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ASSESSING THE KNOWLEDGE OF VEHICLE USERS AND VULCANIZERS OF TYRE PROFILE ON VEHICLE PERFORMANCE

A. K. Arkoh, I. Edunyah, E. Acquah
Correction of the Secondary Immunodeficiency at Radiation Sickness with the Help of Herbal Remedies

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Abstract: The influence of herbal remedies on immunological and hematological parameters in mice with radiation sickness was studied. It has been revealed that the supromed, pro-visions, biomyrin and biofizotham correct the inhibited immune response to erythrocytes of the sheep under radiation exposure, and also the studied means promote the increase in the number of erythrocytes and leukocytes in the blood in mice with radiation sickness. Under the influence of biomyrin, the number of blood leukocytes increases by 1.25 times, providas by 1.33 times, supercedes by 1.42 times and biofetizoetham by 1.47 times.

Keywords: irradiation, secondary immunodeficiency, erythrocytes, leukocytes, sucrromed, proweed, biomyrine, biofizotham.

I. INTRODUCTION

Herbal remedies are widely used in medical practice in the treatment of diseases of various etiologies [2,4,5-9]. It is known that many diseases are accompanied by disorders in the immune system (secondary immunodeficiencies), which require appropriate correction [1,3]. In this respect, preparations of plant origin (for example, immunal) have proved to be very useful. Deep secondary immunodeficiency develops under the influence of various types of radiation on the organism [6,10,11].

The aim of the study was to study the effect of herbal remedies on immunological and hematological parameters in mice with radiation sickness (RS).

II. MATERIAL AND METHODS

To simulate RS white mongrel mice weighing 20-22 g once completely irradiated at a dose of 4 Gy. After 5 days, they were intraperitoneally immunized with erythrocytes of a ram (SRBC) at a dose of $2 \times 10^8$ and after 4 days the number of antibody-forming cells (ABPC) in the spleen was determined by a direct method of local hemolysis by the method of Jerne N.K. and Nordin A.A. (1963) [12]. The number of ABPC was calculated for the whole spleen (absolute index) and for 1 million spleen cells (relative indicator). The total number of nucleated cells of the spleen (NCS) was counted. In the peripheral blood of mice, the number of erythrocytes and leukocytes was determined. The investigated herbal remedies were injected once intragastrically on the day of immunization with SRBC. The animals were divided into 6 groups. Group 1 - intact mice immunized with SRBC; 2nd group (control) - mice with RS, immunized with SRBC; The third group - mice with RS received SRBC and a preparation of sucrromed in a dose of 25.0 mg / kg; The 4th group - mice with RS received SRBC and proline preparation in a dose of 25.0 mg / kg; The 5th group - mice with RS received SRBC and a preparation of biomyrin in a dose of 75.0 mg / kg; 6th group - mice with RS received SRBC and a preparation of biofizotham at a dose of 75.0 mg / kg.

III. RESULTS AND DISCUSSION

The results of studies on the effect of herbal preparations on immunological reactivity in mice with RS are given in Table 1. As can be seen from this table, in the spleen of mice of the control group, an average of 7668.8 ± 245.0 ABPC is formed, and in
animals with RS in 14.4 times less. Consequently, after the radiation exposure, a deep secondary immunodeficiency is formed. It is established that all the studied herbal preparations have the ability to correct to a certain extent the violations in the immune status in irradiated mice. In mice receiving sukromed, 1643.8 ± 58.4 ABPC formed in the spleen, which is significantly 3.10 times higher in comparison with the immunodeficiency group. In the groups of animals with RS that received provid and biomyrinin, the immune response to SRBC in comparison with untreated mice rises by 2.61 and 2.11, respectively. Immunostimulating activity of sucrrromed significantly exceeds that of Provid and Biomyr, and the immunostimulating activity of Provid is higher than that of Biomyr

Consequently, the immunostimulatory activity of plant preparations is significantly different from each other. Under the influence of biofthisoetam, the immune response to SRBC in the irradiated mice increased 3.61 times. The immunostimulatory activity of this herbal preparation is significantly higher than that of the previous three agents.

When calculating ABPC for 1 million spleen cells, the following results were obtained. In the control group this indicator is equal to 45.9 ± 1.8 ABPC, while in mice with RS it is 3.53 times less.

Table 1: The effect of herbal remedies on the immune response to the sheep red blood cells in mice with radiation sickness (RS) (M ± m)

<table>
<thead>
<tr>
<th>Group</th>
<th>Dose, mg / kg</th>
<th>Number of NCS × 10⁶</th>
<th>IR</th>
<th>Number of ABPC at whole spleen</th>
<th>Number of ABPC at 10⁶ cells of the spleen</th>
</tr>
</thead>
<tbody>
<tr>
<td>intact (n = 8)</td>
<td>-</td>
<td>173,3±4,2</td>
<td>-</td>
<td>7668,8±245,0</td>
<td>45,9±1,8</td>
</tr>
<tr>
<td>2.RS (control) (n = 8)</td>
<td>-</td>
<td>42,2±1,0a</td>
<td>-4,10</td>
<td>531,3±19,5b</td>
<td>-14,4</td>
</tr>
<tr>
<td>3.RS + Sukromed (n = 8)</td>
<td>25,0</td>
<td>57,0±1,4ab</td>
<td>+1,35</td>
<td>1643,8±58,4ab</td>
<td>+3,10</td>
</tr>
<tr>
<td>4.RS + Provid (n = 8)</td>
<td>25,0</td>
<td>53,2±1,3ab</td>
<td>+1,26</td>
<td>1387,5±50,9abc</td>
<td>+2,61</td>
</tr>
<tr>
<td>5.RS + biomyrine (n = 8)</td>
<td>75,0</td>
<td>51,1±1,3abc</td>
<td>+1,21</td>
<td>1118,8±40,5abcd</td>
<td>+2,11</td>
</tr>
<tr>
<td>6.RS + biotizoetham (n = 8)</td>
<td>75,0</td>
<td>58,3±1,4abcd</td>
<td>+1,38</td>
<td>1918,8±70,3abcdf</td>
<td>+3,61</td>
</tr>
</tbody>
</table>

Note: here and in Table 2, NCS - nucleated cells of the spleen; ABPC - antibody-producing cells; IR - the index of the ratio: (-) - in relation to 1 gr., (+) - in relation to 2 gr., A - authentically to 1 gr., B - authentically to 2g., C - authentically to 3g., D - authentically to 4 g., F - authentically to 5 g. (p <0.05)

In the group of animals with RS that received sucrrromed and prodigal, the number of ABPC per 1 million of the spleen cells increased, respectively, by 2.29 and 2.08 times. Stimulating activity of these drugs is not significantly different from each other. Less pronounced stimulating effect was detected in biomyrin: the number of ABPC per 1 million splenocytes is 1.74 times higher than in untreated mice. Under the influence of Bioftizoetam, the number of ABPC per 1 million spleen cells in mice with RS increases 2.62 times. Immunostimulating activity of biophthysoetham is significantly higher than in all other herbal preparations.

Thus, when calculating the ABPC for both the whole spleen and 1 million splenocytes, the ability of the studied herbal remedies to significantly enhance immunological reactivity in mice after radiation exposure was established.

As can be seen from Table 1, the total number of NCS in the control is 173.4 ± 4.2106, and after the radiation exposure this index decreases by 4.1 times. With the introduction of Provid and Biomyr, the total number of splenocytes in mice with
RS increases, respectively, in 1.26 and 1.21 times. The stimulating activity of the preparations does not differ significantly from each other.

More pronounced stimulating activity in relation to the total number of NCS in irradiated mice is possessed by sucromed and biophthysoetham: the number of splenocytes significantly increases in 1.35 and 1.38 times, respectively. Their stimulating activity is significantly higher than that of provid and biomyrin.

Thus, the studied herbal preparations have the ability to increase the immunological reactivity of the organism and the total number of NCS in mice with RS.

The results of studies on the evaluation of the effect of herbal remedies on hematologic indices are given in Table 2. In the control group, the number of blood erythrocytes is $5.3 \pm 0.05 \times 10^9$ / ml, and in irradiated mice 2.52 times less.

In the groups of irradiated mice that received sucromed, provid and biomyrin, the number of erythrocytes in the blood increases in 1.33, 1.29 and 1.19 times, respectively. A more pronounced stimulating effect on the red germ of hematopoiesis is biofizoetam: the number of erythrocytes increases by 1.43 times. The stimulating activity of biofizoetam significantly exceeds that of other agents.

The number of blood leukocytes in irradiated mice is reduced by 2.10 times ($7.5 \pm 0.1 \times 10^6$ / ml - control, $3.6 \pm 0.07 \times 10^6$ / ml - irradiation). Under the influence of biomyrin, the number of blood leukocytes increases by 1.25 times, provid by 1.33 times, supercedes by 1.42 times and Biofizoetam by 1.47 times. The stimulating activity of biophthysoetham and sucromed is significantly higher than that of provid and biomyrin.

<table>
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<tr>
<th>Group</th>
<th>Erythrocytes $\times 10^9$/ml</th>
<th>Leukocytes $\times 10^9$/ml</th>
<th>IR</th>
</tr>
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<tbody>
<tr>
<td>1.Intact (n = 8)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2.RS (n = 8)</td>
<td>$2.1 \pm 0.02^a$</td>
<td>$5.3 \pm 0.05$</td>
<td>-</td>
</tr>
<tr>
<td>3.RS + Sukromed (n = 8)</td>
<td>$2.8 \pm 0.03^{ab}$</td>
<td>$7.5 \pm 0.1$</td>
<td>-2.10</td>
</tr>
<tr>
<td>4.RS + Provid (n = 8)</td>
<td>$2.7 \pm 0.03^{abc}$</td>
<td>$5.1 \pm 0.09^{ab}$</td>
<td>+1.42</td>
</tr>
<tr>
<td>5.RS + biomyrine (n = 8)</td>
<td>$2.5 \pm 0.02^{abcd}$</td>
<td>$4.5 \pm 0.08^{abcd}$</td>
<td>+1.25</td>
</tr>
<tr>
<td>6.RS + biotizoetham (n = 8)</td>
<td>$3.0 \pm 0.03^{abcd}$</td>
<td>$5.3 \pm 0.1^{abcd}$</td>
<td>+1.47</td>
</tr>
</tbody>
</table>

On the basis of the data obtained, it can be concluded that the studied herbal remedies have the ability to increase the primary immune response to SRBC and correct the disorders in the hematopoietic system in mice with RS.

