to in cases of liquidity constraints. It consequently creates both funds for operating, the working capital, as well as a reserve in future needs. Accordingly, therefore, capital has two main functions for a banking institution. First, it provides for liquidity, that is short-term function and secondly it provides for stability, that is, long-term function. As analyzed by Athanasoglou et al. (2005), capital also is a preserve in times of financial distress.

According to Okore (2011), a bank that is well capitalized is less likely to be exposed to risks and can therefore build on this perception to build a greater market share. Capital strength is therefore described in terms of the ratio of equity to assets. The higher this ratio is, the better the capital strength of the organization. Since capital provides a buffer zone for time of distress, maintaining capital strength can be seen as a good management practice. In addition, those banks with stronger capital base are perceived to have a safer net to invest in or put
deposits in. This angle of argument is supported by Danny (2014) explaining that banks with capital strength are highly likely to be insured from adverse events that can lead to bankruptcy. According to Migai (2010), banks have capital strength also have greater opportunity to grow since they can be able to have funds to seize opportunities as they come. Thus, such banks can be able to increase market share, increase their operation capacities and hence increase their financial performance.

Following these arguments, Kithinji (2010) concludes that capital strength is a key internal factor that commercial banks can be able to control for enhancing their financial performance. Moreover, the banking industry operates in a very volatile environment. This is especially so for developing countries with Rwanda included. As Chandler and McEvoy (2010) elucidates, banks need to be able to manage their internal factors if they are to remain competitive and be able to support their operations for longer period. Okore (2011) concludes that various risk are associated with too much capital and therefore, banks should be strategic in their management decisions and activities.

Credit Worthiness

The term credit worthiness refers to the ability of a borrower to repay the credit given to him/her. Though the functions played by the credit in an economy cannot be ignored, banks should investigate the credit worthiness before they give any credit to potential clients. Moreover, many microfinances and SACCOs have failed due to inability to assess fully the credit worthiness of their clients. Loan repayment depends on the capability of the loan holder to pay back the loan and its interest. It is during the loan processing when the loan application should be seriously scrutinized and securities of the loan be examined. When the loan officer/analyst and/or the credit manager is evaluating your loan application, he wants to know whether by lending you money he can get his money back and earn some profit on it from you. Before institution approves a loan application, it needs to evaluate if the business can repay the loan with interest for the period in question to avoid loan default (Chandler & McEvoy, 2010).

In most of the African countries, loan repayment is faced with various factors caused by the borrowers. Other factors also relate to poor management of the lending institutions. Bagachwa (2007) in his study found that repayment of loans in Africa is faced with myriad of challenges. This has made the loan performance in many lending institutions to be one of the biggest challenges that banking and other financial institutions have to deal with. For instance, in Tanzania, commercial banks face 14% to 20% loan repayment problems while in Ghana agricultural loan face 45% of repayment problems.

Besley (2003) in his study discusses how loan repayment in Africa and other developing countries differ from loan repayment in developed countries. In his comparative analysis, he observed that the loan repayment in developing countries is coupled with challenges like poor institutional infrastructure, inadequate management skills, insufficient regulatory framework and follow-up. In addition, failure for MFIs and SACCOs to institute proper appraisal procedures have tended to aggravate the situation. Another factor that the author highlights is the poor condition of the rural in Africa who have failed to meet their loan obligation to the SACCOs they belong.

Most of ZCSS members are salaried while others have regular and active accounts with the bank. What makes ZCSS unique in the industry is the recovery system that is done almost every day. the recovery system is largely on the following lines: i) Automatic recovery from payroll and current accounts; ii) Management of late loan repayment and iii) Management of the non-performing loan. According to Cook and Heiser (2011), operational inefficiency has also hindered the loan repayment experienced among many microfinance institutions. As a matter of fact, operational efficiency in a bank can enhance its financial operation and could lead to better financial performance. Operational efficiency is one of the key internal factor that points to the efficient management practices within an organization. The quality and the performance measure of the management can therefore be seen when a firm is able to operate efficiently and meet its targets within the require timeframe (Jason, 2006).

According to Bonfim (2009), operational efficiency in a commercial bank and cooperative banks is to be seen in its loan performance. The better the loan performance in a bank, the better the operating efficiency and consequently, the better the quality of management. In addition, loan performance, which is highly dependent on the credit appraisal procedures can lead to the financial performance of the bank. Similarly, operating costs in a bank can reveal the quality of management as an internal factor driving operational performance (Athanasoglou et al., 2005). Meanwhile, Bonfim (2009) further expounds that operational efficiency can lead to profitability as well as increased market share for a bank. This therefore calls for vigilant performance among the commercial banks in order to gain competitiveness. However, banks should not fail to practice credit appraisal for the sake of gaining market share.

Musyoki (2011) in his study found that there is a significant and positive correlation between asset quality management and performance in Kenya commercial banks. This clearly indicate that there is need for a better asset quality management in commercial banks and cooperative banks in order to ensure improved financial performance. In general, the results show that even though the banks in Kenya score highly in terms of efficiency, there is still a room for improving the operations to achieve full efficiency. The study established that during the study period, commercial banks increased in their total productivity, which coincided with technological development over the study period.

Another study by Ngetich (2011) focuses on the empirical analysis of the commercial bank’s efficiency and performance in Kenya. This study concluded that banks with effective and efficient management, credit lending policy, credit portfolio, labour productivity, information technology, risk and quality management could perform twice better in terms of operations. This is centrally to the performance of banks that do not apply proper management of internal factors are not aligned with organization goals and objectives.

Kithinji (2010) explains that whenever the cost of operations increases from external factors for financial institutions, only banks that nurture good management skills and expertise to cut down on the cost will realize a boost in their performance. Migai (2010) adds that internal factors that contribute to the financial performance of commercial banks should be well managed. These factors are diverse and it is the
work of the management to determine the key factors and put more resources on them.

**Financial Performance of Cooperatives**

For Stoner (2003), performance is defined as capacity for an entity to work successfully towards a sustainable growth and provide responses either to internal or external opportunities and threats. Furthermore, Stoltenberg and Anderson (1995) posited that, performance refers to how successful an entity is, basing on its smooth utilization of available resources to attain its missions, goals and objectives. The main source of revenue that ZCSS generates is earned from loans issued to its clients, commissions and other banks services, therefore, analysis of the loan and its management is the key activities of ZCSS. The financial performance therefore depends on those factors among others.

The measurement of financial performance of organizations is a subjective one. However, the measurement of financial performance is recognized as the key indicator of how well SACCOs and other MFIs are performing. It therefore needed to provide the key financial indicators that can ensure confidence among many of the key players in the market. According to Kiama (2014), one of the key measures of performance in SACCOs can be seen in terms of resource utilization. In terms of financial indication, this resource utilization is expressed in ration form that measures how well the assets have been utilized to provide returns for the company. This is the common measure well known as return on assets. Financial institutions and other organizations are required to report their performance and therefore need to track performance in relation to the return on assets.

Financial performance of MFIs, SACCOs and other organizations can also be measured in terms of return on equity. This measures how well a firm is able to put the equity it has to better use in generating returns. In addition, financial institutions can be able to measure their financial performance through determining the interest margins. This refers to the difference between the interest charged on loans to borrowers and the interest paid by the banks for the use of money to depositors. An interest margin is the area in which banks are said to gain profit from. This is because provision of credit is one of the main activities of a bank (Fiorillo, 2006).

**Empirical literature**

Empirical review is referred to as the existing literature by previous studies on the research subject relevant to the study. In the empirical review, a research tends to investigate the previous studies that are more related to the study variables and analyze their findings. The objective is to guide the researcher in identifying areas of research, identifying concepts and providing a research gap as well as a critical review.

Botti, Corsi and Zacchia (2018), conducted an empirical research on the European microfinance network with an object of establishing the role played by MFIs in Europe. The core objective of the study was therefore to explore the mission, target, social and financial impact of microfinance to the society at large. Using survey questionnaire, the research covered 394 micro lenders in 16 European countries from 2006 to 2015. The results revealed that financial performance of these microfinance institutions was promising with ROE ranging from 3.1% to 13.1% while ROA ranged from 3.0% to 12.5%. In addition, the results findings showed that majority of the MFIs have impacted on the social welfare of the members and community at r-squared of 0.782. The researchers therefore recommend that the policy makers and key players in the microfinance institutions should ensure that the MFIs are performing and have necessary resources for sustainable performance.

On his part, Nduba (2018) did an empirical study in Congo. The research concentrated on the factors affecting the financial sustainability of MFIs. The population was made up of 3218 customers of MFIs and from which a sample 355 customers was selected. The research used descriptive research design and questionnaire made up of both open-ended and closed-ended questions. Using SPSS and excel, the research findings were presented using tables, graphs and frequencies. The results showed that around 64% of clients had taken loan from MFIs with 35% having a guarantor while 31% used assets as security. The results further revealed that the sustainability of the MFIs is highly dependent on the performance of loans with R squared of 0.738. The regression analysis output showed the F-statistics of 1310 revealed the model to be significant. The researcher recommends that MFIs to strengthen loan processing to reduce loan defaults.

In another related research, Wafula (2016) investigates the various factors that affect the sustainability of microfinance institutions in Kenya. In this study, the goal was to determine the influence of liquidity level, operating expense, profitability, leverage of the institutions on the financial sustainability of MFIs. Using descriptive survey research design, the research collected data from 44 MFIs through structured questionnaire and interview guide to key informants. The findings revealed that liquidity (r=0.7), capital adequacy (r=0.645) and leverage (r=0.731) are significantly correlated with financial stability with, and while performance (r=0.128) is not. The multiple regression analysis revealed that the model was significant with F-statistics of 38.579 and p-value=0.007.

Frank, Mbabazize and Shukla (2015) in their research investigated the service terms provided by SACCOs on the members’ economic development in Kenya. The research took a case study of Zigama CSS. The main guiding the research was to find out whether the terms attached to the services provided by ZCSS has an impact on the socioeconomic development of members. The research adopted a cross sectional, correlational and survey research designs. Primary data was collected using questionnaire, interview and observation. The findings revealed that there exists a positive and strong correlation (r=0.695) between services provided by Zigama and the economic development of members. The regression analysis show that the model is significant with t-statistics, t=2.374. The researchers recommended that there is need for awareness among the members in relation to terms and conditions applied in the provision of services like credit.

Further, a research by Mwangi and Wambua (2016) on the factors influencing performance of SACCOs in Kenya took a case study of UNTAS SACCO. The research concentrated on the factors affecting the financial performance of SACCOs in Kenya. In this research, the main objective was to determine those factors that have an influence on the performance of SACCOs. The factors identified in this research were organizational culture, structure, leadership capacity and rewarding practices. The research design used a case study design adopting descriptive analysis and collected primary data using a structured questionnaire. The targeted population was 96 senior
staff from which a sample of 50% that is 48 was selected. All the selected factors were found to be significantly and positively related with performance, namely Organizational culture (0.440), structure (r=0.568), leadership (r=0.375), rewarding practices (r=0.388). The F-statistics (F=9.25) showed that the regression model was significant with an R-square of 0.481.

Mmari and Thinyane (2019) conducted an empirical research on factors influencing performance of SACCOS in Maseru District, Lesotho. While adopting a cross sectional research design, the researchers collected primary data from a sample of 369 respondents drawn from all the 23 SACCOS in the study area. The primary data was collected using structured questionnaire. Seven factors were considered for analysis and among these was loan delinquency ratio, growth of share capital, among others. The results of this research showed that the loan delinquency was high since the ratio was less than 1% of the total loans. It also revealed that the SACCOS performance was good in relation to share capital of the members because they had a strong capital base that enabled them to operate smoothly.

**Theoretical framework**

According to Kothari (2004), theoretical framework refers to a group of interconnected concepts, expressed in a theory form though not necessarily worked upon very well. This study was based on neoclassical theory and efficient structure theory.

**a. Neo-classical theory**

Neo-classical theory of a firm is a theory that can be traced back to Honohan (1997). The theory explains how firms can be efficient in their operations. For instance, technical efficiency, which is derived from this theory, assumes profit-maximizing behavior of a firm. A bank can be able to achieve technical efficiency by having well trained personnel as well as employing machines and technology that are more efficient in operation. A bank can on the other hand become inefficient if technically, it adopts poor technical approach or lack adequately trained staff. In the process of installing new technology, the bank may experience delays since the diffusion of technology is not automatic nor is it instantaneous. However, Derbali (2011), in the X-inefficiency posit that the inefficiency does not occur due to delay in installing or up taking a new technology, but rather on the internal organization of how to deal with this process. Similarly, lack of a certain skill should not be the main cause of inefficiency, but on how to handle the challenge that the bank faces. This implies that the efficiency of a firm is more to do with the management action rather than resource availability.

The neo-classical theory applies in this current study, which is concerned with determining the effect of internal organizational factors on the performance of cooperative banks in Rwanda. The theory postulates that firms can achieve efficiency and hence financial performance for technical reasons. In order to be more efficient in provision of these services, the theory postulate the need for internal management of the resources. Therefore, the efficient performance of a bank is solely dependent on the internal operation of the organization. Without such care, even adequate resource availability can turn ineffective if the firm internal management is up to the task (Makiyan, 2003; De Grauwe (2008)). These reasons are due to internal organization management of the resources. It therefore implies that the organizational performance can be achieved through internal organizational factors.