IV. CONCLUSIONS

1. Sukromed, Provid, Biomyrine and Bioftizoetam corrected the inhibited immune response to erythrocytes of the ram under radiation exposure.

2. The studied means promote an increase in the number of erythrocytes and leukocytes in the blood of irradiated mice.

References


Increasing The Health - Saving Literacy Of Students -
As The Important Factor Of Strengthening Of Their
Reproductive Health

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Abstract: increasing the health-saving literacy of young people in strengthening of the reproductive health of growing generation is the main process, so explanatory works on the problems of forming a healthy generation and a health lifestyle were conducted by seminar-trainings; these will ensure the improvement of their medical culture and preparation to family life.

Key words: health preservation, reproductive health, youth, health generation, healthy lifestyle.

Preservation and strengthening of reproductive health of the growing generation is one of the important direction of the social policy of the Republic of Uzbekistan. As you know, human health depends on a number of factors, including human biological capabilities. The goal of a person’s vital position involves the health person and also to have healthy children, grandchildren and great-grandchildren.

Currently, a large-scale consistent and well-thought-out policy is being implemented in the Republic of Uzbekistan directed to deeper understanding and statement in our society, an important vital value, such as further improving of the health of population and, first of all, growing generation.

In the republic, it has become a tradition to adopt State programs related to health preservation problems, including health-saving competence of listeners. So we can note the followings: 1998- the year of the family; 1999- the year of women; 2000 – the year of healthy generation; 2001- the year of mother and child; 2003- the year of the mahalla (neighborhood); 2004 – the year of kindness and mercy; 2005 – the year of health; 2006 – the year of charity and medical workers; 2007 - the year of Social Protection; 2008 – the year of youth; 2010 – the year of harmoniously developed generation; 2012- the year of the family; 2014- the year of a healthy child and 2016- the year of a healthy mother and child. These data clearly demonstrate social themes and they will be noted as a priority for development of our state, and our people in every possible way contribute to the successful implementation of each point of the state programs, which adopted in the context of the proclaimed year.

Disdainful attitude to the health of the population, ignorance, or rather reluctance of certain members of society to lead a healthy lifestyle, one of the important components of which is directed to the right sexual upbringing, protection of reproductive health, preparation for family life, they can be caused as a whole range of diseases.

Currently, it is believed, that the growing generation requires the presence of qualities of general cultural importance in the modernization of education, such as the development of intelligence, the formation of moral feelings, the care about health of children and adolescents, characterizing their physical and valeological (health-saving) culture. At the same time, it is important to form a personality, who knows the basics of system thinking about the value of health, including reproductive health, who is able to independently acquire health-saving knowledge that listener can use knowledge for the benefit of one’s health, for future generation and the health of others.
In this connection, the importance of knowledge increases on the formation of a healthy lifestyle (HLS), on the healthy generation and necessity of working out of a mechanism by introducing of healthy lifestyle in everyday practice.

It has been established, that the health of the adult and children's population is a social wealth of the society and, as research shows, health is objectively determined by totality of anthropometric, clinical, physiological and biochemical indicators, those are determined in accordance with age, gender, conditions of upbringing and education, so by account of climatic and geographical conditions.

Health-saving competence should be provided by the trainer at all stages of continuing education, fulfilling among other functions and functions of health preservation, which, as they were noted above, they significantly affects to the quality of education, so the presence of some violations in the condition of trainers' health, it will be lead to a decrease of work efficiency and affects to their activity and productivity in participation of the educational process [2].

In the republic of Uzbekistan, the education system creates the necessary conditions for the free development of the individual listeners, and promotes that this development is carried out in various spheres: intellectual, emotional, moral-volitional and value. What negatively does impact to the health of educators and learners in the modern educational institution and consequently reduce the potential or level of their health, including reproductive health? In our opinion, this is the lack of a concept of health-saving knowledge by listeners; for example: the non-fulfillment of hygienic norms and requirements to the preservation of health, including reproductive health on the maintenance of reproductive health; requirements for the organization of the educational process; increased training loads, associated with the intensification of training; low professional competence of educators in the questions of the health-improving orientation of the pedagogical process and the preservation of reproductive health; insufficient knowledge about methodological teaching methods, on this topic of national, individual age and typological characteristics of listeners; authoritarian type of training, characterized by strict compulsion; decreasing of listeners motivation for learning; lack of interaction of educational institutions with the family on the tasks of reproductive health and the formation of a healthy lifestyle; poor-quality servicing of the school psychological and medical service, including on tasks of reproductive health [1,3].

Our creative group, within the framework of the grants of the Oliy Majlis of the republic of Uzbekistan, implemented a project that provides training for young students, future young mothers, with knowledge and skills in the field of health protection, including reproductive and formating of all components of the healthy lifestyle in children, which will help to form a comprehensively developed healthy generation.

Each college pupil and student of higher educational institution potentially is a future mother and therefore our methodology will allow them to grow mentally and physically developed child, the spiritually rich child. In our classes, listeners received knowledge about the influence of such factors as the state of the environment, the health of parents, the conditions and the form of life in the family on the health of the growing generation. The project was implemented in two universities: the Tashkent state pedagogical university named after Nizami and the Uzbek State University of World Languages and in three pedagogical colleges: 1-Tashkent pedagogical college, Pedagogical college named after Yu. Rajabi, Tashkent Pedagogical College. Classes were conducted in experimental groups, for 30 people using interactive teaching methods (brain storming, creating of psychological, pedagogical and life situations, working in small groups, presentations, staging and etc.). During the training, the participants of the trainings received information on the importance of active engine regime, about the regime of the day, about necessity of compliance with the requirements of personal and general hygiene, about necessity of the protection of environment, prevention of injuries and accidents, on the formation of immunity to harmful habits, on correct sexual education, on the preparation of family life by requirements of psycho-hygience of interpersonal relations, about skills of upbringing and education of young children. It’s no secret that many young girls start a family life, having very limited knowledge, skills about protecting health of children, from the moment of conceived child, the period of pregnancy, about the newborn and especially in the first year of the child’s development. The programs of the pedagogical institutions (with the exception of the pre-school
education department) do not give necessary knowledge and practical skills on caring for the child, which leads to contradictions between the level of knowledge, that they can acquire in the process of studying at the university and the requirements on the upbringing of a healthy generation. To overcome this contradiction, a program has been developed to train future young mothers on the skills of caring for child and ensuring the formation of a harmoniously developed personality. The introduction of the program and the corresponding modules for conducting the classes, it will be demanded a process to equip listeners of colleges and students with knowledge about the preservation of their reproductive health, about the favorable course of pregnancy and safe childbirth, and so to acquire practical skills on caring for the child with an account of medical, pedagogical and psychological requirements. In the course of the classes, it was formed a conscious and responsible attitude to the preservation, as for their healthy and future child, skills for healthy lifestyle and developed a sustainable philosophy of health in future mothers. So, there was arisen consultative assistance on prevention of iron and iodine deficiency violation of physical and intellectual development in pregnant women and young mothers. During the project implementation period, 5 one-day trainings were conducted in five educational institutions with a contingent of girls for 30 students in each training. Participants and students, who have received this knowledge, successfully advocate as volunteers in front of their fellow students with information on protection of reproductive health, which it ensures the sustainability of the project. Increasing the activity of young people in strengthening of the reproductive health of the growing generation by strengthening awareness-raising work among them on the problems of forming a healthy generation and healthy lifestyle, providing psychological, medical and pedagogical support for students on enriching their medical-hygiene and psychological and pedagogical knowledge through training seminars, there it was provided a rise in the level of their medical culture and preparation to family life.

References:


Impact of Perceived Fairness on Performance Appraisal System for Academic Staff- General Sir Jhon Kotelawala Defence University

P.L.L.C.P. Alwis

General Sir John Kotelawala Defence University

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Abstract- This study investigates the employees' perception of fairness in the performance appraisal system for academic staff of the General Sir Jhon Kotelawala Defence University.

The perception of fairness in performance appraisal system consists of three main factors: Distributive justice, procedural justice, performance feedback and are used as independent variables and effectiveness of the performance appraisal system as dependent variable. The survey method by using random sampling technique was used to collect the data from academic staff.

Data analysis was conducted by using bivariate correlation and multiple regression analysis. The findings of the result explored that distributive, procedural and performance feedback in the appraisal system are the three significant variables that affect the effectiveness of the performance appraisal system.

Index Terms- Perceived Fairness, performance appraisal system

I. INTRODUCTION

Performance appraisal system is considered as the most important instrument to measure the performance of an employee. Therefore the effectiveness of a performance appraisal system is crucial for the employee development as well as the development of the organization. The reason is that the appraisal system contributes for rewarding, promoting, demoting, terminating of an employee.

The performance evaluation of academic staff at Kotelawala Defence University is carried out by means of a format called “Annual Increment Form which is completed by the raters only. This evaluation is carried out for the sole purpose of granting the annual increment. However, it does not actually taking in to consideration of an individual staff member’s performance progress during the period being evaluated. This format is distributed to the raters by the University administration in a confidential cover.

The process of performance appraisal lacks a proper structure and consistency with respect to organizational goals. Therefore, the higher management of the university is in search of an effective appraisal system for the academic members of the university. Therefore, it is important to achieve the perceived fairness in the performance appraisal system.

This study aims to investigate the relationship and the correlation between distributive justice, procedural justice and performance feedback as independent variables and effectiveness of the appraisal system as the dependent variable.

1. Distributive Justice

Distributive justice is about the perception of individual regarding the fairness of rewards with respect to attained goals or contributed efforts (Colquitt, 2001 Distributive justice refers to the perceived fairness of an individual's outcomes in proportion to the individual's inputs as compared with the outcomes and inputs of relevant others (Bartol, Durham, & Poon, 2001; Elverfeldt AV, 2005).

2. Procedural Justice

Procedural justice is perception of individual about the procedures used to make decision about rewards and to what extend the process is independent and rational for all (Greenberg & Folger, 1983; Mount, 1983, 1984; Pooyan & Eberhardt, 1989).

Procedural justice is measured by assessing the process of procedural rules (Colquitt, 2001) and the process used in making and implementing resource allocation decisions (Bartol et al., 2001). Fairness issues concerning the methods, mechanisms, and processes used to determine outcomes. (Elverfeldt AV, 2005)

3. Performance Feedback

According to Elverfeldt AV, 2005, giving feedback to the employee generally aims at improving performance effectiveness through stimulating behavioural change. Thus is the manner in which employees receive feedback on their job performance a major factor in determining the success of the performance appraisal system (Harris, 1988). Hearing information about the self-discrepant from ones self-image is often difficult and painful. Thus, because feedback may strike at the core of a person’s personal belief system it is crucial to set conditions of feedback so that the ratee is able to tolerate, hear, and own discrepant information (Dalton, 1996). Only if conditions facilitate the acceptance of feedback information then the likelihood of change increases. Dalton (1996) further specifies these conditions: The feedback event should be a confidential interaction between a qualified and credible feedback giver and ratee to avoid denial, venting of emotions, and
be behavioural and mental disengagement. In such an atmosphere discrepancies in evaluations can be discussed and the session can be used as a catalyst to reduce the discrepancies (Jacobs et al., 1980; Elverfeldt AV, 2005)

II. METHODOLOGY AND EXPERIMENTAL DESIGN

The author considers the whole population of civil Academic Members of KDU in the year 2015. The total number of academic members is 166, ranging from Lecturer (Probationary), to Senior Lecturer Grade I from the population of the study. Assistant and Senior Assistant Librarians too are taken as academics as defined by the University Grants Commission.

The sample in this research was civilian academic staff members of General Sir John Kotelawala Defence University with the number of 118 academia. Sample size was determined using Krejcie and Morgan (1970) method. Stratified random sampling method was used and a computer based random number generator was used to select the academic members at each level.

The study involved quantitative methods to collect data by means of a structured pre tested questionnaire. Before the actual study was conducted, a pilot study was carried out to test the validity and reliability of instrument used. For the actual study, the quantitative data was collected by distributing the questionnaire to the academic staff of the university.

The items on the questionnaire are responded to using a 5-point Likert scale ranging from absolute disagreement, through disagree, neutral, agree, and ending in absolute agreement. Numerical ratings for the responses can be obtained by using values ranging from one point for “absolute disagreement” to five points for “absolute agreement”. The response scale is clearly ordinal. However the responses were assigned the values 1, 2, 3, 4, 5 and averages were computed during the analysis.

The questionnaire consists of 58 questions. It measures the level of effectiveness of the appraisal system by the means of independent variables, user’s characteristics, perceived fairness and system characteristics.

Methods of Data Analysis

Data was analyzed using SPSS (Statistical Packages for the Social Scientist) statistical package which was set at the 0.05 significance level. The level of effectiveness of the existing appraisal system will be determined using the results of questionnaires in terms of user’s characteristics, perceived fairness and system characteristics.

All independent variables were given marks between one to five (1-5) for the analysis purpose. Allocation of marks for the respondent’s answers is as follows.

<table>
<thead>
<tr>
<th>Answer</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absolute Disagreement</td>
<td>01</td>
</tr>
<tr>
<td>Disagreement</td>
<td>02</td>
</tr>
<tr>
<td>Neutral</td>
<td>03</td>
</tr>
<tr>
<td>Agree</td>
<td>04</td>
</tr>
<tr>
<td>Absolute Agreement</td>
<td>05</td>
</tr>
</tbody>
</table>

All data was analyzed by using mean value of the factors. Those mean values are interpreted as follows.

<table>
<thead>
<tr>
<th>Mean Value</th>
<th>Level of Effectiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean value between 4-5</td>
<td>Highly effective</td>
</tr>
<tr>
<td>Mean value between 3-3.999</td>
<td>Effective</td>
</tr>
<tr>
<td>Mean value between 2-2.999</td>
<td>Ineffective</td>
</tr>
<tr>
<td>Mean value below 2</td>
<td>Highly Ineffective</td>
</tr>
</tbody>
</table>

The level of effectiveness for each factor of the questionnaire was analyzed using mean and standard deviation. The relationship of effectiveness of appraisal system and the variables; distributive justice, procedural justice and performance feedback were analyzed using Pearson’s correlation and coefficient. The statistically significant factors that affect effectiveness of PAS were determined by Analysis of variance test.

Figure 01 illustrates the conceptual framework of this research.

III. RESULTS

Table 03 Descriptive Statistics of Perceived Level of effectiveness of PAS in Terms of Distributive Justice, Procedural Justice and Performance Feedback. (N = 62)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Level of Effectiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distributive Justice</td>
<td>1.9960</td>
<td>1.03275</td>
<td>Highly Ineffective</td>
</tr>
<tr>
<td>Procedural Justice</td>
<td>2.1355</td>
<td>1.06926</td>
<td>Ineffective</td>
</tr>
<tr>
<td>Performance Feedback</td>
<td>2.0258</td>
<td>1.10882</td>
<td>Ineffective</td>
</tr>
</tbody>
</table>

Correlation Analysis between Independent and Dependent Variables.

Table 04 Correlation Analysis between Overall Effectiveness of performance appraisal system and Independent Variables (Distributive Justice, Procedural Justice and Performance Feedback)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Effectiveness of PAS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pearson Correlation</td>
</tr>
<tr>
<td>Effectiveness of PAS</td>
<td>1</td>
</tr>
<tr>
<td>Distributive Justice</td>
<td>.802**</td>
</tr>
<tr>
<td>Procedural Justice</td>
<td>.84**</td>
</tr>
<tr>
<td>Performance Feedback</td>
<td>.83**</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed)

Multiple Regression Analysis between Independent Variables Related to Effectiveness of performance appraisal system.

Table 05 Regression Analysis between Independent Variables and Effectiveness of performance appraisal system (Model Summary)

<table>
<thead>
<tr>
<th>Model Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Mode 1</td>
</tr>
<tr>
<td>1</td>
</tr>
</tbody>
</table>

IV. DISCUSSION

The total mean for Distributive Justice was 1.9960, which indicates that the respondents perceived that the existing Performance Appraisal System is ineffective in terms of Distributive Justice. Procedural Justice and Performance Feedback showed means of 2.1355 and 2.0258 respectively. Again it can be concluded that the existing Performance Appraisal System is Ineffective.

There is a significant positive linear relationship of effectiveness of Performance Appraisal System and all three independent variables. The relationships are 80.2% for Distributive Justice, 84.9% for Procedural Justice and 83% for Performance Feedback. All three variables have very high positive relationship almost equally.

Model summary shows that the value of R-square for the model is 0.782. This means that 78.2 percent of the variation in the effectiveness of Performance Appraisal System (dependent variable) can be explained from the three independent variables. The adjusted R-square for the model is 0.765, which indicates only a slight overestimate with the model. The standard error of the estimate is only 0.40259.

Regression coefficients represent the mean change in the response variable for one unit of change in the predictor variable while holding other predictors in the model constant. A low p-value (< 0.05) of variables indicates that the changes in the independent variables were related to changes in the response variable, effectiveness of PAS. Conversely, a larger (insignificant) p value suggests that changes in the predictor are not associated with changes in the response. Therefore, the analysis demonstrated that the most significant positively related factor was the procedural justice. It has scored a p value of 0.010 and Beta value of 0.455 It denotes that change of procedural justice by one item may affect the effectiveness by 45.5%.

The fairness of Performance Appraisal System needs to be increased in terms of distributive justice, procedural justice and performance feedback. The fairness of granting rewards to academia should be increased by making the appraisal unbiased.
increased communication between supervisor and subordinate, output related rewards and design the Performance Appraisal System leading to better performance and better work quality.

The Performance Appraisal System should highly focus on procedural justice. Objective measures should be designed to appraisal. The standards should be clearly defined to evaluate the performance. Clear instructions should be given to a both raters and ratees. The standards should be simple and clear. The ratings should be available for review as well. They should be able to discuss problems in relation to their performance evaluation with the supervisor. A follow up system should be incorporated to Performance Appraisal System to monitor whether the raters follow the said standards properly in case of a particular individual as well as in the equal manner for others.

The component of giving feedback should be focused on the new Performance Appraisal System. Feedback of an individual may lead to denial, venting of emotions, and behavioral and mental disengagement. Designing of Performance Appraisal System should address above issues. It should be strictly confidential, constructive and should lead the academia towards achieving expected goals. In this regard the Performance Appraisal System can identify future training needs of the ratees. Student feedback and peer review should also be included in the appraisal form.

V. CONCLUSION

In conclusion, author has identified the fairness of a performance appraisal system has crucial effect on the success of the organization as the perceived fairness has a relationship with the agreement of the system and as the end result the performance of the academic staff.

The academia are very vigilant about the fairness based on the appraisal system, how the head of departments treat them, and the end result. Hence, the fairness of an appraisal system affect all dimensions of academia in the university. Therefore the higher authority should take necessary steps to upsurge the fairness level of the Performance Appraisal System for academic staff at General Sir Jhon Kotelawala Defence University.

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AUTHORS

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Awareness about Minimum Support Price among the farmers over the Agro-Ecological Zones of Jammu Province of Jammu & Kashmir state, INDIA.

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Abstract: The present paper is an attempt to analyse the awareness level about MSP among the farming community. The various initiatives taken by the government would result into a more fruitful way if the programmes are widely spread over both the horizontal and vertical strata of a region. The objective of extending support to the farming community through such programmes is to strengthen the agriculture sector by giving security to the farmers to face the price fall. This would certainly ensure the fair remunerations to the farmers resulting in the development of the rural areas. The data used in the analyses are collected from the field survey well spread over the different agro-ecological zones and the response of the farming respondents are recorded on the well designed questionnaire. The study shows that the vulnerable sections of the society are still neither aware of such programmes nor getting reasonable benefits.

Key words: Minimum support price, Agriculture, farming community, vulnerable sections

INTRODUCTION

Minimum Support Price (MSP) is a form of market intervention by the Government of India to insure agricultural producers against any sharp fall in farm prices. The minimum support prices are announced by the Government of India at the beginning of the sowing season for certain crops on the basis of the recommendations of the Commission for Agricultural Costs and Prices (CACP). MSP is the price fixed by Government of India to protect the producer - farmers - against excessive fall in price during bumper production years. The minimum support prices are a guaranteed price for their produce from the Government. The major objectives are to support the farmers from distress sales and to procure food grains for public distribution. In case the market price for the commodity falls below the announced minimum price due to bumper production and glut in the market, government agencies purchase the entire quantity offered by the farmers at the announced minimum price. Such policy decisions are taken by the government with the objective to support the farmers to get their due share which helps to have assured earning in the season. Minimum Support Price (MSP) is an integral component of Agriculture Price Policy of India. It targets to ensure minimum support price to farmers and affordable price to consumers through public distribution system (PDS) (Parikh & Singh 2007). The price support system was conceptualized as an institutional mechanism to extend incentives to the farmers to adopt new technologies during the period of green revolution (Planning Commission 2005; Deshpande 2008). MSP is viewed as a safety net to ensure price security for a long-term investment decision to farmers.