**b. Efficient structure theory**

The efficient structure theory originated first with Demsetz in 1973. This theory was first proposed as an alternative to organizational performance tied to the market structure arguments on performance (Bibow, 1995). The efficiency structure hypothesis holds that when a bank operates in an efficient way, it is going to gain a competitive advantage due to reduced costs of operations that effectively influence the pricing of its services. This implies that the differences created in the operational costs between competitors can end up creating different market share between the competitors. This end up bringing about market dominance for one firm while others may have a lower market share. It consequently shows that firms with efficient operation may end up dominating in a market because of their efficiency (Aver, 2008; Derbali, 2011).

When these arguments are applied in the banking industry, this theory clarifies that only those banks, whose operation is more efficient in comparison to theirs, are more likely to gain higher profits. These profits result from the associated low costs of operational whenever there is efficiency in the bank. Such banks may end up holding a bigger market share due to their related lower pricing of their products and services. This theory therefore relates with the current study because efficient management of internal organizational factors can lead to lowering operating costs within a bank and therefore resulting into better financial performance. For instance, efficient credit management in ZCSS can save the organization from high costs related to loan recovery.

**Conceptual framework**

A conceptual framework aims at developing a comprehensive situation. Naughton (2016), argue that conceptual framework refers to opinions concerning the interaction and correlation between independent and dependent variables and indicating the relationship in Figures 2.1.

![Conceptual Framework](image)

**Figure 1: Conceptual Framework.**

Source: Researcher (2019)

Figure 1 indicates the study’s conceptual framework that comprises of independent and dependent variable. The independent variables in this study are some internal organizational factors, namely, liquidity, capital strength and credit Worthiness. These factors lead to influence the financial...
performance of cooperative banks, which is the dependent variable. In this regards, the dependent variable will be measured through the following indicators: ROA (return on asset); ROE (return on Equity) and increased interest margin. The figure also shows the intervening variables, which include compliance with regulations and working out problems of activities.

III. MATERIALS AND METHODS

A descriptive research design was adopted by using both primary and secondary data. This helped to describe findings of information pinpointed for several impediments (Caroline, 2010). The design was found to be highly effective when it comes to describing the performance of an organization and hence adopted to analyze the factors influencing performance of ZCSS. In addition, correlational research design was also used. In this, the researcher was able to establish the relationship that exists among the study variables.

Sample size is defined as the number of people, units and objects chosen in the sample, Kothari (2009) whether the sample is chosen adequately. The researcher used a study population of 193 staff of ZCSS from which a sample size of 103 was determined using Yamane’s formula (1967) is used to estimate the sample size.

\[ n = \frac{N}{1 + Ne^2} \approx 103 \]

Where \( n \) is the sample size, \( N \) is the total population and \( e \) is the sampling error=0.05. In this research project, the researcher used stratified random sampling technique. According to Creswell and Creswell (2017), stratified random sampling technique involves dividing the population into strata within which the elements exhibit similar characteristics. The selection of the sample element within each stratum is then done using simple random technique and according to the proportion of each stratum.

Table 1: Target Population and Sample Size

<table>
<thead>
<tr>
<th>Categories</th>
<th>Target population</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Executive</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Management Committee</td>
<td>15</td>
<td>8</td>
</tr>
<tr>
<td>Middle Managers</td>
<td>16</td>
<td>9</td>
</tr>
<tr>
<td>Analysts</td>
<td>62</td>
<td>33</td>
</tr>
<tr>
<td>Junior Staff</td>
<td>98</td>
<td>52</td>
</tr>
<tr>
<td>Total</td>
<td>193</td>
<td>103</td>
</tr>
</tbody>
</table>

Source: Researcher (2020)

Primary data was collected using closed ended-questionnaires, which were distributed to the respondents using the technique of dropping the questionnaires to the selected respondents and picked them after answering the questionnaire. The questionnaires were given to them in hard copy and respondents were able to respond by filling in the space provided.

All the questionnaires were filled and returned representing 100% response rate. Majority of the respondents were male representing 58% of the total respondents while female were 42%. Out of the 103 respondents who participated in the study 15.53%, were in age group 20-29 years; 17.48% in the age group of 30-39 years; 62.14% were aged between 40-49 years whereas 4.85% were aged 50 years and above. 58.25% of the respondents hold bachelor’s degree, 19.42% have diploma, 14.56% master’s degree and 0.97% with PhD while 6.8% have other professional courses.

Findings on Objective One

The first internal organization factor investigated in this research was liquidity management.

Table 1: Constitution of the liquidity

<table>
<thead>
<tr>
<th>Constitution of the liquidity</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equity</td>
<td>29</td>
<td>28%</td>
</tr>
<tr>
<td>Interest from loans &amp; Deposits</td>
<td>13</td>
<td>13%</td>
</tr>
<tr>
<td>Retained earnings</td>
<td>20</td>
<td>19%</td>
</tr>
<tr>
<td>Deposits from clients</td>
<td>40</td>
<td>39%</td>
</tr>
<tr>
<td>Investment returns</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Total</td>
<td>103</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: Primary data (2020)

Out of the 103 respondents who participated in the study 40 (39%) believe that the liquidity of the bank comes from the deposits from the clients, 29 (28%) are of the view that it is supported by the interests from loans and deposits. Few of them 1 (1%) think that the liquidity is supported by the investment returns. These findings are in line with the findings by Wafula (2016) who found that liquidity has an influence on the financial performance of microfinance institutions in Kenya.

A short analysis of the Statement of financial position from 2014 to 2018 shows that ZCSS liquidity is made of 76% customer deposits, 19% is the share capital, whereas the retained earnings supports 3%. The customer deposits are money on the clients’ current accounts, voluntary savings and compulsory savings. Customer deposits are term deposits for a determined period and at an agreed interest rate. The ratios are almost the same from 2014 to 2018.

Table 2: Constitution of the cash and cash equivalent

<table>
<thead>
<tr>
<th>Constitution of the cash Equivalent</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Promissory notes</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Term deposits</td>
<td>20</td>
<td>19%</td>
</tr>
<tr>
<td>Government security &amp; other bonds</td>
<td>12</td>
<td>12%</td>
</tr>
<tr>
<td>Cash &amp; cash reserves at BNR</td>
<td>29</td>
<td>28%</td>
</tr>
<tr>
<td>Treasury bills</td>
<td>42</td>
<td>41%</td>
</tr>
<tr>
<td>Total</td>
<td>103</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: Primary data (2020)
As shown in Table 3, majority of the respondents, that is, 42(41%) believe that the cash and cash equivalent of the bank made of Treasury bills. In addition, 29(28%) are of the view that it is made of cash and cash reserves at BNR, 20(19%) think that it is made of term deposits and 12(12%) say that it is made of government security and bonds.

A short analysis of the Statement of financial position from 2014 to 2018 shows that ZCSS cash and cash equivalent is made of 42% Treasury bills (amount due from other banks), 26% is made of cash and cash reserves at BNR, 26% is also made of government securities and bonds, whereas the remaining 6% is made of other equity investment. The ratios are almost the same from 2014 to 2018.

Table 3: Financing the total assets

<table>
<thead>
<tr>
<th>Financing the total assets</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loans</td>
<td>59</td>
<td>57%</td>
</tr>
<tr>
<td>Interest coverage</td>
<td>30</td>
<td>29%</td>
</tr>
<tr>
<td>Reserves to BNR</td>
<td>10</td>
<td>10%</td>
</tr>
<tr>
<td>Other investments &amp; financing</td>
<td>3</td>
<td>3%</td>
</tr>
<tr>
<td>Provisions for doubtful debts</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>103</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: Primary data (2020)

Different respondents have different views on where ZCSS gets its strength. Most of the respondents 26 (25%) attribute its strength from the management which is able to ensure the safe operations of the institution as they comply with the necessary and applicable internal and external regulations. Other respondents, 21(20%) say that it comes from its capital adequacy which enables it to meet its cash demand, 20 (19%) say that it is from asset quality (loan’s quality) and liquidity, 13 (12%) said that it competitive advantage is drawn from the earnings, 3 (3%) think that it is from the sensitivity factor. Internationally, those factors are given the followings rates: Management (25%), Capital adequacy and Asset quality (20%) each, Earnings (15%), Liquidity and Sensitivity (10%) each. As Ngetich (2011) pointed out, bank efficiency should be measured in line with the CAMELS model.

Table 5: Maintaining Liquidity for Daily Operations

<table>
<thead>
<tr>
<th>Maintaining liquidity for daily operations</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working Capital</td>
<td>30</td>
<td>29%</td>
</tr>
<tr>
<td>Short term Finance</td>
<td>20</td>
<td>19%</td>
</tr>
<tr>
<td>Current Ratio</td>
<td>19</td>
<td>18%</td>
</tr>
<tr>
<td>Other Liquid assets</td>
<td>18</td>
<td>17%</td>
</tr>
<tr>
<td>Cash</td>
<td>16</td>
<td>16%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: Primary data (2020)

Different respondents have different views on why ZCSS maintains its liquidity for day-to-day operations. Most of the respondents 30 (29%) say that it is for working capital purposes like issuing loans to the clients, 20 (19%) say it is to finance the short term finance like buying treasury bills and bonds whose maturity is one year and less. Another 19 (18%) say it is to keep the current ratio as a requirement of the central bank, 18(17%) say that it is to finance other liquid assets while, 16 (16%) said that it is to keep the cash ratio and reserves at the BNR. Ngetich (2011) also found the need for maintaining liquidity at optimal levels to ensure smooth operations of the bank.

Findings on Objective Two

The second internal organizational factor was capital strength has big effect on the performance of a financial institution.

Table 6: Determinants of CSS capital strength

<table>
<thead>
<tr>
<th>Determinants of financial performance</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Debt Capital ratio</td>
<td>20</td>
<td>19%</td>
</tr>
<tr>
<td>Investment Returns</td>
<td>30</td>
<td>29%</td>
</tr>
<tr>
<td>Retained Earnings</td>
<td>30</td>
<td>29%</td>
</tr>
<tr>
<td>Working Capital</td>
<td>13</td>
<td>13%</td>
</tr>
<tr>
<td>Members Contribution</td>
<td>10</td>
<td>10%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>103</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: Primary data (2020)

Out of the 103 contacted respondents 30 (29%) believe that the performance of financial statement is determined by the increase of the retained earnings as well as investment returns. Another 20 (19%) believe that it is determined by debt equity ratio which shows the ability of the company to pay its debts, 13 (13%) say that it is determined by the working capital while only 10 are of the view that it is determined by the members’ contribution which constitutes the cheaper source of finance. In line with the findings by Nduba (2018), the findings show that investment...
returns and members contribution influence the performance of cooperative bank.

### Table 7: Ability of ZCSS to meet the requirements of BNR

<table>
<thead>
<tr>
<th>BNR Requirements</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital Adequacy</td>
<td>30</td>
<td>29%</td>
</tr>
<tr>
<td>Debt- Equity Ratio</td>
<td>15</td>
<td>15%</td>
</tr>
<tr>
<td>External Capital</td>
<td>19</td>
<td>18%</td>
</tr>
<tr>
<td>Debt Ratio</td>
<td>20</td>
<td>19%</td>
</tr>
<tr>
<td>Internal Capital</td>
<td>19</td>
<td>18%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>103</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Source: Primary data (2020)**

As shown in Table 8, most of the respondents, that is, 30 (29%) believe that the ZCSS Capital has been adequate enough to enable it sustain in the business. Another 20 (19%) of the respondents believe that ZCSS has been able to maintain its debt ratio to sustain its growth within the range required by BNR. In addition, 19 (18%) the internally generated capital as well as the external capital also supported ZCSS to meet the requirement of the regulator while only 15 (15%) are of the view that it is the debt equity ratio was also among the factor well controlled to meet the requirement of the central bank. Capital strength was found by Cook and Heiser (2011) as a major factor that influence bank performance.

### Table 8: Sustainability of ZCSS

<table>
<thead>
<tr>
<th>Sustainability</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working Capital</td>
<td>2</td>
<td>2%</td>
</tr>
<tr>
<td>Interest Coverage</td>
<td>50</td>
<td>49%</td>
</tr>
<tr>
<td>Equity</td>
<td>10</td>
<td>10%</td>
</tr>
<tr>
<td>Retained Earnings</td>
<td>11</td>
<td>11%</td>
</tr>
<tr>
<td>Debt</td>
<td>30</td>
<td>29%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>103</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Source: Primary data (2020)**

Out of the 103 respondents, majority, 50 (49%) believe that interest coverage ratio within ZCSS is enough to ensure its sustainability into the business. This is because, most of its members get their salary through ZCSS and it covers the debts on the salary before the members gets paid, hence the defaults rate is very minimum. 30 (29%) believe that ZCSS debt are also a determinant factor to ensure its sustainability whereas the 76% of the total assets are deposits from the clients. Among these deposits include voluntary savings and compulsory savings which ZCSS remunerates 4-5% interests. 11 (11%) say that the retained earnings are enough to ensure the sustainability in the fore future. 10 (10%) of the respondents say that the equity of the bank is also strong enough to ensure the sustainability in the business. The argument is that on top of the members’ contribution, the compulsory savings is considered as equity of the bank because the member does not have direct access to that money anytime needed while 2 (2%) believe that it is the working capital that is sufficient enough to ensure its sustainability into the financial industry. Cook and Heiser (2011) provide similar insights on the need of capital for sustainability.