There have been many concerns off late regarding operation and effectiveness of MSP. In the given study, MSP is considered as a safety net ensuring a sustained development in agriculture sector and an attempt has been made to understand the awareness regarding MSP over the six agro-ecological zones of the study area. It has been analysed that in the growing structural change in the landholding size from medium to small and marginal farmers the diversification of crops is an excellent way for generating better livelihood in the agriculture. The awareness regarding such government intervention will help the farmers to diversify their agricultural practices which would help them to generate good income. The key objectives of the study are to understand the status of farmers’ awareness of MSP of crops grown by them and its low correlates and to explore the nature of the relationship between farmers’, awareness regarding MSP and their decision to diversify the crops.

OBJECTIVES:

The paper attempts to examine the following objectives:
1. To understand the importance of Minimum Support price in agriculture
2. To examine the awareness of MSP among the various social group.

RESEARCH METHODOLOGY/RESEARCH ELABORATIONS

The study region comprises of ten districts namely, Doda, Rajouri, Poonch, Jammu, Samba, Reasi, Ramban, Kishhtwar, Udhampur and Kathua. The region is divided into approx. 60 blocks. The given problem is investigated over the ten districts comprising these 60 blocks of the region. Since, the physiographic of the region is so diverse in nature as the terrain, climate, soils, and slope all are so diverse in the region. There is so much of physiographical diversity within a block and within the districts in Jammu province. The basic concept of the region is the ideology of geography as a discipline. It helps in understanding the interrelationships of physical and non-physical attributes on the earth surface. According to George Kimble (1950’s) “Any portion of earth’s surface where physical conditions are homogeneous can be considered to be a region in the geographic sense.” A region is not an object, either self-determined or nature given. It is an intellectual concept, an entity for the purpose of thought created by the selection of certain features that are relevant to an aerial interest or problem and by the disregard of all features that are considered to be irrelevant. In order to have a sustained agricultural development it is the need of the time to have a systematic planning of agricultural activities. There are several reasons assigned by the researchers for the popularity of the concept of region in various studies focusing on the regional planning and development. The failure of the socio-economic development in the country over the planning era has led to emphasize on new thinking focusing the provision of equal living conditions in different regions including employment, housing and social security, ensuring an appropriate infrastructure equally distributed and brought close to the people resulting in minim sizing the social, economic poverty.

In order to have a sustained agricultural development it is the need of the time to have systematic planning of agricultural activities. The Agro-ecological zoning is one of the most important base for agricultural development planning as the agricultural enterprises is the outcome of physical and the social attributes of a region. The identification of these agro-ecological zones will help to have a careful assessment of agro-climatic resources and as far as the study region is concerned it has huge agro-climatic potential, as the region experiences sub-tropical to temperate type of climate. The modern tool such as satellite remote sensing and GIS have been providing newer dimensions to have effective management mobilization of the natural resources. It has been conceived that GIS and remote sensing has a great role to play in agro-ecological zoning for sustainable development due to its multi-stage character of comprehensive approach to agro-ecological zoning. Sustainable development of mountainous regions is a challenging task because of its diverse physiography and fragile eco-system. The most important striking characteristic of mountainous region is its spatial variability. This makes the planning and use of natural resources of this region more complex than any other. The present study is conducted in the Jammu province of J&K (latitude…) to demonstrate the use of remote sensing and GIS as a tool for demarcation of agro-ecological zoning with mountain perspective (Patelet al..2002). The methodology used in the study is described as follows:-

METHODOLOGY ADOPTED FOR DELINEATION OF AGRO-ECOLOGICAL ZONES OF JAMMU PROVINCE

![Diagram of Agro-ecological zones methodology](Figure: 1.1)
DATA SET USED:
In this study spatial datasets of, LANDSAT ETM+ and IRS LISS III were used correspondingly, including the Survey of India Toposheets (1972). The area of interest was extracted by sub-setting of the town planning map of Jammu & Kashmir. All the images were first geo-corrected and geo-referenced in Earth Re-source Data Analysis System (ERDAS) Imagine 9.0 soft-ware, assigning Universal Transverse Mercator with World Geocoded system (UTM WGS 84) projection parameters. Further for assistance in the process of interpretation SOI toposheets was also geo-referenced and were given similar projection and datum. Satellite imagery was stacked into different bands to produce a false color composite (FCC), the area of interest was extracted by sub-setting of the image. These images were digitized in GIS environment using ArcMap 10 software in the form of polygons representing different categories.

SAMPLING FRAMEWORK

Further, an attempt has been made to identify the number of villages falling under different AEZ. Following are the details of the number of villages and number of households (hhs) falling under different zones, identified with the help of proportion allocation technique which is as follows:

\[ n_i = \frac{n \times N_i}{N} \]

n = Number of sample size (1% of the total number of households (hhs) in the study region) ni= Number of households (hhs) falling under each zone.

N= Number of hhs falling under the study region.

With the above formulation we will get the size sample hhs to be obtained from each AEZ.

In the present study the sample size is 7253.

Agro-ecological zone 1= \( (7253 \times 181162) \div 725345 = 1811.50 \)

Similarly, the size of sample from the each AEZ has been calculated as under:

<table>
<thead>
<tr>
<th>S.No</th>
<th>Agro-ecological Zones</th>
<th>Number of sample hhs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Zone A = ( (7253 \times 181162) \div 725345 = 1811.50 )</td>
<td>1811</td>
</tr>
<tr>
<td>2</td>
<td>Zone B = ( (7253 \times 215321) \div 725345 = 2153 )</td>
<td>2153</td>
</tr>
</tbody>
</table>
After getting the numbers of sample households from each zone we had to select the criteria for selection of farming families from each zone and in the present work the size of landholdings was considered in order to identify the number of respondent (farming families) to be selected from the different size of landholdings. A well designed questionnaire is prepared to generate the required data through the field survey. While filling the questionnaire, care has been taken to cover almost all the social and economic attributes which help us to understand the poverty issues in the agriculture sector.

Since, the obtained size of sample was still on the higher side and keeping in mind the time and the cost factors the obtained 1% sample of the entire population (7253) was further reduced to 50% of the sample households to be selected from the all identified zones. Therefore by reducing it to 50% of sample households from all the zones, the selected number of sample has been presented in the following table.

**TABLE: 1.2 AGRO-ECOLOGICAL ZONES SHOWING THE SELECTED SAMPLE SIZE OF THE HOUSEHOLDS.**

<table>
<thead>
<tr>
<th>S.No</th>
<th>Agro-ecological Zones</th>
<th>Number of sample hhs</th>
<th>Number of samples after reducing to 50%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Zone A = (7253×181162) ÷ 725345 = 1811.50</td>
<td>1811</td>
<td>905</td>
</tr>
<tr>
<td>2</td>
<td>Zone B = (7253×215321) ÷ 725345 = 2153</td>
<td>2153</td>
<td>1076</td>
</tr>
<tr>
<td>3</td>
<td>Zone C = (7253×2072245) ÷ 725345 = 2072</td>
<td>2072</td>
<td>1036</td>
</tr>
<tr>
<td>4</td>
<td>Zone D = (7253×95707) ÷ 725345 = 957</td>
<td>957</td>
<td>479</td>
</tr>
<tr>
<td>5</td>
<td>Zone E = (7253x 21651) ÷ 725345 = 216</td>
<td>216</td>
<td>108</td>
</tr>
<tr>
<td>6</td>
<td>Zone F = (7253x4259) ÷ 725345 = 42</td>
<td>42</td>
<td>21</td>
</tr>
</tbody>
</table>

Source: Field work, 2016-17

**ANALYSIS/RESULTS**

The share of agriculture in the India’s GDP has fallen steadily from around 25 per cent in the early part of the century to less than 17 per cent now. But almost half of India’s population is dependent on agriculture for livelihood. Farming is a risky business with the farmer’s income dependent on the vagaries of weather and pests, as well as local and international price trends. The MSP mechanism shields farmers to an extent, from such risks, by guaranteeing a floor price for their produce. MSP also ensures that the country’s agricultural output responds to the changing needs of its consumers. This year, for instance, the prices of pulses have shot up sharply due to a sharp fall in production in the just concluded rabi season. The Centre has thus hiked the MSP of pulses by a larger margin than for paddy, to expand sowing of pulses in the coming year.

There are many policy decision taken by the government for strengthening each and every sector of economy. The agriculture sector has a great role to play in the economy of the country and time to time constructive measures are taken by the government to support the farming sector. In the given paper an attempt has been made to examine the awareness of Minimum support price system as government intervention to ensure fair price to the farmers in the country. The awareness of MSP over the different agro-ecological zones in the study area has recorded through the field visits to different zones. The effective and efficient planning for the inclusive development would be more fruitful when the performances of different developmental indicators are examined from the regional approach. The approach of sustainable development in the agriculture sector along with the other sectors of the economy is possible only when each and every section of the society would get the benefits. Therefore, in the given attempt an effort has been made to understand the awareness of the farming respondents about MSP over the different sections of the society in the six identified agro-ecological zones in the study area.
## Table 1.3 CASTEWISE RESPONSES OF THE RESPONDENTS ABOUT MINIMUM SUPPORT PRICE

<table>
<thead>
<tr>
<th>Caste</th>
<th>Heard Count</th>
<th>Not heard Count</th>
<th>Can't say Count</th>
<th>Total Count</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Zone</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zone A</td>
<td>28</td>
<td>82</td>
<td>28</td>
<td>138</td>
</tr>
<tr>
<td>Zone B</td>
<td>72</td>
<td>36</td>
<td>0</td>
<td>108</td>
</tr>
<tr>
<td>Zone C</td>
<td>0</td>
<td>220</td>
<td>0</td>
<td>220</td>
</tr>
<tr>
<td>Zone D</td>
<td>45</td>
<td>90</td>
<td>0</td>
<td>135</td>
</tr>
<tr>
<td>Zone E</td>
<td>18</td>
<td>22</td>
<td>0</td>
<td>40</td>
</tr>
<tr>
<td>Zone F</td>
<td>0</td>
<td>6</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>ST</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zone A</td>
<td>0</td>
<td>45</td>
<td>0</td>
<td>45</td>
</tr>
<tr>
<td>Zone B</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Zone C</td>
<td>0</td>
<td>42</td>
<td>0</td>
<td>42</td>
</tr>
<tr>
<td>Zone D</td>
<td>10</td>
<td>20</td>
<td>0</td>
<td>30</td>
</tr>
<tr>
<td>Zone E</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Zone F</td>
<td>0</td>
<td>6</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>OBC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zone A</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Zone B</td>
<td>36</td>
<td>18</td>
<td>0</td>
<td>54</td>
</tr>
<tr>
<td>Zone C</td>
<td>20</td>
<td>42</td>
<td>0</td>
<td>62</td>
</tr>
<tr>
<td>Zone D</td>
<td>40</td>
<td>21</td>
<td>0</td>
<td>61</td>
</tr>
<tr>
<td>Zone E</td>
<td>6</td>
<td>14</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>Zone F</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>OTHER (GENERAL)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zone A</td>
<td>36</td>
<td>657</td>
<td>18</td>
<td>711</td>
</tr>
<tr>
<td>Zone B</td>
<td>517</td>
<td>397</td>
<td>0</td>
<td>914</td>
</tr>
<tr>
<td>Zone C</td>
<td>222</td>
<td>490</td>
<td>0</td>
<td>712</td>
</tr>
<tr>
<td>Zone D</td>
<td>144</td>
<td>109</td>
<td>0</td>
<td>253</td>
</tr>
<tr>
<td>Zone E</td>
<td>34</td>
<td>14</td>
<td>0</td>
<td>48</td>
</tr>
<tr>
<td>Zone F</td>
<td>2</td>
<td>5</td>
<td>0</td>
<td>7</td>
</tr>
</tbody>
</table>

Source: Field survey (2016-17)

The above graphic presentation shows the caste wise response of the farming respondents over the different zones in the study area. As far as the awareness about MSP in zone A is concerned it is evident from the above figure (fig1.3) that there are variations in the response regarding the awareness of MSP among the different castes in zone A. In case of awareness of MSP among the schedule castes, the majority of the respondents have not heard about MSP which constitutes 81 respondents followed by the response under the ‘can’t say’ category recording 27 responses, 27 respondents who heard about MSP in zone A. It is interesting to record in zone A that in the schedule tribe category only the response under the ‘not heard’ category has been recorded. Further, in case of OBC all the responses have recorded under the ‘heard’ category which constitutes 9 respondents (table 1.3). In the general category the maximum number of the respondents have been recorded as 657 who have not heard about MSP and 36 respondents are with the response of ‘heard’ and a representable number of response have been recorded in the third category of response i.e. ‘can’t say’ which has 18 number of respondents.

The status of awareness of the respondents in zone B about MSP is showing a completely different picture when compared with zone A. The number of respondents who are aware about MSP are of higher proportion or those falling in the category of ‘heard’ are constituting 72 respondents as compared to 36 respondents falling under the category of ‘not heard’ in case of schedule caste. This zone has not recorded any response from the schedule tribes under any category of ‘heard’, “not heard” or ‘can’t say’ as a response by the respondents about MSP. In case of OBC 36 respondents have heard about MSP followed by 18 respondents falling under the ‘not heard’ category. The picture of the general category is little satisfactory where the response in the ‘heard’ category is exceeding from the ‘not heard’ category (fig 1.3)

While considering the zone C the trend followed in the response of the respondents are very discouraging as in case of schedule caste and schedule tribes no response of the respondents have been recorded in the ‘heard’ category of assessing the awareness of MSP. In case of OBC a mix response has been witnessed which constitutes of 20 responses in the ‘heard’ category followed by
42 responses in ‘not heard’ category. The general category has shown a higher number of responses in the ‘not heard’ category constituting 488 respondents (table 1.3)

While discussing about the response of respondents about MSP in zone D it has been found that both in schedule caste and schedule tribes community the response in the ‘not heard’ category about MSP is exceeding but in case OBC a opposite trend has been witnessed where the response in the ‘heard’ category is constituting 43 respondents when compared with the responses recorded in ‘not heard’ category

The picture of the response of the respondents about the MSP is showing a mixed trend in zone E about MSP in the ‘heard’ and ‘not heard’ category. In this zone no responses have been recorded in the schedule tribe category. In case of the schedule caste group this zone has shown the maximum response of respondents under the ‘heard’ category regarding the awareness about MSP when compared over the six agro-ecological zones in Jammu province.

The OBC has exceeded in the responses under the ‘not heard’ category while the responses under the general category are satisfying. (table1.3)

The zone F is the last zone of the study area this zone has shown a trend of the responses about MSP which when compared with other zones in Jammu province is really discouraging. In this zone except in the general caste there is no response recorded about MSP in the ‘heard’ category in case of schedule caste, schedule tribe and OBC caste in the study area. Moreover the response in the ‘heard’ category is also on lower side when compared with zone B, C, D and F (fig 1.3). Therefore, it is quite evident from the above discussions the every zone in the study area has recorded different types of responses and therefore all the zones are in need of having a zone specific planning to encounter the different developmental issues.

CONCLUSION

• The Minimum Support Price (MSP) has more advantages if implemented properly it can be used by the government as a powerful tool in stabilising the economy resulting in the sustained development of the agrarian sector in the country.

• Minimum Support Prices are considered as an important pillar of Indian Agricultural price policy rolled out with an intention of providing price security to farmers.
Theoretically, the support prices are to give benefit to the farmers of the entire nation. In this article, an attempt has been made to examine the awareness of MSP over the identified agro-ecological zones in Jammu province.

This can be concluded from the study that there is clear evidence on the awareness level on MSP, among farmers in the study area, being very low particularly in the schedule case, schedule tribe and OBC sections of the study area.

The farmers, due to numerous factors, end up selling their produce at prices below MSP, which either mean losses or very low profits. Thus, it is imperative to link MSP and farmers most realistically.

There is a need to raise awareness levels on MSP among farmers and explaining them on how it works to their benefit. This could be made possible by organising awareness drives, initially pushing the government agencies to foray into the non-serviced villages to procure food grains directly from farmers rather than the farmers coming to the agencies.

This is because few villages are situated far off from these agencies, which make it difficult for the farmers to have access. Agencies reaching out to farmers should also help in the trust building on government schemes among the farmers.

Moreover, Civil Society Organisations (CSOs) might also play a vital role in educating farmers on MSP. Once a strong MSP and farmer linkage is firmed up, it ought to make farmers realise the benefits of the government support system for agriculture produce and in turn raising their income levels.

There is a need to create a platform where farmers might be able to voice their concerns and suggestions. The farmers had historically fallen prey to high interest rates and ever increasing debts, which, for them, became a vicious cycle to come out from.

The support needs to come from the other end as well like the farmer bodies, gram panchayats and civil societies. Partnership between various governmental and non-governmental agencies at the district-level could be fostered to further the implementation of government schemes, especially the MSP. This will also ensure the holistic coverage of all vulnerable categories of farmers.

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Concepts and Methods of Embedding Statistical Data into Maps

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Abstract- The main focus of this study is to find appropriate and stable solutions for representing the statistical data into map with some special features. This research also includes the comparison between different solutions for specific features. In this research I have found three solutions using three different technologies namely Oracle MapViewer, QGIS and AnyMap which are different solutions with different specialties. Each solution has its own specialty so we can choose any solution for representing the statistical data into maps depending on our criteria's.

Index Terms- API, GIS, JDBC, NSDP, Oracle MapViewer,

I. INTRODUCTION

A map is a very powerful way to present data. It is much more intuitive than presenting the same data in the form of coordinates or text. Using the functionalities of spatial databases, along with other Middleware tools, such spatial applications can be developed that is capable to represent the statistical data into maps in various ways. In this research work a spatial application of a specific country will be designed and developed and it will show statistical data on the map (Bar chart, Pie chart etc.) and also it will show the five different layers of addresses (District, county, sub-county, parish and villages) along with other features. We need to find out some useful and stable solutions for embedding statistical data into maps and Compare the solutions with specific features and finally implement the appropriate solution for the specific country.

II. OVERVIEW OF DIFFERENT TECHNOLOGIES

A. Oracle MapViewer

Oracle MapViewer is a very powerful and specialized tool for rendering maps using spatial data managed by Oracle Spatial and Graph or Oracle Locator (also referred to as Locator). MapViewer offers tools that hide the difficulty of spatial data queries and cartographic rendering. It can also deploy in any Java EE container such as web logic server or glass fish or Tomcat [1].

The prime benefit of MapViewer is its incorporation with Oracle Spatial and Graph, Oracle Locator, and Oracle Fusion Middleware. MapViewer cares two-dimensional vector geometries stored in Oracle Spatial and Graph, as well as GeoRaster data and data in the Oracle Spatial and Graph topology and network data models. Oracle MapViewer is also an Open Geospatial Consortium (OGC)-compliant web map service (WMS) and web map tile service (WMTS) server [1].

Figure 1: Basic flow of action in MapViewer [2]

- A Map rendering engine running in Oracle application server: The rendering engine is visible as a servlet that processes requests sent by client demands, draws the proper data from spatial tables, and builds maps in a variety of graphical formats (GIF, PNG, JPEG, or SVG), which it then returns to the asking client. In addition to the core mapping servlet, the Mapviewer server also delivers a map cache server and a feature-of-interest (FOI) server [3].
- Metadata Definitions: The Map definitions/ Metadata are stored in the database. This is the place where we can describe our map such as which table to use, how maps should be rendered (Themes, Styles etc.) [3].
- Oracle Maps Application Programming Interfaces (APIs): These APIs allow us to retrieve mapviewer features from many different application development environments. These APIs contain XML, Java, PL/SQL and JavaScript (AJAX) interfaces. The Java API also comprises JavaServer Pages (JSP) to ease the insertion of maps in JSP [3].
- Map Builder Tool: A map builder is a standalone program through which we are able to manage our metadata stored in the database [3].
Oracle MapViewer is a part of Oracle Fusion Middleware. Oracle MapViewer is a complete package for map rendering and display statistical data on the map. The main benefit of Oracle MapViewer is that it can be used both as online as well as offline, because it has a suite of Application Programming Interfaces (API’s) and Oracle Map. Map builder tool is another excellent component of Oracle MapViewer which makes it easy to manage metadata (define styles, themes, base maps) in a spatial database. We can display statistical data in a various way from MapViewer. From map builder tool we can define different advanced styles (Bar chart, Pie chart, Bucket, Heat maps) and themes associated with those styles and then render them as a vector layer on the map. We do not need to depend on other service provider for map rendering because Oracle MapViewer has Oracle Map, which served cached map image tiles to the client. MapViewer provides a nice platform where we can easily define our own map rendering styles, themes etc. using map builder. Oracle MapViewer is not a commercial solution, so that we can use it without any cost.