### Table 9: Capital Base for ZCSS financial performance

<table>
<thead>
<tr>
<th>Capital base</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profit Earned</td>
<td>60</td>
<td>58%</td>
</tr>
<tr>
<td>Special Reserve</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>General Reserve</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Statutory Reserve</td>
<td>18</td>
<td>17%</td>
</tr>
<tr>
<td>Revenue Reserve</td>
<td>25</td>
<td>24%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>103</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Source: Primary data (2020)**

The results displayed in Table 10 shows that majority of the respondents, that is, 60 (58%) believe that the profit earned are enough and will significantly increase the capital base of the cooperative to ensure its long-term sustainability into the business. Another 25 (24%) believe that ZCSS takes a big portion of the revenue for the retained earnings which ensures the growth of the capital base. Lastly, 18 (17%) say that the already constituted statutory reserves at BNR are enough to ensure the long run of the cooperative. There was no response on special reserve and general reserve. According to the findings by Danny (2014), the long-term sustainability of banks is hinged on its capital base.

### Table 10: Efficient capital management

<table>
<thead>
<tr>
<th>Efficient capital management</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Efficient Cash flow</td>
<td>16</td>
<td>16%</td>
</tr>
<tr>
<td>Weighted capital</td>
<td>14</td>
<td>14%</td>
</tr>
<tr>
<td>Working capital Management</td>
<td>25</td>
<td>24%</td>
</tr>
<tr>
<td>Investments</td>
<td>20</td>
<td>19%</td>
</tr>
<tr>
<td>Efficient capital Structure</td>
<td>28</td>
<td>27%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>103</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Source: Primary data (2020)**

Out of the 103 respondents, 28 (27%) and 25 (24%) believe that efficient capital structure and working capital management respectively affect in the increase of the members’ contribution. Another 20 (19%) say that good investments also contribute to the increase of the members’ contribution. While 16 (16%) believe that efficient cash flow management is a determinant factor to increase the profitability of the cooperative therefore the increase of the members’ contribution. 14 (14%) believe that well balance between capital and debt (weighted capital) enables the bank to become more profitable hence increase of the members’ contribution. Aver (2008) found that efficient working capital management could help the banking systems operate more efficiently and reduce their operating costs. In addition, Mmari and Thinyane (2019) found that performance of SACOs is very much influenced by the capital they possess.

### Findings on Objective Three

The third internal organizational factor was sound credit policies and good scrutiny of the loan applications.
Once on the
larity. From time to time, the
penetration of the banking i
like agriculture, energy etc. Avar (2008) attributed the growth and
who want to invest in some sector of the economy as motivation
central bank may decide to give grant or some facility to investors
project has got any grant or any faci
capital investment required while 8(8%) consider whether the
This is followed by the owners' other
an indication of the capital investment required in the business.
This is followed by the owners' other assets used in the business
by 20 (19%) respondents. 12(12%) believe that the amount of
retained earnings of an existing project is also an indication of the
capital investment required while 8(8%) consider whether the
project has got any grant or any facility. From time to time, the
central bank may decide to give grant or some facility to investors
who want to invest in some sector of the economy as motivation
like agriculture, energy etc. Avar (2008) attributed the growth and
penetration of the banking industry in Slovenian partly due to their
reduced cost through loan recovery processes.

### Table 11: Assessment of the client capacity

<table>
<thead>
<tr>
<th>Assessment of the client capacity</th>
<th>F</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Past cash flow statement</td>
<td>29</td>
<td>28%</td>
</tr>
<tr>
<td>Projected cash flows</td>
<td>13</td>
<td>13%</td>
</tr>
<tr>
<td>Regular income of the owner (eg. Salary)</td>
<td>40</td>
<td>39%</td>
</tr>
<tr>
<td>Other income (eg. Spouse income)</td>
<td>20</td>
<td>19%</td>
</tr>
<tr>
<td>Stability of their employment</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>103</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: Primary data (2020)

Out of the 103 respondents, 40 (39%) support that regular
income of the owner of the business is an important factor to
determine the client capacity to repay the loan should the projected
income from the business fail. Another 29 (28%) believe that past
cash flow of the business is a good sign that the project is viable.
In addition, 20 (19%) say that when the promoter has other source
of income like the salary of his/her spouse is an assurance that the
loan will be paid. 13 (13%) respondents place importance on the
projected cash while only one respondent place reliance on the
established that MFIs were more effective when their credit policy
is strong.

### Table 12: Assessment of the client capital investment required

<table>
<thead>
<tr>
<th>Capital investment required</th>
<th>F</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash Owner's equity</td>
<td>41</td>
<td>40%</td>
</tr>
<tr>
<td>Loan amount</td>
<td>22</td>
<td>21%</td>
</tr>
<tr>
<td>Retained earnings</td>
<td>12</td>
<td>12%</td>
</tr>
<tr>
<td>Grant or facility</td>
<td>8</td>
<td>8%</td>
</tr>
<tr>
<td>Other assets used in the business</td>
<td>20</td>
<td>19%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>103</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: Primary data (2020)

The results as shown in Table 13 revealed that the majority
of the respondents, at 41 (40%) support that owner’s equity
contribution in cash play signifies commitment of the owner in
the business which also induces the bank to invest in that business.
Another 22 (21%) of the respondents say that the loan size also is
an indication of the capital investment required in the business.
This is followed by the owners' other assets used in the business
by 20 (19%) respondents. 12(12%) believe that the amount of
retained earnings of an existing project is also an indication of the
capital investment required while 8(8%) consider whether the
project has got any grant or any facility. From time to time, the
central bank may decide to give grant or some facility to investors
who want to invest in some sector of the economy as motivation
like agriculture, energy etc. Avar (2008) attributed the growth and
penetration of the banking industry in Slovenian partly due to their
reduced cost through loan recovery processes.

### Table 13: Assessment of the client condition

<table>
<thead>
<tr>
<th>Client condition</th>
<th>F</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>25</td>
<td>24%</td>
</tr>
<tr>
<td>Duration of the loan</td>
<td>30</td>
<td>29%</td>
</tr>
<tr>
<td>Period stayed in service</td>
<td>6</td>
<td>6%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>103</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: Primary data (2020)

Out of the 103 respondents, 30 (29%) support that the
duration of the loan is an important factor that ZCSS consider to
grant the loan because the longer it takes to pay the loan, the riskier
it becomes. 28 (27%) of the respondents say that the employees,
the period remaining in service is also an important factor to be
considered because one of the regular source of his income will
change. Another 25 (24%) respondents of the loan applicant also
say that age of the respondent matters because the older he is, the
lessor innovative he becomes and vice versa. Further, 14 (14%) of
the respondents believe that the business industry they want to
invest in counts in the sense that if it is the first project in that
industry, changes of the project to fail are high. The les important
considered is the period the loan applicant has stayed in the service
with 6 (6%) of the respondents. Wafula (2016) research pointed
the need for thorough screening on the potential clients to increase
loan performance.

### Table 14: Assessment of the client character

<table>
<thead>
<tr>
<th>Client Character</th>
<th>F</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference to CRB</td>
<td>52</td>
<td>50%</td>
</tr>
<tr>
<td>Marital status</td>
<td>8</td>
<td>8%</td>
</tr>
<tr>
<td>Bankruptcy history</td>
<td>22</td>
<td>21%</td>
</tr>
<tr>
<td>Education background</td>
<td>6</td>
<td>6%</td>
</tr>
<tr>
<td>Reputation</td>
<td>15</td>
<td>15%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>103</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: Primary data (2020)

The findings shown in Table 15 revealed that out of the 103
respondents contacted, 52 (50%) say that the analyst has to refer
to the Credit Reference Bureau (CRB) to check the rating and the
level of indebtedness of his client. Another 22 (21%) of the
respondents say that a client who has not been honoring his
obligation with the bank (bankruptcy of the client) is also
scrutinized very seriously before granting him another loan. Out
of the total, 15 (15%) respondents say that a client with a good
reputation has high chance to succeed in the business environment.
8 (8%) respondents that a married business man is more stable and
will always struggle to respect his obligation with the bank. While
only 6(6%) respondents believe that education background has a
big influence on someone’s behavior including his relationship
with the bank, hence paying well his loan obligations.

### Table 15: Assessment of the client collateral

<table>
<thead>
<tr>
<th>Client Collateral</th>
<th>F</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical assets</td>
<td>30</td>
<td>29%</td>
</tr>
<tr>
<td>Insurance</td>
<td>25</td>
<td>24%</td>
</tr>
<tr>
<td>Movable assets (eg. vehicle)</td>
<td>6</td>
<td>6%</td>
</tr>
<tr>
<td>Other fund guarantee</td>
<td>26</td>
<td>25%</td>
</tr>
<tr>
<td>Cash (eg. savings)</td>
<td>16</td>
<td>16%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>103</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: Primary data (2020)
Out of the 103 respondents, 30 (29%) say that the more value of the mortgage the more the client will fear to lose his asset in case of default. However, the bank has more preference on the fund guarantee and insurance as agreed by 26 (25%) and 25 (24%) respondents respectfully. The cash guarantee or insurance are paid immediately upon bank first demand, unfortunately fund guarantee are very rare to get and insurance are more expensive. 16 (16%) of the respondents say that a client who has good saving history on his account is less risky hence is more preferred while 6 (6%) of the respondents say the movable assets are given less weight. This is considered in case of financing a car and the bank requires a comprehensive insurance with interest transferred to ZCSS. On the collateral, Wafula (2016) recommended that use of collateral might salvage banks from increased non-performing loans.

Effect on Financial Performance of ZCSS

When bank has good credit policies, with enough capital and the management is able to take appropriate decision, it becomes good performing. The researcher also investigated the effect of the internal organizational factors on the performance of ZCSS. This is further explained in the following subthemes.

The correlation Matrix

First, the researcher checked the relationship among the study variables as shown in Table 17.

Table 16: Correlation Matrix

<table>
<thead>
<tr>
<th></th>
<th>ROA</th>
<th>Interest</th>
<th>ROE</th>
<th>Liquidity</th>
<th>Capital</th>
<th>Credit Worth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Correlation</td>
<td>1</td>
<td>.617**</td>
<td>.313**</td>
<td>.570**</td>
<td>.616**</td>
<td>.754</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>N</td>
<td>103</td>
<td>103</td>
<td>103</td>
<td>103</td>
<td>103</td>
</tr>
<tr>
<td>Interest</td>
<td>.617*</td>
<td>1</td>
<td>.692**</td>
<td>.690**</td>
<td>.691**</td>
<td>.645**</td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>.038</td>
<td>.001</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>N</td>
<td>103</td>
<td>103</td>
<td>103</td>
<td>103</td>
<td>103</td>
</tr>
<tr>
<td>ROE</td>
<td>.313**</td>
<td>.692**</td>
<td>1</td>
<td>.564**</td>
<td>.539**</td>
<td>.380**</td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>.001</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>N</td>
<td>103</td>
<td>103</td>
<td>103</td>
<td>103</td>
<td>103</td>
</tr>
<tr>
<td>Liquidity</td>
<td>.570**</td>
<td>.690**</td>
<td>.564**</td>
<td>1</td>
<td>.726</td>
<td>.743*</td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.121</td>
<td>.031</td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>N</td>
<td>103</td>
<td>103</td>
<td>103</td>
<td>103</td>
<td>103</td>
</tr>
<tr>
<td>Capital</td>
<td>.616**</td>
<td>.691**</td>
<td>.539**</td>
<td>.726</td>
<td>1</td>
<td>.768</td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.121</td>
<td>.069</td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>N</td>
<td>103</td>
<td>103</td>
<td>103</td>
<td>103</td>
<td>103</td>
</tr>
<tr>
<td>Credit Worth</td>
<td>.754</td>
<td>.645**</td>
<td>.380**</td>
<td>.743*</td>
<td>.768</td>
<td>1</td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>.071</td>
<td>.000</td>
<td>.000</td>
<td>.031</td>
<td>.069</td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>N</td>
<td>103</td>
<td>103</td>
<td>103</td>
<td>103</td>
<td>103</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed)

Source: Primary data (2020)

According to Table 17 the correlation between the dependent variables, namely, return on asset (ROA), interest margin and return on equity (ROE) shows positive and high relationship with the independent variables namely the liquidity, capital strength and credit worthiness. For instance, the Pearson’s correlation between ROA and liquidity is 0.570, with capital strength is 0.616 and with credit worthiness is 0.754. On the other hand, the Pearson’s between interest margin and liquidity is 0.690, with capital strength is 0.691 and with credit worthiness is 0.645. Lastly, the Pearson’s correlation between ROE and liquidity is 0.564, with capital strength is 0.539 and with credit worthiness is 0.380. These findings confirm findings by Danny (2014), Wafula (2016) and Botti, Corsi and Zacchia (2018). However, Derbali (2011) found a negative correlation between liquidity and bank performance.