B. QGIS

QGIS is a software program with a graphical user interface to deploy the functionalities of Geographical Information System (GIS). The QGIS application provides several tools to provide an easy way to display map layers, map legends and so on. QGIS application is free cost tool to work with geospatial data and visualized the geospatial data according to our own requirements. Through QGIS application we are able to work with various spatial databases and display statistical data from database on the map. QGIS can load vector data from different data sources and also from shape files.

Geographical Information System (GIS):
Geographical Information System (GIS) is becoming an increasingly important tool in environmental management, retail, military, police, tourism and many other spheres of our daily lives [4]. GIS is more than just software, and it refers to all aspects of managing and using digital geographical data. A common feature of GIS is that they allow us to associate information (non-geographical data) with places (geographical data) [5]. GIS Systems work with many different types of data. Vector data is stored as a series of x,y coordinate pairs inside the computer’s memory and Raster data are stored as a grid of values [5].

A GIS consists of:

- Digital Data — the geographical information that we will view and analyzed using computer hardware and software [5].
- Computer Hardware — computers used for storing data, displaying graphics and processing data [5].
- Computer Software — computer programs that run on the computer hardware and allow us to work with digital data. A software program that forms part of the GIS is called a GIS Application [5].

With QGIS we can use separate shape file to produce vector layers or we can access different spatial databases like PostGIS, SpatiaLite and MS SQL Spatial, Oracle Spatial etc. So it is a database independent solution for our case. We can add different layers for zooming capability with statistical data for each layer. If data is changed in the database then it will depicted within a few seconds in the QGIS browser. QGIS can be used as a WMS, WMST, WMS-C or WFS and WFS-T client, and as a WMS, WCS or WFS server.

C. AnyMap

AnyMap is a powerful product from AnyChart. AnyChart is a flexible JavaScript (HTML5) based solution that allows developers to embed interactive and great looking charts and dashboards into any web, standalone or mobile project [6]. Whether we need to improve our website with better reporting, embed dashboards into our on-premises and SaaS systems, or build an entire new product, AnyChart covers all data visualization needs. AnyMap is a very useful tool for side-by-side reporting [6].

We can use it online or offline. To use AnyMap we need to have JavaScript file for each geographical location that we are targeting to display on the map. We can also use JSON file. This method is dependent to the AnyChart map data. The zoom in - zoom out feature is obtain by drilldown map otherwise it is a single layer representation with other features e.g. tooltips, different types of charts etc. When we change anything in the database then the change will not directly depict on the map because the maps are rendered from JavaScript or JSON source which needs to be updated when we have made any changes in the database. To visualize the data for a specific location from database we need to create JavaScript or JSON data file for that specific location. AnyMap is not a database dependent technology and it is a specialized tool for chart representations of statistical data.
III. SOLUTIONS FOR EMBEDDING STATISTICAL DATA

A. Embedding and Evaluating Statistical Data into Map using Oracle MapViewer

To use Oracle MapViewer we have used glassfish server for quick installation and use the pre deployed MapViewer and mvdemo data. For map rendering we need to create styles, themes and base maps using map builder which is used to define Meta data into database. In this solution we do not need to depend on third party map provider i.e. we can depend on our own data and also we can work offline as well as including our statistical data into map along with different features.

A work flow that we have used here is given bellow:

- Download Oracle Mapviewer Quick start Kit with glassfish container
- Install the glassfish server which has mapviewer and mvdemo pre-deployed on it
- Download and import the mvdemo data for demo examples
- Configure the mapviewer according to the mapviewer user’s guide
- Run the mapviewer and mvdemo and play around with examples
- Load the shp file of Uganda map using map builder
- Define metadata (Styles, Themes, Base maps) using Map builder
- Display the map using mapviewer admin console or using HTML5 to display the map

To evaluate Oracle MapViewer with our requirements we will use the data set for and also use statistical data for USA states, cities. As we have prepared data and configured MapViewer, now we can use MapViewer to explore some key features from our requirements:

**Display Map with Bar Chart**

To represent statistical data as Bar Chart into map I have used Non-Spatial Data Provider (NSDP) mechanism to join the results of a database query (i.e. a JDBC vector layer) with content in an xml document and display it.

**Display map with variable Buckets**

To display the variable buckets i.e. different county colors based on the total population of that county we need to create an advanced style (variable buckets) from map builder and then assign that style to a theme and then we can use it as a predefined vector layer.

**Reflecting the metadata changes into the map**

The tile layers that we have created using map viewer admin console those tile layers are managed by the map tile server which is a part of Oracle MapViewer. When a client is requesting for a map then map tile server fetches the requested tile image and store them and returns to the client. Oracle maps have three dissimilar choices for storage the map image tiles [7]:

- Store the tiles using the local file system
- Store the tiles in a database table. (currently not used)
- Stream the tiles directly without caching

I have used Stream without caching and it’s simply solved the update problems. That means if we change anything in the underlying database or metadata (Themes, base maps) then the change will be depicted in a minute. To do this task, we need to set the persistent tiles attribute false in MapViewer while creating a new tile layer. After making the tile layer as stream without caching, now if we change anything in the database that related with this tile, the change will be depicted.
B. Embedding and Evaluating Statistical Data into Map using QGIS

To deploy our requirements with QGIS application we will follow the work flow diagram as bellow:

- Downloading and Installing QGIS
- Creating a new project and managing data sources using DB manager
- Add different layers and specify the styles and other rules for displaying
- Install the qgis2web plugin using plugins manager
- Create the webmap using qgis2web plugin
- Create a package to create the GEOJSON data from SDO_GEOMETRY
- Create a database job that performs the conversion of SDO_GEOM to GEOJSON periodically

Web map using qgis2web plugin

Qgis2web generates a web map from our current QGIS project so we can publish our project as a web map using qgis2web plugin. To publish a the layers as a web map we need to navigate:

Select Create web map → select the necessary properties from the following wizard → select update preview → select export

When we have completed export successfully then the exported map is saved in the default location.

Create a package to convert SDO_GEOMETRY into GEOJSON

So far we did not use any QGIS server or geoserver, we just simply create the map and used qgis2web plugin to published the map. qgis2web plugin create a folder and store all resources to generate the map separately so that this folder is isolated from QGIS and we can use that folder anywhere and run the html file to access the map. So if we change any data in the database then the change will not take effect until we create a new web map using qgis2web plugin manually. But one of our main requirements is to update the map automatically after any changes in the backend database. We have three JavaScript files which contain GEOJSON data. Our purpose is to update this data source if any changes happen in the database because we need to display the statistics data into map which are rendered from these data source and other rendering resources will remain unchanged. To make these things happen we need to build a package which will be responsible for converting the SDO_GEOMETRY data into GEOJSON array from database along with statistical data as properties. To execute the package we need to run the following files [8]:

SQL>@ora2geojson.pkh
SQL>@ora2geojson.pkb

After running these two files we can make a query to run the package and get the GEOJSON output from a specific table as follow [8]:

SELECT ora2geojson.sdo2geojson('select * from states',Rowid,GEOM) FROM states;

Where 'states' is the spatial table or view and GEOM is the name of the spatial column. The ROWID is needed to collect the attributes.

The output from the above query is looks like:

Web map using qgis2web plugin

Qgis2web generates a web map from our current QGIS project so we can publish our project as a web map using qgis2web plugin. To publish a the layers as a web map we need to navigate:

Figure 7: After changing the state abbreviation

Figure 8: Work flow of QGIS implementation

Figure 9: A web map using qgis2web plugin

Figure 10: GEOJSON output from the package
C. Embedding and Evaluating Statistical Data into Map using AnyMap

To deploy our requirements using AnyMap we need to download AnyChart installation package from https://www.anychart.com/download/products/. We can also use AnyMap without downloading the installation package. To continue our work we have followed a working flow diagram as follow:

Figure 11: Work flow of AnyMap implementation

Drilldown Map

To achieve the zooming capability we have to use drilldown map in AnyMap. In our case we have used statistical data for three states and visualized them with drilldown capabilities from AnyMap. To do this we have created two JavaScript file that contains functions that returns the statistical data for that specific states and counties.

Dashboard

To represent the statistical data into map using AnyMap we have to use dashboard technique which will display statistical data into map as a chart or combo box. We can achieve the output as follow [9]:

Figure 12: Dashboard in AnyMap

IV. CONCLUSION

MapViewer is a very powerful and specialized solution for map rendering from Oracle spatial database with statistical data. QGIS is another GIS tool to make maps from different spatial databases or from single shape files with statistical data. AnyMap is a JavaScript solution to represent the map from data files not directly connected to the database. To determine the best solution I have compared every solutions with each other based on important criteria’s. I have described the comparison details in table no. I bellow. From the comparison I would like to prefer that the solution using Oracle MapViewer might be one of the best solutions depending on the features and special criteria’s. Compare with Oracle MapViewer the QGIS tool is easier to use and it’s relatively simple to handle. Oracle MapViewer is a specialized tool for representing statistical data into map and works with spatial data. One major disadvantage is that it is not database independent. More details for each solution is given in the table I.