Regression Model on the ROA

In addition to the correlation analysis, the researcher also conducted the regression analysis to determine the effect of internal organizational factors on the return on assets.
Table 17: Regression Model between Organizational Factors and ROA

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.756a</td>
<td>.572</td>
<td>.559</td>
<td>.354</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>Df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Regression</td>
<td>3</td>
<td>5.475</td>
<td>44.152</td>
<td>.000b</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>100</td>
<td>0.124</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>103</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Constant)</td>
<td>.940</td>
<td>.000</td>
<td>3.637</td>
</tr>
<tr>
<td></td>
<td>Liquidity</td>
<td>.011</td>
<td>.089</td>
<td>.030</td>
</tr>
<tr>
<td>1</td>
<td>Capital</td>
<td>.090</td>
<td>.000</td>
<td>.196</td>
</tr>
<tr>
<td></td>
<td>Credit Worth</td>
<td>.653</td>
<td>.000</td>
<td>.743</td>
</tr>
</tbody>
</table>

a. Dependent Variable: ROA  
b. Predictors: (Constant), Credit Worth, Liquidity, Capital

Source: Primary data (2020)

As shown in Table 18, the Pearson’s correlation between ROA and the predictors is 0.756 with an $R^2$ of 0.572. This shows that 57.2% of the changes in return on asset for ZCSS is influenced by the changes in liquidity, capital strength and credit worthiness of the clients.

Mwangi and Wambua (2016) also found positive and significance relationship between liquidity, capital adequacy, leverage and performance of SACCOs.

Further analysis were also conducted using analysis of variance (ANOVA) as shown in Table 18. According to the findings, the model was found to be significant with F-statistics of 44.152 and a p-value of less than 5%. Since that model was found to be significant, the researcher went ahead to investigate the coefficient for each of the independent variables on the return of asset as shown in Table 4.18. Botti, Corsi and Zacchia (2018) found that the model on ROA was significant.

The analysis of the regression coefficients revealed that all the indicators were significant since the p-values were less than 0.05. For liquidity, the p-value ($p=0.009$) was less than the threshold level of significance of 0.05. Hence, the variable was found to have a positive and significant effect on ROA. Similarly, the coefficient of capital strength was found to be significant with ($p=0.038$) and that of credit worthiness with ($p$-value =0.005). These was concluded to mean that both capital strength and credit worthiness have a positive and significant effect on ROA. These results are in line with the findings by Wafula (2016).

Regression Model on Interest Margins

To determine the effect of the selected organizational factors on the interest margin, the researcher conducted regression analysis whose results are discussed in the sections that follow.
Table 18: Regression Model between Organizational Factors and the Interest Margins

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>.747a</td>
<td>.558</td>
<td>.544</td>
<td>.345</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>Df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>14.736</td>
<td>3</td>
<td>4.912</td>
<td>41.628</td>
<td>.000b</td>
</tr>
<tr>
<td>Residual</td>
<td>11.761</td>
<td>100</td>
<td>.118</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>26.497</td>
<td>103</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Constant)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.016</td>
<td>.251</td>
<td></td>
<td>.000</td>
</tr>
<tr>
<td>2</td>
<td>Liquidity</td>
<td>.281</td>
<td>.086</td>
<td>.326</td>
</tr>
<tr>
<td></td>
<td>Capital</td>
<td>.309</td>
<td>.100</td>
<td>.424</td>
</tr>
<tr>
<td></td>
<td>Credit Worth</td>
<td>.108</td>
<td>.104</td>
<td>.206</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Credit Worth, Liquidity, Capital
b. Dependent Variable: Interest

Source: Primary data (2020)

As shown in Table 19, the Pearson's coefficient of correlation between the internal organizational factors and the interest margin was found to be positive and high with R=0.747. On the other hand the R²= 0.558 shows that 55.8% of the changes of interest margin in ZCSS is influenced by the changes in the internal organizational factors, namely, liquidity, capital strength and credit worthiness. These results corroborate with those of MMari and Thinyane (2019) on the factors that influence the profit margin for banks. Table 19 shows the results of ANOVA between the internal organizational factors and the interest margins. According to the results the F-statistics (F=41.628) and the p-value (p<0.05) show that the model is significant. This is interpreted to mean that the regression model between the internal organizational factors as predictor variables of interest margins is significant and further analysis can be conducted on the same.

Further analysis of the effect of the internal organizational factors on the interest margins of ZCSS were conducted based on the coefficients of regression for each predictor variable. As shown in Table 19, the coefficient for liquidity was found to be significant since the p-value (p<0.05) was found to be less than 0.05. The coefficient of capital was also found to be significant since the p-value (p<0.05) was also less than 0.05. This shows that both liquidity and capital strength in ZCSS have a positive and significant effect on the interest margins of the cooperative bank. However, the effect of credit worthiness on interest margins was not found to be significant since the p-value (p= 0.301) is greater than 0.05. Wafula (2016) also found positive and significant correlations between liquidity, capital adequacy with performance of microfinance.

Regression Model on the ROE

The researcher wanted to know the impact of the liquidity management, capital strength and credit worthiness on the ROE of the cooperative bank. The findings of this study are presented in Table 20.
The fund is made of 15% of the remuneration of the saving accounts (voluntary and compulsory). This solidarity fund is kept in the bank as another source of cash etc. This solidarity fund offers a number of advantages like, reducing the number of defaulters, the family of the deceased client. This was introduced in a discussion with the leadership of ZCSS in light of how the cooperative constituted its capital base to ensure its sustainability, the manager said that all members of the cooperative are required to make a compulsory saving of 7% of their regular income (salary or any other monthly income) that will be based on to be granted a loan. In addition to that, members were also sensitized to put aside any amount of their choice on a voluntary saving account every month. The two savings accounts constitute therefore a strong capital base of the cooperative, which ensures long-term sustainability of the business. The voluntary saving account is remunerated 7% interest whereas compulsory saving account earns 8%.

As shown in Table 20, the Pearson’s coefficient of correlation R= 0.619 with an R² of 0.383. This reveals that 38.3% of the changes in the ROE in ZCSS is influenced by the changes in liquidity management, capital strength and credit worthiness as internal organizational factors. On ROE, Wafula (2016) found positive and strong correlation.

The analysis of variance between the internal organizational factors and return on equity was also conducted with the results as shown in Table 20. According to the table, the model was found to be significant with F-statistics (F=20.510) and p-value (p<0.05). These results shows that the regression analysis conducted between the internal organizational factors as predictor variables of return on equity has significant value.

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>.619</td>
<td>.383</td>
<td>.365</td>
<td>.485</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>Df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>14.336</td>
<td>3</td>
<td>4.779</td>
<td>20.510</td>
<td>.000b</td>
</tr>
<tr>
<td>Residual</td>
<td>23.262</td>
<td>100</td>
<td>.233</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>37.598</td>
<td>103</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>(Constant)</td>
<td>1.659</td>
<td>.353</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Liquidity</td>
<td>.461</td>
<td>.121</td>
<td>.533</td>
</tr>
<tr>
<td></td>
<td>Capital</td>
<td>.445</td>
<td>.141</td>
<td>.633</td>
</tr>
<tr>
<td></td>
<td>Credit Worth</td>
<td>-.322</td>
<td>.146</td>
<td>-.163</td>
</tr>
</tbody>
</table>

a. Dependent Variable: ROE  
b. Predictors: (Constant), Credit Worth, Liquidity, Capital  
Source: Primary data (2020)

Financial performance of ZCSS

ZCSS operating income has been increasing every year from 9.5B Rwf in 2014 to 20.9B Rwf in 2018, this show on average an annual increase of 20.1%. The retained earnings have been increasing every year from 4.2B Rwf to 9.6B Rwf. Hence, the Return on Equity (ROE) and Return on Asset have been increasing every year as shown here below.

<table>
<thead>
<tr>
<th>Year</th>
<th>ROE</th>
<th>ROA</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>14%</td>
<td>3.10%</td>
</tr>
<tr>
<td>2015</td>
<td>15%</td>
<td>3.20%</td>
</tr>
<tr>
<td>2016</td>
<td>15%</td>
<td>3.20%</td>
</tr>
<tr>
<td>2017</td>
<td>17%</td>
<td>3.80%</td>
</tr>
</tbody>
</table>

Discussions with ZCSS management

In a discussion with the leadership of ZCSS in light of how the cooperative constituted its capital base to ensure its sustainability, the manager said that all members of the cooperative are required to make a compulsory saving of 7% of their regular income (salary or any other monthly income) that will be based on to be granted a loan. In addition to that, members were also sensitized to put aside any amount of their choice on a voluntary saving account every month. The two savings accounts constitute therefore a strong capital base of the cooperative, which ensures long-term sustainability of the business. The voluntary saving account is remunerated 7% interest whereas compulsory saving account earns 8%.

Although members are required to contract life insurance that will pay the outstanding loan in case of death of the client, ZCSS introduced a solidarity fund with the aim of supporting the family members of the deceased client. This was introduced because some members complained about expensive amount of fees paid to contract that life insurance and in case of short-term loan, they do not even go for it. In case of death therefore, the solidarity fund pays the outstanding liability up to 25M and the life insurance pays the balance. This fund offers a number of advantages like, reducing the number of defaulters, the family members risk of losing the mortgage reduce, once the loan gets fully paid, the members of the deceased client are allowed to access the savings (voluntary and compulsory savings), the fund is kept in the bank as another source of cash etc. This solidarity fund is made of 15% of the remuneration of the saving accounts
(7% for voluntary saving and 8% of the compulsory saving account).

V. CONCLUSION AND RECOMMENDATION

This study identified issues that affect financial performance of the ZCSS. ZCSS top management has been stable and is composed of competent management committee with at least Master’s degree and other profession qualification. This is at the core center of its success over the past 5 years. Based on CAMELS Model, the management factor is the most important factor with the highest score and determinant factor for the success of any cooperative bank.

ZCSS management and majority of employees representing 68.9% have worked for the bank for more than 5 years and have acquired experience in the banking industry, hence the more experienced the employee becomes, the more he performs better. This also indicates that employees’ turnover within ZCSS is low and it employed good retention policy.

ZCSS Management also put in place good and sound credit policies that enabled the cooperative to constitute a good loan portfolio with a low rate of bad performing loans less than 2%. ZCSS has been able to attract deposits and savings from its clients to constitute its capital. This allows the bank to meet its cash demand and it constituted investment that were able to generate good returns.

- It is recommended to other microfinance institutions to mobilize savings (minimum monthly saving) from their members to strengthen their capital base for the long-term sustainability and introduce a solidarity fund as discussed above.
- It is also recommended that other microfinance institutions should hire competent employees with relevant qualifications and deploy policies to retain the good performing employees especially at the top management level.
- The researcher also recommends that the management of MFIs should streamline their credit policy to ensure that nonperforming loans are minimized and enough liquidity is maintained.
- It is recommended that the ZCSS should diversify its products and introduce for example school solidarity fund for the members’ children.

REFERENCES


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Relationship Between Learning Approaches and Academic Achievement of Accounting Education Students

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Abstract- Learning approach is an important consideration when planning for effective instruction and assessment. Hence, effective educators always desire to know how students learn so that they can be better informed how to go about their teaching and assessment. The study investigated the learning approach that most Bachelor of Education accounting students use for accounting as a course. Further, the study also examined the relationship between students learning approaches and academic achievement. Correlational design was used for the conduct of this study. Accounting education students of the University of Cape Coast were targeted, however, only the final year students (n = 154) were assessed due to three-month recess of schools as a result of the Covid-19 global pandemic. Entwistle et al.’s (2000) Approaches and Study Skills Inventory for Students was adapted and used to collect data on students learning approaches while Cumulative Grade Point Average (CGPA) was used as a measure of students’ academic achievement. Mean and standard deviation was used to analyse the research question as Pearson’s Product Moment Correlation Coefficient was used to test the hypothesis in the study. Findings of the study revealed that most of the students of accounting education (respondents) made use of a strategic approach in the study of accounting as a course. Also, the study discovered that the surface learning approach had an inverse relationship with academic achievement. The study recommended that teachers should adopt an assessment procedure (preferably, performance assessment) that would cause students to make use of higher learning approaches such as deep learning. Implications for teaching and learning were also discussed.

Index Terms- Academic achievement; Learning; Deep approaches; Surface approaches; Strategic approaches.

I. INTRODUCTION

Globally, an important factor in the development of future accountants is the education process that they undertake. Consequently, professional accounting bodies have become increasingly concerned with accounting education (Montaño & González, 2009). The quality of teaching and learning in higher education has been a subject of debate for many decades (Owusu, Kwakye, Bekoe & Welbeck, 2019). Adequate preparation of accounting graduates to face the world of work has been a subject of debate for most economies, especially, developing countries. Universities have been criticized for raising accounting graduates who cannot think and make judgments on issues independently. The teaching of accounting in universities has often been described to be overly technical, for students to grasp concepts and reproduce financial statements (Ballantine et al., 2008). Recently, there has been a call for accounting instructors to move beyond just the impartation of technical knowledge and equip students with a deeper understanding of principles and concepts underpinning accounting practices (Flood & Wilson, 2008). Undoubtedly, the role of educators in equipping students with the skill set relevant for today’s job market is quintessential, however, it is also a fact that graduates will learn how to become successful professional accountants if they adopt the life-long learning concept and thereby continually adapt to changes in the business environment (Owusu et al., 2019).

The way students’ study, rather than the content of what they study, is an area that is recently getting the attention of researchers in education. For some decades now, scholars in education have tried to understand how students learn from a phenomenographic point of view (Duff, 2004). Previous studies on how students learn were done using text reading experiments in the 1970s. Beginning point focused on exploring ways of explaining some of the main differences in how students go about learning in schools (Phan & Deo, 2007; Justicia, et al., 2008). For the advancement of quality of learning among students, it is imperative to get the full glimpse of the process of learning among students. The way they learn can be explained using cognitive or behavioural theories but it is also important to take note of their experiences within the school setting (Marton & Booth, 1997, p. 13).

Approaches to learning which stand for the way students manage their study tasks (Bryne et al. 2002). Previous studies on approaches to learning had come up with three approaches that are often used by learners, they include; surface, strategic, and deep learning strategies (Biggs 1988; Enwistle 1987). Around the year 1976, Marton and Soljo discovered two different ways in which learners learn study materials. They called those strategies surface and deep. Deep approach is mostly connected with a student trying to learn to understand the subject matter through making reference to other materials and previously learned concepts. This is to say that, it is a learning process whereby learners consciously get involved in the learning process, relate
previous life encounters and earlier acquired information, express intrinsic interest and try harder to understand what they learn (Enswistle & Ramsden 2003; Lucas 2001). In contrast, the surface approach is about learning without having a clear understanding of the subject. We often refer to such a situation as rote-learning and memorizing the fact, that is a student committing the information to memory just for the purpose of reproducing it without understanding what it is (Enswistle & Ramsden 2003; Lucas 2001). In addition to the two approaches, Ramsden (1979) added a third approach which he called a strategic approach whereby learners go through the course with the sole objective of getting high grades in examination. Essentially, a student using a particular approach when learning is informed by certain specific intentions or motivations to learning.

Numerous studies have been done on students’ approaches to learning in the accounting education literature (Byrne & Flood, 2005; Donald & Jackling, 2007; Flood & Wilson, 2008; Jackling & De Lange, 2009), and pointed out Deep, surface and strategic learning as the predominant students’ learning approaches (Ballantine et al., 2008; Byrne et al., 2010). Some empirical studies have found out that most accounting students demonstrate surface learning approaches (Andon, Chong & Roebuck, 2010; Donald & Jackling, 2007). Findings of other studies demonstrate the existence of differing learning approaches of accounting students based on context (Hall, Ramsay and Raven, 2004; Byrne and Flood 2005; Byrne et al, 2010; Teixeira et al., 2013). Clearly, studies have shown that the kind of learning approach that accounting students demonstrate to a large extent depends on the country within which that study was conducted (Byrne et al. 2010). Most of the foregoing studies undoubtedly, were conducted in the more advanced jurisdictions. What then is the case of Ghana? What is the predominantly used learning approach of accounting students and our public universities? There exists paucity of literature on the learning approach of accounting students in Ghana which warrant more empirical investigation. The only study done and published in Ghana concerning accounting students learning approaches made use of only students from school of business (Owusu, Kwakye, Bekoe & Welbeck, 2019) ignoring accounting education students. This study therefore sought to contribute to what is known about the phenomenon by focusing on the learning approaches of Bachelor of Education accounting students. Specifically, the study sought to explore the relationship between learning approaches and academic achievement in accounting.

II. LITERATURE REVIEW

Learning approaches among accounting students

Previous studies existing in the accounting education literature point out to the fact that most accounting students predominantly make use of surface learning approach (English, Luckett, & Mladenovic, 2004; Flood & Wilson, 2008), they tend to employ strategic learning approach in some instances but rarely employ deep learning approach as they find this method very difficult since the discipline are mathematically based (Byrne & Flood, 2005). In addition, Byrne et al. (2010) in a comparative study examined the learning approaches of accounting and science students in Ireland and discovered that while accounting students were more strategic learners than science students, the science students adopted a deep learning approach. Barac (2012) also conducted a study using auditing students in South Africa. The study, like others already mentioned, discovered that the students were more strategic in their learning which supported the findings of Flood and Wilson (2008) in Ireland. Studies further clarify that the possibility of accounting students applying various learning approaches at different levels of their studies is undeniable (Hall et al., 2004; Ballantine et al., 2008). For example, earlier in the accounting education literature, Hong Kong, Gow, Kember, and Cooper (1994) revealed that accounting students do adopt a deep learning approach in the early years of their study, but they become more surface learners as they progressed through their course. However, arguing that some low-level competencies in accounting can be effectively learned with a surface learning approach, Hall et al. (2004) support the idea that at some point, an accounting student will be a surface learner. It is also argued that the nature of accounting studies may require some form of memorization and rote learning at all levels from introductory accounting to senior level accounting units (Birkett & Mladenovic, 2009). Volet and Chalmers (1992) indicated that the way students learn can be seen as on a continuum with surface and deep learning the extremities. Gibbs (1995) posited most often in real life situations when learners adopt a surface style of learning it nearly always leads to poorer quality learning outcomes. He also opined that evidence exists to point to the fact that learners can commit to memory not just information but also procedures. In accounting terms this would equate to not just rote learning facts, but whole processes which in most cases are permissible for practice sake.

Learning approaches and students’ academic achievement

Learning strategies is an exceptional idea by Marton and Säljö (1976) in the late 1970s which set the foundation for ‘student learning approaches’ (SLA) theories (Biggs, Kember, and Leung, 2001). Conceptually, a learning approach has to do with a student’s conceptions when he/she is placed in a learning context and the modus operandi of their academic tasks. This is normally known when questionnaires are used to assess it (Watkins, 2001 cited in Rodriguez & Cano, 2007). Several data-based studies have been done on the connection between learning strategies and students’ learning outcomes. Cano (2007) discovered that learning approach is a crucial factor in explaining students’ performance. Cano’s (2007) study showed application of deep learning approach brought about good performance among the samples. This probably happened due to the fact that learners who perform well are more likely to be those that make use of deep learning strategy than their counterpart low achievers (Zeegers, 2001). Entwistle, Tait, and McCune, (2000) opined that in the forthcoming periods for college degree, especially when the mode of assessment system in a way rewards the efforts of learners that dig deeper for better understanding of concepts, students are more likely to score higher on the deep approach learning scale which will relate to good performance. In this line, studies have suggested that students who adopt a surface learning approach are inclined to be at a lower performing level (Biggs, 2003; Birenbaum, 2007).
Moreover, studies have shown that students who use desirable learning approaches, especially by rating higher on deep approach and strategic approach scales, have high academic achievement (Byrne et al. 2002; Duff, 2004). Other studies also corroborate the conclusions that deep and strategic approaches to learning tend to be related with high academic achievement (Canb 2005; Lietz & Matthews, 2006). Trigwell and Prosser (1991) cited in Kyndt et al., (2011) investigated the correlation between students’ learning approaches and the performance of final year nursing students who were 122 in number. Findings showed a positive relationship between deep learning approach and academic performance. Unfortunately, not all study’s findings show a connection between deep learning approach and performance (Byrne, Flood, & Willis, 2004; Djijbels et al., 2005). Some studies found that deep approach did not have any relationship with higher grades on students’ assessment (M imbashian et al., 2004; Trigwell & Prosser, 1991). Undeniably, most of the studies above are those that emanate from developed jurisdictions. The case of Ghana is worse since most studies conducted in accounting education over the years have not paid attention to the learning approaches of accounting students in Ghana. This study therefore contributes to the literature by investigating learning approaches of Bachelor of Education accounting students in Ghana.

III. RESEARCH QUESTION
The following research question guided the study.
1. What is the predominantly used learning approach of accounting education students in Ghana?

IV. RESEARCH HYPOTHESIS
The following hypotheses were posed to guide the study:

H0: There is no statistically significant relationship between accounting students' learning approach and their academic achievement.

H1: There is a statistically significant relationship between accounting students' learning approach and their academic achievement.

V. RESEARCH METHODS
Correlational design was the choice design for the study. The population of the study comprised all Bachelor of Education Accounting students of the University of Cape Coast, however, only the final year students (2019/2020 academic year) were accessible to the researcher. The entire final year students (n=154) were used for the study (census). One hundred and fifty-four (154) students were asked to complete the questionnaire. The return rate for the survey was 100%. Students’ approach to learning (SAL) accounting education courses were measured using an adapted Entwistle et al.’s (2000) ASSIST research instrument which is also called Approaches and Study Skills Inventory for Students. The instrument consisted of 53 items on three hypothetical sub-scales of a ‘defining’ approach to learning which is deep approach, surface approach, and strategic approach. The respondents were asked to indicate their degree of agreement with statements scored on a seven-point Likert scale with 1 being strongly disagreed and 7 strongly agree. Before the administration of the instrument, respondents were assured confidentiality and anonymity after they had signed a consent form. Students’ academic achievement were measured using cumulative grade point average (CGPA) of the final semester for the final year students. Information about the CGPA was taken from the university academic record unit. In this case, each dimension’s composite score (i.e, deep, strategic and surface) of students’ approaches to learning (SAL) (predictor variables), were computed with the overall composite score of students' CGPA (criterion variable) to estimate the relationship. The estimation of the relationship was done using Pearson’s Product Moment Correlation Coefficient (PPMCC) and this was how the hypothesis was tested. Data to answer the research question, however, was analysed using mean and standard deviation. Tables were drawn to showcase the summary of the results.

VI. RESULTS OF THE STUDY
Research Question: What is the predominantly used learning approach of accounting education students in Ghana?

This research question sought to determine the learning approach that B.Ed. (Accounting) students use when studying courses within the discipline. Students’ approaches to learning were measured using ASSIST scale. Summary of the results are shown in Table 1.

Table 1- Learning approaches among Bachelor of Education accounting students

<table>
<thead>
<tr>
<th>Students Learning Approaches</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface approach</td>
<td>4.60</td>
<td>.82</td>
</tr>
<tr>
<td>Strategic approach</td>
<td>5.02</td>
<td>.76</td>
</tr>
<tr>
<td>Deep approach</td>
<td>4.60</td>
<td>.77</td>
</tr>
</tbody>
</table>

Source: Field Data (2020)

Table 1, shows the types of learning approaches used by Bachelor of Education accounting students in the university that was selected for the study. The items were responded to by the students based on a seven-point Likert-type of scale (1=strongly disagree, 7=strongly agree). Results indicate that majority of the respondents (i.e. students) use Strategic Approach (M = 5.02, SD = .76), followed by Deep Approach (M = 4.60, SD = .77) and the minority Surface Approach (M = 4.46, SD = .82). The relevant meaning that can be drawn from the results in Table 1 overall, is that education accounting students sampled made use of the three approaches to learning while on the programme, however, majority of them aligned themselves to the use of strategic approach while some of them (i.e. in a minority) made use of surface learning approach.

Hypothesis: H0: There is no statistically significant relationship between accounting students' learning approach and their academic achievement.

The hypothesis sought to examine the connection between learning approaches of students and their academic performance. CGPA was used to represent students’ academic performance (criterion) while students' learning approaches (predictors) were
measured using ASSIST scale. Summary of the analysis are shown in Table 2.

Table 2- Correlation Matrix of student learning approaches and academic achievement

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>CGPA</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surface Approach</td>
<td>-23*</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strategic Approach</td>
<td>39*</td>
<td>1.0</td>
<td>1.0</td>
<td></td>
</tr>
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<td>Deep Approach</td>
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*Correlation is significant at the 0.05 level (2-tailed).

Table 2 provides the summary of results for correlation between learning approaches of students and their academic achievement. By using Pearson correlation to determine the strength of relationship between the two variables (that is, SAL and CGPA), results indicate that there was a positive relationship between Strategic Approach (SA) and achievement ($r = .39, p = .001$) as well as Deep Approach (DA) and achievement ($r = .58, p = .001$). Even though the results for SA and DA in terms of magnitude appear to showcase a somewhat moderate relationship, the case of Surface Approach was worse. This is because, Surface Approach to learning showed a reverse relationship with performance ($r = -.23, p = .001$). It can be inferred from the result that the more students cling to the use of Surface Approach to learning in their studies, the lower their academic achievement would be. Alternatively, the results demonstrate that the use of Strategic Approach and Deep Approach tend to align with higher academic achievement. The results definitely have implications for the academic guidance role of accounting education instructors within our tertiary education set up.

VII. DISCUSSION

The study had an objective to explore the predominantly used learning approach of education accounting students in the selected university. Findings indicated that the majority of the study sample (B.Ed. Accounting students) made use of a strategic approach to learning with the rest aligning themselves to a deep and surface approach. The majority of the accounting education students being strategic in their learning point to the fact that they have their focus on achieving high grades in combination with well-organised studying and attention to assessment requirements. The students only prioritise implementing plans to achieve higher grades without necessarily focusing on deeper understanding of concepts taught. The findings in this study corroborate with Byrne et al. (2010) in a comparative study found out that accounting students were more strategic learners than science students. Further, Barac (2012) study had earlier discovered that students learning auditing (an accounting course) were more strategic in their learning which supported the findings of Flood and Wilson (2008). The fact that accounting education students were strategic in their learning instead of being deep learners was not surprising but rather a reflection of an ancient held view that Ghanaian education system places more emphasis on passing examinations rather than seeking to gain knowledge concepts studied.