Figure 11: Different stages of Drilldown Map
Table I: Comparison between three solutions based on important features

<table>
<thead>
<tr>
<th>Feature’s</th>
<th>Mapviewer</th>
<th>QGIS</th>
<th>AnyMap</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does the solution depend on other service providers (e.g. maps provider)? Are there any fees?</td>
<td>No. No cost</td>
<td>No No cost</td>
<td>Yes Depends on our services</td>
</tr>
<tr>
<td>Online or offline</td>
<td>Mainly Offline also can be used as online</td>
<td>Offline</td>
<td>Offline or Online</td>
</tr>
<tr>
<td>Can I apply statistics data into the map?</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Is it possible to color regions based on statistical data of a map?</td>
<td>YES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Can I zoom into the map to get more details (e.g. borders of sub counties)?</td>
<td>YES</td>
<td>YES</td>
<td>YES, Using drilldown method</td>
</tr>
<tr>
<td>Update the Map if Meta Data (Base map, Themes...) is changed</td>
<td>Map is updated instantly.</td>
<td>Map is updated periodically.</td>
<td>Possible to make it periodically</td>
</tr>
<tr>
<td>Database independent</td>
<td>No</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Does the solution support online access to statistics databases?</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>Specialized for map rendering?</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Depict charts in the map</td>
<td>Both Bar and Pie</td>
<td>YES</td>
<td>YES, As dashboard</td>
</tr>
<tr>
<td>Does the solution fit into the Java Universe</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>

ACKNOWLEDGMENT

At first all thanks goes to almighty creator who gives me the opportunity, patients and energy to complete this study. I would like to give thanks to Dr.-Ing. Mayer of the Faculty for Informatics and Electrotechnic at University of Rostock and Mr. Schippmann of the Mühlbauer ID Services, I have found always immense support from them to keep my work on the right way.

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Finally, I must express my very profound gratefulness to my parents and to my wife for providing me with constant support and encouragement during my years of study and through the process of researching and writing this paper. This accomplishment would not have been possible without them. Thank you.

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Assessing the Use of Motivational Strategies in English Language Instruction: The Case of Lafto Secondary School Grade Nine Students in focus

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Abstract: This study assessed the use of motivational strategies in language instruction at Lafto Secondary School. The study was aimed at assessing the use of motivational strategies in language instruction. The study particularly, tried to find out teachers’ use of motivational strategies in language instruction. To this end, the study employed descriptive survey method, which involves both quantitative and qualitative methods. Accordingly, Lafto secondary school was selected through availability sampling. Then, all English Language teachers were selected from grade nine purposefully for the interview. In addition, data were collected from 60 randomly selected students from grade nine for questionnaire. Thus, descriptive statistics using frequencies and percentages were employed in analyzing the quantitative data and the qualitative data were analyzed qualitatively. Finally, based on the findings, the researcher recommended that working on the use of motivational strategies and should be used widely in the school so as to enhance students’ performance. The results of the study revealed that even if the use of motivational strategies at Lafto secondary school was practically used but it has been given less attention to use some strategies frequently at the study school.

Key Words: motivation, strategies, motivational strategies

Introduction

Motivation plays a critical role in the success of learning a foreign language since it’s the primary dynamic stimulus that initiates a mental and physical activity and it is the driving force that maintains the desire in the long and exhausting learning process (Al-Mahrooqi R., Shahid A., Cofie C., 2012). This means motivation could be an internal state that arouses, directs, and maintains human behavior.

Motivational strategies are defined by Dornyei (2001b) as: Motivational strategies are techniques that promote the individual's goal-related behavior. Because human behavior is rather complex, there are many diverse ways of promoting it – in fact, almost any influence a person is exposed to might potentially affect his/her behavior. Motivational strategies refer to those motivational influences that are consciously exerted to achieve some systematic and enduring positive effect. (p. 27) Motivational strategies refer to instructional interventions applied by the teacher to elicit and stimulate student motivation. In other words, motivational strategies are methods that a teacher can use to increase learners’ motivation (Dörnyei 2001a, p. 28).

Most of the motivational strategies proposed by Dorney (2001b) are meant to be related to the language learners' general motivation in long-term course of second language acquisition. However, it has been substantiated through other studies that there is a close
relationship between the situation-specific motivation in L2 classroom and general, trait-like motivation (Dornyei, 2002; Dornyei & Kormos, 2000). Dörnyei (2001a, p. 25) believes that most learners’ motivation can be improved. They are founded on Dörnyei and Ottó’s process-oriented model (Dörnyei 2001b, p. 119). Motivating students can be performed in various ways and it is likely that at least one of the motivational strategies used by a teacher suits each learner (2001a, pp. 24-25).

The current study is a modified replication of Dörnyei (2001a) original survey to explore the range of motivational strategies that teachers can use to motivate their learners in language instruction. Thus, motivational strategies that have been adapted for the questionnaire and interview used in the current study have been revised on the basis of this. Therefore, this current paper aims to assess the use of motivational strategies in language instruction that teachers can employ to motivate their students’ in Lafto Secondary School.

Research Question

- To what degree teachers basically use motivational strategies in the English language instruction?
- To what extent do English language teachers use persistently different motivational strategies?
- How does the teachers’ motivational strategies use shape the students’ classroom motivation in terms of the level of their attention and participation?

Objectives of the Study

General Objective

The general objective of this study is to assess the use of motivational strategies in language instruction to enhance student’s engagement in learning English language.

Specific Objectives of the Study

The specific objectives of this study are:

- To make out the motivational strategies that basically used in the language instruction by teachers
- To describe how often English language teachers persistently use different motivational strategies in their classrooms to raise the students’ participation?
- To examine how often teachers’ motivational strategies use shape the students’ classroom motivation in terms of the level of their attention and participation.

Research Design

Burns and Grove (2003, p.195) define a research design as “a blueprint for conducting a study with maximum control over factors that may interfere with the validity of the findings. Therefore, this study was designed as descriptive survey design which involves both qualitative and quantitative research methods.

Sample Size and Techniques

A sample, as the name it implies a smaller representation of a larger whole. Burns and Grove (2003, p.31) refer to sampling as a process of selecting a group of people, events or behavior with which to conduct a study. Polit et al (2001, p.234) confirm that in sampling a portion that represents the whole population is selected. Therefore, the target population of the study was grade nine students and English teachers at Lafto Secondary School in Dambi Dollo town - Qellem Wellega Zone. Thus, 200 grade nine students were selected through random sampling techniques, 4 English teachers who are currently teaching grade nine were selected through
purposive sampling. So, a total of 204 respondents were taken as a population of the study from Lafto Secondary School. So, the total population size was 204. But, the researcher has taken 30%, which is recommended by many scholars, of the total population from students i.e. 60 of them.

**Source of Data and Population of the Study**

The sources of the study were 60 grade nine students and (4) English teachers from Lafto high school which mainly focuses on assessing the use of motivational strategies in language instruction.

**Study Population**

The population in this study was ninth grade students and English teachers in Lafto secondary schools in Dambi Dollo. Random sampling method was employed to select the students’ participants to allow the distribution of sample over the population and purposive sampling was employed for teachers since they have relevant practices and exposure for the topic of the study.

**Data analysis**

Since the purpose of the study was to assess the use of motivational strategies in language instruction at Lafto High School, descriptive research method was employed to make known the frequency of using motivational strategies in language instruction in the sampling school. Qualitative and quantitative methods of data analysis were used for the reason that in conducting this research both were essential. The data collected through different instruments were tabulated, coded and analyzed. A five-point Likert scale was used to measure the level and type of subjects’ using motivational strategies. Such scale was used in the questionnaire to specify the level of the agreement or disagreement and the impotence of using motivational strategies. Following that, tables were prepared for each variable and appropriate percentages of variables were calculated.

The English teachers and students in Lafto secondary school were administered a series of questionnaires designed to identify the use of motivational strategies by the teachers in the EFL class and students too. Thus, data that were collected through semi-structured interviews and questionnaires were analyzed by organizing the data in tables, interpreted and discussed accordingly.

**Results and Discussions**

It is believed that without adequate use of motivational strategies even the cleverest learners are unlikely to persist long enough to attain any really useful language proficiency, while most learners with strong motivation can achieve a working knowledge of the L2, regardless of their language aptitude or any undesirable learning conditions (Cheng & Dörnyei, 2007).

The results indicate that, with a few exceptions, students and teachers agree as to how motivational they find various teaching practices.

Thus, this study aimed at assessing the use of motivational strategies in language instruction in the case of lafto secondary school. To gather appropriate data for the study, interview, and questionnaire were employed. Since, the teachers’ use of motivational strategies in language instruction has pivotal role in enhancing students’ motivation to foster students’ engagement in language class, the results and discussions of teachers’ frequency use of motivational strategies in language instruction obtained through questionnaire and interview and students’ questionnaire responses were triangulated. Finally, the major findings that indicated the use of motivational strategies in language instruction were discussed under this section respectively.
Analysis of Data Obtained through Interview

Teachers’ use of motivational strategies in language instruction

There were four English teachers who participated in interview so as to provide the researcher detail information about their use of motivational strategies in language instruction. Although all teachers agreed on the use of motivational strategies in language instruction, the researcher did not confirm with students questionnaire. And all the four interviewees (teachers) responded that without using motivation strategies, it is difficult to teach English as a foreign language and engage the learners in the learning activities. Therefore, regarding item 1, “how often do you use motivational strategies to motivate your students in the English language classrooms”? Four of the respondents replied that as they use always during language instructions. This implies that frequency of using motivational strategies have important and determining role in the learning process. Moreover, the language teacher has a significant function and role in giving motivation to the learner for learning language.

Regarding item 2, “Do you think that using motivational strategies is important to develop students’ engagement in English class? According to the interviewees’ response, all of them agreed on the idea of using motivational strategies so as to enhance students’ engagement in English lesson. Because the interviewees recognized the importance of student motivation through which the students actively take part in English class. Relating to this matter, Ellis (1994, p. 508) says that “language teachers readily acknowledge the importance of learners’ motivation, not infrequently explaining their own sense of failure with reference to their students’ lack of motivation”. Motivational strategies influence that are consciously exerted to achieve some systematic and enduring positive effect. In line with this idea, they were asked, “how do you keep your students motivated during English language instruction? The teacher respondents replied that they keep their students to be motivated by providing them clear and simple lesson and by teaching things step-by-step in order to arouse students’ interest towards the lesson and having good relationship with students. A good relationship between students and their teacher is one of the basic motivational conditions required in a classroom as suggested by motivational strategy literature (Dörnyei, 2007). Therefore, based on the data from the teachers, the English teachers seemed to be aware of and employed a range of strategies to enhance students’ motivation and learning in their classrooms.

Concerning item 4, “Do you think that creating a pleasant classroom atmosphere is helpful to promote students’ motivation in the language instruction? Regarding this item four of the interviewers agreed that creating a pleasant classroom atmosphere is important strategies. Cheng and Dörnyei (2007) found that the importance of the classroom climate as a motivational strategy was placed highly by English language teachers.

Regarding Item 5, teachers were interviewed whether they encourage or motivate their students to set goals. Concerning the motivation or encouragement of the students to set learning goals, four of the teachers replied that “yes”. The way they motivate/encourage their students is using one to five group formation strategy which is currently implemented at all educational levels in Ethiopia.