The second objective was on investigating the relationship between students’ approaches to learning and their academic achievement. Findings indicated that there was a positive relationship between students’ approaches to learning (SAL) such as deep and strategic, however, surface approach had an inverse relationship. This suggests that the more students aligned themselves with surface learning approach in their studies the lower their academic achievement becomes This finding is parallel with previous research which has shown that consequently students who adopt a surface learning approach are incline to have lower achievement level (Biggs, 2003; Prosser and Trigwell, 1999; cited in Birenbaum, 2007).

Again, this is to say that the use of deep or strategic learning approaches had connections with higher performance, however, not true for surface approach. The findings concur with Cano’s (2007) study which discovered that high application of deep learning approach resulted in a better academic performance among the samples. In line with this same idea, studies have shown that students who use desirable learning approaches such as deep approach and strategic approaches have high academic achievement (Byrne et al. 2002; Duff, 2004). Other studies also corroborate the finding that deep and strategic approaches to learning tend to be correlated with high academic achievement (Cano 2005, Watkins 2001, cited in Lietz & Matthews, 2006).

VIII. CONCLUSIONS

Based on the findings of the study, it can be concluded that majority of University of Cape Coast accounting education students who were used in this study are more likely to have good grades in most of their courses in the accounting education programme because of their usage of strategic learning approach; however, may not be able to apply conceptual knowledge of those courses to actual situation. Further, it can be concluded that University of Cape Coast assessment, especially, for accounting education programmes rewards deep and strategic learning approaches since those learning approaches (i.e. deep and strategic) have positive connection with higher achievement.

IX. RECOMMENDATIONS

Based on the findings, the following recommendations are given for policy and practice.

1. Instructors of Bachelor of Education accounting courses should adopt an assessment procedure (preferably, performance assessment) that would cause students to make use of higher learning approaches such as deep learning approach and switch from strategic and the surface learning approaches. By implication students’ learning approach may be a function of the mode of assessment they have been subjected to over their study years.

2. Course instructors should emphasize a teaching strategy that directs students to self-regulate their learning and brainstorming. These strategies would help students to
appreciate conceptual understanding and applications rather than resorting to rote learning style of learning.

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**Environmental responsibility as a need for successful modern business**

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**Abstract** - The great challenges and problems in the new millennium in the field of environment due to intensive economic and technological development all over the world have taken on the characteristics of an ecological crisis. Excessive urbanization, uncontrolled development, over-exploitation of forests, mining, transport and industry have negatively affected environment all over the world. The consequences of such a state are numerous, from global climate change, ozone depletion, genetic mutations of organisms, extinction and spread of endangered plant and animal species to worrying depletion of natural resources.

**Index Terms** - Challenges, Environmental, Development, Organisms

**I. INTRODUCTION**

Having in mind the scope and areas of environmental pollution, including all natural resources, for the preservation and protection of the environment is necessary to have a comprehensive, holistic approach, i.e., to implement all measures and activities in a systematic way.

Environmental protection means a series of measures and activities from legal, technical, technological and other, which are taken in order to best prevent, eliminate or mitigate the consequences and causes of environmental pollution and excessive consumption of natural resources. It also includes anticipation of all human activities and activities that may negatively affect, endanger and degrade the environment in order to prevent them.

In order for the improvement of the environmental safety, it is necessary to consider all negative effects, work on their solution, reduce them and, if possible, completely eradicate them. These are the reasons that environmental management emerged, a part of various activities. Environmental management is a relatively young scientific discipline, which has a key role in establishing sustainable development and harmonizing its three sectors of development: social, economic and environmental.

**II. ENVIRONMENTAL MANAGEMENT**

For achieving the desired state of the environment in the future, there must be used planning methods and models to help in conducting sustainable development policy. Therefore, it is necessary to develop methods of environmental management at the level of theory, as well as at the level of regulations, standards and guidelines. This requires responsible elected representatives at all levels, and effective committees at the central level, which can assist in the adoption of sustainable environmental development policy, to consider proposed laws and regulations, to monitor the effectiveness of the implementation for adopted laws, to conduct investigative hearings and to play a key role in regional networks.

The principles and elements of environmental management strategies include the following:

- environmental policy
- planning,
- introduction and implementation verification and corrective action
- review and improvement
- continuous improvement.

The economic dimension of sustainable development is taking part in responding to global competition and achieving competitive advantage through more efficient use and increasing the productivity of available resources, while taking into account the elimination or minimization of negative environmental impacts. The implementation of eco-management in ecology and sustainable development imposes certain changes in thinking and business. Environmental management refers to environmental planning and its focus is on implementation, monitoring, control as well as practical issues to be faced in terms of environmental protection, for example, modification of habits that harm human nature, and it is much more than theoretical planning.

In theory and practice, there is a combination of ecology and marketing and the offer of a new series of products free of harmful substances. In promotional campaigns, companies are increasingly releasing labels of healthy and green, so green marketing has developed as a result of the joint action of marketing

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1Dukanović, M., (1996), "Životna sredina i održivi razvoj", Elit, Beograd

2Elesawi A., (2018), Uloga energetske efikasnosti u sistemu održivog razvoja na primjeru održive izgradnje u Libiji, Union Nikola Tesla, Beograd

3Milutinović S., (2012), Politike održivog razvoja, Fakultet zaštite na radu u Nišu, Niš
and ecology. From the point of view of environmental needs, market research is becoming an extremely important segment of marketing companies that suggest to producers the most cost-effective ways of connecting ecology, aesthetics, business and ethics.  

III. ECONOMIC INSTRUMENTS FOR ENVIRONMENTAL PROTECTION

Environmental protection appears as a new limiting factor for capital increase, because additional environmental costs in the long-term trend can negatively affect this process. The application of modern tools such as, for example, strategic environmental impact assessment is certainly one of the ways to achieve this goal. Also, empowering the poorer population and less developed regions to manage natural resources appropriately, for example through better access to information, judicial or participation in decision-making mechanisms by involving the public in the earliest stages of decision-making or any other appropriate means.

According to the OECD, there are the following economic instruments for environmental protection:

1. fees and taxes for pollution emissions;
2. user fees and taxes;
3. penalties;
4. product fees;
5. performance guarantees and, 
6. compensation.

Pollution Emission Fees and Taxes—emission charges are direct payments based on estimates and specific measurements of the concentration and type of pollution. These measures, especially in transition countries, affect a large number of producers and in most cases are combined with penalties.

User fees and taxes - This instrument of environmental policy is usually local in nature, i.e. it is applied at the levels of local communities. The funds collected in this way are used to finance specific environmental problems in certain localities, such as: disposal and collection of waste, improving the quality of drinking water in the place/commune, exploitation of raw materials, hunting grounds, ponds and the like.

Penalties—Taxes and penalties are the simplest and easiest to apply mechanisms, but it does not mean that they are the most desirable, nor the most effective for environmental protection. When a production has resulted in a negative external effect and when there is a difference between social and private costs, the producer faces the social consequences of an economy that does not respect environmental standards. The purpose of this tool is to equalize private and social costs and benefits.

When the manufacturer is charged a penalty in the amount of the marginal cost of pollution, the marginal private and social costs will be equalized. The manufacturer can reduce pollution by reducing the volume or changing the method of production. Changes in production methods may cause expenditure on pollution control devices or increase costs due to switching to another type, more environmentally friendly raw material.

Product Fees—Products whose production causes environmental pollution during production, consumption or in the form of waste are burdened with estimated social costs. The goal is to adjust the relative prices of products, in order to reduce their demand. The funds thus collected serve to finance a changed method of production, which is more environmentally friendly. Product fees can be applied e.g. on artificial fertilizers, pesticides, plastic packaging, batteries and the like.

Performance guarantees - Producers or users of natural resources are obliged to provide a guarantee, which guarantees compliance with environmental conditions. Upon fulfillment of obligations, the warranty is returned to the manufacturer.

Compensation - For the functioning of this economic instrument, the role of the state is necessary, which has the obligation to create and guarantee the civil right to compensation (discussed in previous chapters) or has regulations through regulations for compensation through funds, water pollution compensation funds, funds for damage from oil slicks and the like.

Assets raised through these funds can be made available to those affected by pollution or to the state. It depends on the specific situation and circumstances which individual instrument or which combination of instruments should be used. The choice of economic instruments also depends on the priority goal to be achieved. If the level of penalties is higher than the amount of protection costs, it is to be expected that economic entities (companies, entrepreneurs, etc.) will behave economically rationally and decide to provide an appropriate level of environmental protection. Conversely, in the event that the cost of the fine is lower than the cost of preserving the environment, through means of protection or more expensive raw materials and procedures, companies are likely to opt to pay the fine. On the other hand, the penalty will mean budget revenue that the state, could use for other purposes, and the environment will become polluted.

Specific protection problems are best solved by a combination of economic and other instruments. Economic instruments applied alone will not give optimal results. How successful will be implementation of different instruments will depend on the accompanying combination of individual policies.

4 Klinčev R., i Ristić Ž., (2011), Ekološki menadžment, dostupno na
5 Milutinović S., (2012), Politike održivog razvoja, Fakultet zaštite na radu u Nišu, Niš
6 Popov Đ., (2011), Ekonombska analiza prava životne sredine i održivi razvoj, Zbornik radova Pravnog fakulteta, Novi Sad
7 Ibid
8 Ibid
9 Popov Đ., (2011), Ekonombska analiza prava životne sredine i održivi razvoj, Zbornik radova Pravnog fakulteta, Novi Sad
Economic instruments that should encourage energy efficiency policies in developing countries should include the provision of various benefits for companies that implementing policy of higher energy efficiency. Energy efficiency principles must be incorporated in public procurement and implementation criteria for allocating funds from domestic and international funds and loans.

Establishment of funds to support projects that have built-in elements of increased energy efficiency policies as well as cooperation with international financial institutions in order to implement favorable credit arrangements, attracting foreign and local banks to have an interest in lending to projects in the field of rational energy use, are important steps for achieving environment safety.

The high costs of new technologies, which reduce carbon dioxide emissions, are not justified from an economic point of view for the simple reason that the imposed increase in production costs for environmental reasons reduces the country’s competitiveness, firms and market competitiveness. That is why a system was launched in which all countries of the modern world receive permits for pollution (based on the allowed amount of carbon dioxide).

From a global point of view, all economic and environmental problems are observed as planetary issues in the structure of the prevailing doctrines and scientific paradigms of today's economy, social theory, natural science and technology. Ecological rationality rediscovers the fact that the preservation of natural resources and the establishment of natural balance are a reflection of a new economic philosophy in which ecological standardization, reduction of technological and consumer pollution, ecorecycling, environmental legislation and education, environmental research and investment in protection of human beings and their spiritual culture, mental and moral health of people.

IV. ENVIRONMENTAL MANAGEMENT

Team of professionals in human resources dealing with the issue of sustainability, represents employees as an interest group that has a key role in forming “green teams” and encouraging employee engagement on environmental and other issues. The human resources team also achieves goals that are their responsibility, such as employee turnover, safety at work, and employee satisfaction. Green human resources use the employee’s ability to respond to demands for the promotion of environmental sustainability through the results of their work and improve employee awareness and commitment to sustainability issues.

Ecomanagement involves planning, organizing, personnel policy, management and process control. Education and training of people who wants to be an expert in eco-management are very important.

Ecomanagement is part of good business practice in all organizations that have a clear strategy and goal based on continuous improvement of their processes. For organizations involved in urban sustainable development planning, it represents challenge and a way to prove and commit to new approaches, new philosophies, new ways of thinking, critical and scientific approach, readiness and ability to change and undertake business and other endeavors with better efficiency and with the general affirmation of effective practice.

Methods and instruments for environmental management are systematized tools for obtaining information on the environment and assistance in making decisions on the environmental impact of current or planned activities in order to protect and improve the environment, ie achieve the goals of sustainable development. These funds can be used by all social actors (either from the private or public sector), in sim activities and at all levels, from local, through regional, national to international.

In practice, a large number of eco-management tools, are applied. Some of the instruments are used as a legal obligation, some are standardized at the level of national or international standards and their application is voluntary, while others are in the development and improvement phase.

Strategic environmental assessment can take several forms:
1. Sectoral (strategies for the development of transport, energy, water management),
2. Spatial (assessment of spatial plans at the state, regional and local level),
3. Indirect (environmental assessment of scientific programs, plans for privatization of public enterprises, etc.)

The scope of strategic environmental assessment includes testing of quality: air, water, soil, biodiversity, as well as waste recycling. In addition, it may include multi-source impact assessment (cumulative impact assessment) and social impact assessment.

Objectives of environmental management include:
- Prevention and solution of environmental problems;
- Establishment of boundaries;

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14 Bogavac I., Ristić Ž., (2012), Ekošloški menadžment, Međunarodna naučna konferencija Menadžment 2012, Mladenovac
16 Grujić K., i Živanović N., (2012), Ekološki menadžment trendovi razvoja u ambijentu, Međunarodna naučna konferencija Menadžment 2012, Mladenovac
18 Ibid
• Establishment and maintenance of institutions that effectively assist environmental research, monitoring and management; and, if possible, improve existing resources,
• Where possible to improve the “quality of life”,
• Identify useful new technologies or policies.¹⁹

Approaches to environmental management

Environmental management should modify the ethics of individuals, groups and societies in order to achieve its goals, through three main approaches:

1. Advisory:
   • education;
   • demonstrations (eg farm or factory model);
   • media or closed approaches - eg the letter includes a message);
   • advice (eg telephone helplines).

2. Economic or fiscal:
   • taxation (“green fees”);
   • loans, assistance;
   • discounts;
   • quotas or trade agreements.

3. Regulatory:
   • standards;
   • restrictions and monitoring;
   • licenses;
   • determination of a zone (restrictive activities in a given area).²⁰

Environmental management must be flexible, adaptable and perceptive so that it can respond to the various demands of the powerful, environmental change, public attitudes and human capabilities. Environmental coordination requires coping with the constraints, potentials, risks and dangers of both the environment and people.

Environmental management involves a large number of different professional institutions and agencies such as:
• government agencies (eg the European Environment Agency);
• international bodies and subsidiary organizations (eg the World Bank);
• research institutes;
• non-governmental organizations ("Friends of the Earth");
• public.

All potentials that are managed by environmental management should be used so that individuals, groups and society are directed to the path of sustainable development.

V. CONCLUSION

It is possible to operate responsibly towards society and the environment and be a competitive and profitable company at the same time. Observes in the context of long-term investments in renewable energy sources, ecological production and waste management, which will make business not only resistant to climate change challenges but also much more competitive because the fight against climate change is an opportunity for companies to introduce innovative solutions, process and product modernization and thereby creating new opportunities in other markets.

The business people realized their key role in protecting the environment, if they became aware of the pressure that their business activity exerts on the environment. And just as employment is a key prerequisite for social security, so environmental protection has become a leading prerequisite for a company’s business. Marketing, management and public relations, in order to gain an ecological reputation, which predominantly determines consumer decisions on the purchase of (environmentally friendly) products, must pursue a responsible environmental policy.

Environmental pressures from the public have forced an accelerated transformation in the valuation of managerial success, which, in addition to the usual managerial performance based on profit growth, incorporates a long-term component of team development ability that successfully introduces the company to sustainable development, with high ecological morale of employees and so-called green production.

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Knowledge, Attitudes and Practices of Army Soldiers on Prehospital Trauma Care in Matara District, Sri Lanka


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Abstract- Injury is one of the leading causes of hospitalization in Sri Lanka. The prehospital trauma care is critical in reducing the morbidity and mortality following injury. This study was carried out with the objective of describing the knowledge, attitudes and practices on prehospital trauma care among army soldiers in Matara District. A descriptive cross sectional study was carried using a self-administered questionnaire among all army soldiers attached to the Matara army camp. Knowledge and practices were categorized as “Poor” and “Good” taking 50% as the cut off. Total of 266 participants was studied and the response rate was 97.79%. The overall level of knowledge on prehospital trauma care was poor (78.6%). The knowledge on golden hour of trauma, triage system and cardio pulmonary resuscitation was markedly poor. More than 80% of them had positive attitudes on most aspects of prehospital trauma care. Majority (62.8%) had a poor level of practice. They lack practice on first-aid, cardiopulmonary resuscitation and safe transportation of the patients. A significant association was observed between good knowledge and good practice on prehospital trauma care. A high proportion had poor knowledge and poor practice on prehospital trauma care while majority had positive attitudes. It is recommended to include training on prehospital trauma care in the basic military curriculum which will enhance the ability to act as first responders effectively.

Index Terms- Disasters, Prehospital Trauma Care, First Responders, Army Soldiers

I. INTRODUCTION

Disaster is “a serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental loses and impacts, which exceeds the ability of the affected community or society to cope using its own resources” (UNISDR 2009). Both the natural and human induced disasters have become more common due to rapid developmental activities and climate change. Therefore, disaster risk management has become a more important topic globally. Disaster risk management is the systematic process of using administrative directives, organizations, and operational skills and capacities to implement strategies, policies and improved coping capacities in order to lessen the adverse impacts of hazards and the possibility of the disaster” (UNISDR 2009).

While addressing this issue, emergency services “the set of specialized agencies that have specific responsibilities and objectives in serving and protecting people and property in emergency situations” (UNISDR 2009) has become more important. It is well known that in a disaster situation the tri forces and emergency medical services provide prehospital trauma care (PHTC), as they play a major role in disaster risk management. Injuries or the trauma has become one of the main causes which accounts for morbidity and mortality all over the world. It places much burden on countries where resources are limited and yet to be developed (WHO Geneva 2005). The best way to reduce the burden of injuries is by the primary prevention proactively. However once an injury happens the consequences can be minimized by delivering effective prehospital and hospital based trauma care to the patient.

Evidence based studies have shown that PHTC given by the trained lay first responders is life saving and can reduce the trauma mortality where it takes a long time to reach the definitive health care institutions (Murad et al. 2012). Therefore, if the PHTC is delivered appropriately the outcome of the hospital based trauma care will be better.

Although developed countries have well established PHTC systems, Sri Lanka doesn’t have such a system. The Ministry of Healthcare and Nutrition has identified the need and formulated the National Policy on Injury Prevention and Management in 2009. Under the vision of “Injury free Sri Lanka” the ministry has introduced eight strategic objectives. The sixth strategic objective is to strengthen the organization capacity to improve prehospital and institutional care for emergency care and rehabilitation. One of the key results expected is to make available the appropriate prehospital care (Ministry of Health 2010).
In most instances the PHTC providers are the laypeople known as “first responders”. This group includes taxi drivers or truck drivers, soldiers, students or workers, etc. (WHO Geneva 2005). The quality of the PHTC system will be determined by the knowledge, attitudes and practices of these people. All over the world there is a lack of evidence based studies which make it difficult to determine the importance of these people in PHTC setup. In Sri Lanka military play a main role being the first responders in disaster events. They have involved in emergency response activities during the Elam war which ended in 2009; post tsunami era in 2004 December; major flood occurred in January and February in 2011 (Disaster Management Centre 2011); Badulla, Koslanda landslide in 2014 and etc. Sri Lankan army has agreed to give military assistance during disasters for evacuation and search rescue on request made by Disaster Management Centre (DMC) (Disaster Management Centre 2011). During the Nepal earthquake in 2015 May, most of the military subunits were mobilized and deployed among the affected districts to support the on-going relief missions (OCHA 2015). These facts point out the necessity of a research to study the existing knowledge, attitudes and practices of army soldiers, being the first responders in disasters. Based on the research findings we can identify the lapses and suggest enhancements to the current management programmes and thus improve them to face the future disasters, effectively.

1.2 Justification
Injury has become a much popular public health issue globally. As the traumatic injuries have become the most commonest cause of hospitalization in Sri Lanka, it has become an economic burden to the government, which usually spends more for the development of health sector in comparison to the other South Asian countries (Ministry of Healthcare and Nutrition 2008). The Department of Injuries and Violence Prevention at the World Health Organization (WHO) has stated that implementation system would mitigate of PHTC would mitigate the consequences caused by trauma (WHO Geneva 2005). WHO has identified PHTC as a priority and has issued guidelines on it. In Sri Lanka, PHTC system started to develop after the tsunami in 2004. The Ministry of Healthcare and Nutrition of Sri Lanka established the trauma secretariat for the development of trauma response system. They were able to develop eight prehospital care systems in Sri Lanka. Those are established in Anuradhapura, Badulla, Colombo, Galle, Jaffna, Kandy, Mannar and Kurunegala. They had also carried out a review project to audit the PHTC systems in Sri Lanka from 2005 – 2011 (Ekanayaka 2011). Matara district in Sri Lanka has experienced major disasters such as severe floods in December 2009, January and May 2010 (Disaster Management Centre 2009), tsunami in December 2004 and etc. The total population of Matara district is eight hundred and nine thousand three hundred according to the census carried out in 2012 (District Secretariat 2012), and it is situated in the southern costal belt. Matara city has become a popular commercial centre with the rapid development. The Nilwala river flows through the city and is responsible for the floods which occur more often (Asian Disaster Preparedness Centre 2010). However, still there is no well-established PHTC system to be identified in the city. The main army camp of Matara District is situated in close proximity to the city and is readily accessible in a disaster situation. Therefore they are usually the first responders in a disaster situation. To implement a good PHTC system it is important to evaluate the existing knowledge, attitudes and practices of its providers. However, in the absence of previous studies this research intends to identify the existing knowledge, attitudes and practices on PHTC among army soldiers in Matara District. The outcome can be used as a source to identify the gaps and establish a PHTC system which suits the area. This will help to reduce the burden on the family, community and achieve the development goals of the country.

II. LITERATURE REVIEW
Prehospital care can be simply explained as any initial medical care / first-aid given to a patient by a paramedic or other person until the patient reaches a definitive health care institution. Different countries have established different prehospital care systems. Some of the common models are given below.
- National systems - This is developed and controlled by the central government of the country.
- Local or regional systems – Local or regional governments with the help of other agencies will administer this system.
- Private systems – Private emergency medical service companies will operate this.
- Hospital-based systems – This is the simplest system to establish and maintain. Consist of the resources and the infrastructure of the central or referral hospital.
- Volunteer systems – Depend on the prehospital care providers in the community.
- Hybrid systems – Combination of many systems.

Prehospital trauma care systems cannot function alone and they should be incorporated in to the health care system which exists within the country. Volunteer systems are usually seen in rural and remote areas where as it depends on the prehospital care providers known as “first responders” (WHO Geneva 2005). There are two concepts which influenced the development of PHTC. The first concept is “Golden hour” of trauma. Following a disaster or a trauma most of the time the first hour is spent at the scene or on the way to the hospital. This is the most valuable time where urgent medical / surgical interventions should be done. Basic first-aid given during this time may save a life.
The second concept is the “Trimodal distribution of trauma deaths” developed in 1983 by Trunkey (Lockey 2001). He states that death following an injury can occur in one of the three phases and is shown in figure 1.

1. 50% of deaths can occur in the immediate phase. (Due to overwhelming injury)
2. 30% of deaths may occur within the first four hours of injury - Intermediate or subacute phase.
3. 20% of deaths may occur after four hours of injury – Delayed phase. (WHO Geneva 2005)

The PHTC mainly benefits the second phase. Most of the deaths in this phase occur due to compromised airway, respiratory failure or uncontrolled haemorrhage. Those can be readily corrected by the first responders with the use of basic first-aid measures (WHO Geneva 2005). The laypeople from the community or specific groups such as truck drivers, army soldiers, the workers at the fire brigade act as the so called first responders. Even in the developing countries, where the resources are limited, many lives can be saved by the first responders by training what is to be done at the scene and giving the basic supplies and the equipment they need (WHO Geneva 2005). Each country should identify the most suitable PHTC system for them and should improve on it.

Knowledge, attitudes and practices on prehospital trauma care

The quality of PHTC depends on the level of knowledge and skills of the people who deliver it. Although we expect the knowledge level and skills on PHTC to be higher among healthcare workers, a study done in India with 200 resident doctors, 104 hospital consultants and 108 private practitioners found that median scores of knowledge was 52%, attitude was 82% and practice was 54%

They had less than adequate knowledge and practices but positive attitudes on PHTC (Kumar et al. 2008). A similar study carried out in Iran among relief workers regarding first-aid measures said that they demonstrated a moderate level of knowledge, attitudes and practices regarding first-aid (Delavar et al. 2012).

Although studies done among army soldiers regarding knowledge, attitudes and practices are rare, similar studies have been conducted among the taxi drivers. A study conducted in Nigeria to find the first-aid knowledge and application among commercial inter-city drivers with 229 participants said that only minority (37.6%) identified basic resuscitation priorities correctly. Most (79.9%) believed that they could be trained and would be willing to apply first-aid (Olugbenga-Bello et al. 2012). Another study was conducted in Ethiopia to assess knowledge, attitude and practices of first-aid service provision associated with road traffic accidents (RTA) among 400 taxi drivers. Majority (86.3%) were not trained on first-aid before the study. Only 46.3% had a good knowledge on giving first-aid during RTA. 88.24% of them believed that it is necessary to provide first-aid immediately for the victims at the scene and 81.8% were willing to provide first-aid (Getahun 2015).

Training on prehospital trauma care

A study done on current patterns of PHTC in Kampala, Uganda and the feasibility of a lay-first-responder training program identified scene management, immediate care and transportation as the main areas. Furthermore, the training program should include universal precautions, scene management, primary survey, airway control, bleeding control, recovery position, splinting fractures, safe lifting and transport of the injured patient to the hospital. Triage will also help to minimize the overwhelming the hospitals with the minor injuries. They have selected 309 laypeople as the study population. Fifty two percent of them had first-aid training previously. Before training, they answered 45% of the questions correctly and after the training it was 86%. Therefore, they have come to the conclusion that a PHTC course can improve laypeople’s knowledge on basic trauma care (Jayaraman et al. 2009 a).

Although PHTC has an important role in disaster management, lack of evidence based studies has limited the improvement. A study done in Iraq has shown that where prehospital time is longer and the first responders are trained they answered 45% of the questions correctly and after the training it was 86%. Therefore, they have come to the conclusion that a PHTC course can improve laypeople’s knowledge on basic trauma care (Jayaraman et al. 2009 a).

A study done in Ethiopia to assess knowledge, attitudes and practices of first-aid measures stated that a higher percentage (94.4%) of participants thought first-aid training was important to all military personnel (Mebrahtu 2014). Where the literature is concerned, there were few studies done to assess the effectiveness of basic PHTC program done for lay first responders. A study done in Uganda says the lay first responders were able to retain the knowledge given on PHTC effectively and were able to use the first-aid skills and supplies confidently for at least 6 months following the training. The participants were asked to fill a pictographic record following each emergency they experienced during the study period (Jayaraman et al. 2009 b) which is illustrated in figure 2.

Similar type of pictographic records can be used for the evaluation of the military personnel in our country with necessary modifications done following the pre-test.

An effective communication system is required for the function of PHTC system (WHO Geneva 2005). Few more things should be done to improve the quality of the PHTC system. Listening in, on radio or other communications is useful to identify the knowledge, attitudes and practices of the people who provide the PHTC. Direct observation, report review, critical incident review, outcome studies, continuing education and discipline are the other key facts which can be used for the quality improvement (WHO Geneva 2005). A fully functioning and established PHTC system not only increases the capacity to respond the disaster situations, but also helps the patients in medical/surgical emergency situations daily. And it is the best method to face the mass casualty incidents successfully (WHO Geneva 2005).
III. METHODOLOGY

This descriptive cross sectional study was carried out in 2015 among all (266) recruited in Martara district. A self-administered Questionnaire was used as the study instrument which was modified, validated and pretested. It assessed socio-demographic information of army soldiers, their attitudes and practices on prehospital trauma care. Principal investigator collected the data following the ethical and administrative clearance.

Statistical Package for the Social science (SPSS) was used to analyze the data. Cross tabulations were done to identify the possible associations using chi square statistics. Knowledge and practices were categorized in to two groups as “Poor” and “Good” taking 50% as the cut off.

IV. RESULTS

The study population consist of 266 participants (response rate 97.79%) lodged at army camp Matara fort and its two detachments located in Matara district. All were male and majority (47%) was in the age group of 28 to 37 years. Most (43.6%) had a monthly income of 30,000 rupees to 39,999 rupees and not qualified General Certificate of Education (Ordinary Level) – 65.8%. Nearly two third (68.8%) of them had worked for more than 05 years as army soldiers. The overall level of knowledge on prehospital trauma care is poor (78.6%) while knowledge on golden hour of trauma (77.1%), triage system (74.4%), cardio pulmonary resuscitation (92.5%) and transportation of patients with spinal cord injury (69.2%) was markedly poor. The description of knowledge of army soldiers on Prehospital trauma care is given in Table 1. Good knowledge is significantly associated with advance age (p=0.001), higher income (p=0.001) and higher level of education (p=0.001), whereas it has no significant association with work duration.

Table 1: Description of knowledge of army soldiers on prehospital trauma care

<table>
<thead>
<tr>
<th>Question</th>
<th>Correct</th>
<th></th>
<th>Incorrect</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Have you ever heard of prehospital trauma care?</td>
<td>067</td>
<td>25.2</td>
<td>199</td>
<td>74.8</td>
</tr>
<tr>
<td>b. Have you ever heard of first responders of a disaster?</td>
<td>126</td>
<td>47.4</td>
<td>140</td>
<td>52.6</td>
</tr>
<tr>
<td>c. Do you know that you belong to first responders of a disaster?</td>
<td>142</td>
<td>53.4</td>
<td>124</td>
<td>46.6</td>
</tr>
<tr>
<td>d. Do you know about the first golden hour of trauma?</td>
<td>061</td>
<td>22.9</td>
<td>205</td>
<td>77.1</td>
</tr>
<tr>
<td>e. Have you ever heard about the triage system?</td>
<td>068</td>
<td>25.6</td>
<td>198</td>
<td>74.4</td>
</tr>
<tr>
<td>f. When evaluating an injured patient, what is the first thing you should do?</td>
<td>145</td>
<td>54.5</td>
<td>121</td>
<td>45.5</td>
</tr>
<tr>
<td>g. The best and safest way to stop bleeding is,</td>
<td>126</td>
<td>47.4</td>
<td>140</td>
<td>52.6</td>
</tr>
<tr>
<td>h. Do you know how to assess airway, breathing and circulation of an injured patient?</td>
<td>109</td>
<td>41.0</td>
<td>157</td>
<td>59.0</td>
</tr>
<tr>
<td>i. Do you know how to give mouth to mouth breathing?</td>
<td>142</td>
<td>53.4</td>
<td>124</td>
<td>46.6</td>
</tr>
<tr>
<td>j. Do you know how to perform CPR- Cardio Pulmonary Resuscitation?</td>
<td>020</td>
<td>07.5</td>
<td>246</td>
<td>92.5</td>
</tr>
<tr>
<td>k. Do you know that transport of the patient to a health care facility is a part of prehospital trauma care?</td>
<td>110</td>
<td>41.4</td>
<td>156</td>
<td>58.6</td>
</tr>
<tr>
<td>l. Do you know how to transport a patient with suspected spinal cord injury, without making any secondary damage?</td>
<td>082</td>
<td>30.8</td>
<td>184</td>
<td>69.2</td>
</tr>
</tbody>
</table>

More than 80% of them had positive attitudes on most aspects of prehospital trauma care while majority thinks it is good to have knowledge on this topic and they would have performed better in disaster situations if they were trained on pre hospital trauma care. This is illustrated in Table 2.
Table 2: Description of attitudes of army soldiers on prehospital trauma care

<table>
<thead>
<tr>
<th>Question</th>
<th>Positive</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Prehospital trauma care is an important part in disaster management</td>
<td>242</td>
<td>024</td>
</tr>
<tr>
<td>b. By improving prehospital trauma care we cannot reduce morbidity and</td>
<td>090</td>
<td>176</td>
</tr>
<tr>
<td>mortality caused by disasters.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. As army soldiers we play an important role in prehospital trauma care</td>
<td>218</td>
<td>048</td>
</tr>
<tr>
<td>as the first responders.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. It is good to have the knowledge about prehospital trauma care.</td>
<td>216</td>
<td>050</td>
</tr>
<tr>
<td>e. We would have performed better in disaster situations if we were</td>
<td>225</td>
<td>041</td>
</tr>
<tr>
<td>trained on prehospital trauma care.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

With regard to the practice, majority (62.8%) is included in the group of poor level of practice. They lack practice on first-aid, cardiopulmonary resuscitation and safe transportation of the patients. Moreover, they had less opportunity to participate in drills/simulation programs done on disaster events.

Good practice is significantly associated with advance age (p=0.001) and higher level of education (p=0.001) but not associated with level of income and working duration of army soldiers. Highly significant association (p=0.001) was observed between the level of knowledge and level of practice on prehospital trauma care of army soldiers. It is observed that higher the knowledge practices become better.

V. DISCUSSION

This is a descriptive cross sectional study designed to assess the knowledge, attitudes and practices of army soldiers on prehospital trauma care in Matara district. As far as literature is concerned, this is one of the first studies carried out in Sri Lanka to assess the knowledge, attitudes and practices on prehospital trauma care related to army soldiers who act as the first responders in disaster situations.

Out of 266 army soldiers who participated in the study, 78.6% of soldiers had a poor level of knowledge and only 21.4% had a good level of knowledge on PHTC. Among the study participants more than 70% haven’t heard about PHTC or the triage system, and stated that they didn’t know about the first golden hour of trauma. The first golden hour is the time which lasts for an hour following a trauma. Most of the time the golden hour is over once the patient reaches the health care facility. Either, patient has spent the golden hour at the site or during the transport. Necessary interventions done during this time may enhance the survival rate of the patient (Lockey 2001). This may not be the expert medical interventions, but simple first-aid measures done by the first responders which is included in PHTC might be able to reduce the morbidity and mortality (Murad et al. 2012). Therefore these are very important concepts to be discussed during training programs on PHTC.

It is remarkable that 92.5% of the study population said that they don’t know how to perform CPR. Therefore most of the soldiers have very poor knowledge on CPR and this aspect should be critically addressed during the training programs. Another common injury type seen during the disasters is spinal cord injury. It is shown that 69.2% of the soldiers don’t know how to transport a patient with suspected spinal cord injury, without making any secondary damage while 30.8% of them said they had known how to do so. The first responders should be trained on safe transportation of patients although most don’t know that it belongs to PHTC.

A study carried out among commercial inter-city drivers in Nigeria, who may act as first responders show that the first-aid knowledge and application revealed that basic first-aid knowledge was poor within the cohort, as less than 50% had correctly identified the appropriate first-aid concepts. The study sample had less knowledge on application of appropriate air way, haemostasis and fracture management (Olugbenga-Bello et al. 2012).

Out of five questions asked about attitudes four of the questions were answered positively by more than 80% of the soldiers. However 66.1% of the study population thinks that we cannot reduce morbidity and mortality by improving PHTC. The findings of the study done to assess knowledge, attitudes and practices of military personnel regarding first-aid measures in Northern Command 21st division in Ethiopia stated that out of 375 participants 97.3% thought first-aid was important to military personnel’s and 2.7% thought
it is not important as it should be done by health workers. It further says 94.4% of the participants thought first-aid training was important to military personnel (Mebrahtu 2014). Similarly 84.6% of the army soldiers participated in this study said they would have performed better in disaster situations if they were trained on PHTC.

Out of 266 army soldiers who participated in the study, 62.8% of soldiers had a poor level of practice and only 37.2% had a good level of practice. Mean total practice on PHTC was 3.94 and standard deviation was 2.033 and the range was 08 being the minimum mark 00 and the maximum mark 08. Practice was assessed by using 08 questions which included the very basics used in PHTC.

Nearly three quarter (77.4%) of the study sample said that they haven’t ever performed CPR on an injured patient while 22.6% of them had given CPR to the injured people. A similar study conducted among relief workers in Iran stated that 83% knew how to perform CPR correctly (Delavar et al. 2012).

Our study showed that, almost half (53.4%) had attended first-aid training programs, while 46.6% had not trained on first-aid skills. As the basic military training of an army soldier doesn’t contain a training session on first-aid at least during the first working year of their life, should undergo basic first-aid training. They should be given an opportunity for this.

A more or less similar study carried out in rescue and relief bases of the Red Crescent society of Mazandaran province of Iran among the relief workers regarding first-aid measures has shown an average knowledge score of 56.5% and attitude score of 52.9%. Therefore it demonstrated moderate level of knowledge, attitudes and practices towards first aid (Delavar et al. 2012) thus our study showed poor level of knowledge and practices towards PHTC. This discrepancy may be due to the training sessions conducted for the relief workers and PHTC is containing much broader area than first-aid.

Another study carried out in India on knowledge, attitudes and practices of hospital consultants, resident doctors and private practitioners with regard to prehospital and emergency care in Lucknow revealed that knowledge (52%) and practices (54%) was less than adequate among the three groups of the respondents while the score achieved on attitudes (82%) was high (Kumar et al. 2008).

This study showed that, among those who were less than 37 years 14.8% had good knowledge while among those who were 37 years or more had 36.1% of good knowledge. This association between age and knowledge is statistically significant at p < 0.001. This shows that advance age is positively associated with good knowledge. However, it can be seen that within each age group more than 60% had poor knowledge. With aging most of the soldiers are exposed to different training sessions and get more experienced than the younger crowd. That may be the reason to have good knowledge with the advance age.

Considering the soldiers who received a salary of less than Rs.30000, 7.8% had good knowledge while among those who received a salary of Rs.30000 or more had 28.4% of good knowledge. This association between income and knowledge is statistically significant at p < 0.001. This shows that higher income is positively associated with good knowledge. Moreover, more than 70% had poor knowledge within each group of income. Higher the income the soldiers can spend more to gain knowledge. They may do self-learning by reading books or participating paid programs on the above topic may lead to have good knowledge with higher income.

In our study, among those who were educated up to grade 11, 14.3% had good knowledge while those who were qualified O/L and above had 35.2% of good knowledge. This association between level of education and knowledge is statistically significant at p < 0.001. This shows that higher level of education is positively associated with good knowledge. However, it can be seen that within each group of education more than 60% had poor knowledge. Whereas a study conducted in Iran among relief workers has shown a significant difference between knowledge and educational level (p <0.001) (Delavar et al. 2012).

The association between working duration and level of knowledge of army soldiers on PHTC is not statistically significant in the present study.

In this study, among those who were less than 37 years 29.0% had good practice while among those who were equivalent or over 37 years had 55.4% of good practice. This association between age and practice is statistically significant at p < 0.001. This shows that advance age is positively associated with good practice. With aging the experience they gathered may have contributed for the good practice. Among those who were educated up to grade 11, 29.1% had good practice, while those who were qualified O/L and above had 52.7% of good practice. This association between level of education and practice is statistically significant at p < 0.001. This shows that higher level of education is positively associated with good practice.

Among those who had poor knowledge 74.2% had poor practice. Among good knowledge only 21.1% had poor practice. It shows that having good knowledge is positively associated with good practices. Therefore, in the event of planning training programs for the army soldiers on PHTC, the objectives should be formulated to improve their knowledge on PHTC. With the improvement of knowledge the level of practices will get improved due to significant association between the two variables.
VI. CONCLUSION

Study concluded that higher proportion of army soldiers had poor knowledge and practice on prehospital trauma care while majority had positive attitudes regarding it. Majority lacks knowledge and practice in first-aid and cardiopulmonary resuscitation. Due to significant association observed between knowledge and practice it can be recommended to include a training session on prehospital trauma care in the basic military curriculum which will enhance the ability to act as first responders effectively. Further research is needed in this area of prehospital trauma care to enhance the qualitative outcome.

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