In general, the interview data showed that the teachers have good knowledge about the use of motivational strategies in language instruction and they all responded that without using motivational strategies it is difficult to teach foreign language and capture students’ attention toward the lesson, assist the students to have good result and to attain their individual goals. Because paying attention to the use of motivation in language instruction process and developing, enforcing, and strengthening it, can be some
effective and helpful factor in the process of language instruction. Ellis (1994) sees the incident of learning by means of motivation and believes that the learning process simply occurs when a person is motivated.

**Analysis of Teachers’ questionnaire**

The researcher prepared questionnaire questions in which the selection of the strategies to be included in the questionnaires was based on Motivational Strategies in the Language Classroom by Do‘rnyei (2001a), and final version of the questionnaires was made of 13 motivational strategies for teachers and asked them to rate the frequency with which they used each strategy on a 5-point scale ranging from 1 (never) to 5 (always).

**Teachers’ experiences of using motivational strategies**

<table>
<thead>
<tr>
<th>Uses of motivational Strategies.</th>
<th>Always</th>
<th>Usually</th>
<th>Some times</th>
<th>Rarely</th>
<th>Never</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. How often do you use motivational strategies to familiarize the learners with the importance of English language</td>
<td>- 2 50</td>
<td>- 50</td>
<td>2 50</td>
<td>- - -</td>
<td>4 100</td>
<td></td>
</tr>
<tr>
<td>2. When you teach, how often do you teach things step-by-step?</td>
<td>4 100</td>
<td>- 1</td>
<td>2 50</td>
<td>- - -</td>
<td>4 100</td>
<td></td>
</tr>
<tr>
<td>3. How often do you introduce various interesting content and topics which students are likely to find interesting?</td>
<td>- 50</td>
<td>- 25</td>
<td>3 75</td>
<td>- - -</td>
<td>4 100</td>
<td></td>
</tr>
<tr>
<td>4. During your class, how often you regularly remind students that the successful mastery of English is beneficial to their future?</td>
<td>2 50</td>
<td>2 50</td>
<td>- -</td>
<td>- - -</td>
<td>4 100</td>
<td></td>
</tr>
<tr>
<td>5. How often do you work on increasing students’ self-confidence in language instruction?</td>
<td>- 50</td>
<td>- 25</td>
<td>3 75</td>
<td>1 25</td>
<td>4 100</td>
<td></td>
</tr>
<tr>
<td>6. How often do you create a pleasant and relaxed atmosphere in the classroom?</td>
<td>- 50</td>
<td>2 50</td>
<td>3 75</td>
<td>- - -</td>
<td>4 100</td>
<td></td>
</tr>
<tr>
<td>7. During your class, how often you show your enthusiasm for teaching English by being committed and motivating yourself?</td>
<td>4 100</td>
<td>- 25</td>
<td>3 75</td>
<td>- - -</td>
<td>4 100</td>
<td></td>
</tr>
<tr>
<td>8. How often do you encourage peer teaching and group presentation?</td>
<td>- 50</td>
<td>2 50</td>
<td>- -</td>
<td>- - -</td>
<td>4 100</td>
<td></td>
</tr>
<tr>
<td>9. While you are teaching, how often do you encourage questions and other contributions from students?</td>
<td>- 50</td>
<td>2 50</td>
<td>- -</td>
<td>- - -</td>
<td>4 100</td>
<td></td>
</tr>
<tr>
<td>10. How often do you create good relationship with the students?</td>
<td>4 100</td>
<td>- 25</td>
<td>1 25</td>
<td>- - -</td>
<td>4 100</td>
<td></td>
</tr>
<tr>
<td>11. During English class how often do you use arousal of curiosity to motivate the students?</td>
<td>- 50</td>
<td>1 25</td>
<td>1 25</td>
<td>- - -</td>
<td>4 100</td>
<td></td>
</tr>
<tr>
<td>12. During English class how often do you teach at a pace that is not too fast and not too slow?</td>
<td>- 50</td>
<td>1 25</td>
<td>1 25</td>
<td>- - -</td>
<td>4 100</td>
<td></td>
</tr>
<tr>
<td>13. How often do you encourage students to set learning goals?</td>
<td>- 50</td>
<td>2 50</td>
<td>2 50</td>
<td>- - -</td>
<td>4 100</td>
<td></td>
</tr>
</tbody>
</table>
The above table presents a brief explanation of each strategy that English language teachers use during their class. Accordingly, for the first item, 2(50%) of the respondents said “usually”, where as 2(50%) of them responded “sometimes” respectively. This indicates that motivation in language instruction does not only mean having a desire to start learning language but also includes willingness to make the required effort. Therefore, motivation in language instruction is directly connected with how much effort the learner and teacher are willing to contribute. According to Grander (1985), familiarizing learners with the importance of English language and learners’ disposition towards the target language is considerable influence on their learning achievement.

Regarding Item2, there is no doubt that the way the teacher presents the learning tasks bears a strong effect on how the students perceive the assigned activity. For this reason, all respondents replied that they always teach things step by step. This is confirmed with the interview question. This indicates that the teachers use motivational strategies in presenting lesson step by step so as to make the clear.

In item3, the teachers were asked if they introduce various interesting content and topics which students are likely to find interesting. Responses to this item disclosed that 1(25%) of the respondents usually introduce various interesting content and topics while 3(75%) of the teachers reported that they do it sometimes. This indicates teachers are not introducing various interesting content always due to the influence of the content of the text book. Anderman and Anderman (2010) suggest that teachers could make tasks interesting by using various types of tasks which could be challenging, include novel elements, and relate to the learners’ interests. In addition, Dörnyei (2001a) also points to a number of strategies which teachers could use to make tasks motivating such as identifying the purpose of the tasks and attracting students’ attention to the content of the task and giving entertaining examples makes the lesson more interesting.

Regarding Item 4, the teachers were asked whether they regularly remind students that the successful mastery of English is beneficial to their future. Responses to this item revealed that 2(50%) of them responded always where as 2(5%) of replied usually.

Concerning item5, 3(75%) of the respondents answered as they sometimes work on increasing students’ self-confidence where as 1(25%) of them responded as they rarely work on increasing students’ self-confidence. To maintain students’ motivation, teachers should build students’ self-confidence. Another strategy which a teacher could use to increase the confidence of the students is encouragement which could be defined as ‘the positive persuasive expression of the belief that someone has the capability of achieving a certain goal’ (Dörnyei, 2001a, p.91).

On the Item 6, 2(50%) replied usually, and 2(50%) replied sometimes to create a pleasant and relaxed atmosphere in the classroom respectively. This indicates even if respondents didn’t respond always, teachers are becoming more sensitive to this issue. Dörnyei (2001a) suggests some strategies which create a pleasant and supportive classroom atmosphere including the use of humor in the class.

Concerning Item7, 4(100%) of the respondents revealed that they do have enthusiasm and commitment which are found to be the main factors leading to success in the language teaching and learning process. Therefore, teachers’ responses revealed a significant effect of a good example by being committed and motivated to helping the students succeed in language instruction. This idea indicates that creating ‘beautiful image’ in students’ mind is really pivotal by being enthusiasm and commitment, by being role model for their students in the class and outside the class too.
The teachers were asked whether they encourage peer teaching and group presentation. Thus 3(75%) and 1(25%) of the respondents responded sometimes and rarely respectively. This show that peer teaching and group presentation are at optimal level to keep students feel safe and can stimulate their arousal which enables them to focus on their learning process and allows them to see their progress.

Regarding item 9, 4 (100%) of the respondents reacted with question as they always encourage their students to ask questions freely which is crucial to the way teachers manage the class, engage students with content, encourage participation and increase understanding. Therefore, encouraging questions and other contributions from students is helpful to develop interest and motivate students to become actively involved in lessons and develop critical thinking skills. Cotton (2001) outlined these functions of questioning and states that ‘Instruction which includes posing questions is more effective in producing achievement gains than instruction carried out without questioning students’.

Under Item 10, teachers were asked whether the build good relationship with students or not. Responses to this item revealed that 4(100%) of the respondents pointed out that they understand the importance of maintaining a positive relationship with students. This shows that teachers’ maintaining a positive relationship with students was considered and found to be powerful and influential in increasing students’ motivation to learn English, gaining students’ attention, and in encouraging participation in the classroom activities. Teachers could create good relationship with the students by using some strategies such as accepting them, and paying attention to each students (Dörnyei, 2001a). Brophy (2004) also suggest that teachers should know their students by learning their names, greeting them, and spending some time with them. Therefore, the teacher, who respond to his/her concerns in an empathic manner and who succeed in establishing relationships of mutual trust and respect with the learners, is more likely to inspire the students in academic matters.

Regarding Item 11, teachers were asked whether they use arousal of curiosity to motivate the students or not. Answers to this item revealed that 2(50%) of the respondents responded as usually, 1(25%) and 1(25%) reacted as some times and rarely respectively. This indicates that teachers are not using this motivational strategy even if curiosity motivation is based on the idea that students derive pleasure from activities through which teachers induce arousal.

Concerning Item12, 2(50%) of the respondents answered as usually, 1(25%) and 1(25%) reported as some times and rarely respectively. This shows that half of the respondents use different paces in their language instruction although half of them (50%) reported as they use usually. But a good pace helps students feel like they are moving along and helps a teacher hold the students’ attention. However, it is important that teachers are aware of how variations in pace can affect their learners’ motivation and learning, maintaining an appropriate learning pace for a group of students is a key part of good classroom management.

Regarding Item 13, 2(50%) replied that as they sometimes encourage students to set goal where as 2(50%) responded that as teachers rarely encouraged students to set goal. This indicates that teachers are not alert about the importance of encouraging students to set goals. Because goals are not only outcomes to shoot for but also standards by which students can evaluate their own performance and which mark their progress. Thus, both teachers appeared to be aware of the importance of ‘setting goals’ in order to motivate students to learn English. In this context Dörnyei (2001b) states that students make efforts to reach preset goals. Realistic goals help students to improve their performance. Realistic goals result in students' performing more effectively. Short-term goals may result in more positive effects (Slavin, 2000).

### Analysis of students' questionnaire English teacher frequently uses of motivational strategies during English class.

<table>
<thead>
<tr>
<th></th>
<th>Always</th>
<th>Usually</th>
<th>Sometimes</th>
<th>Rarely</th>
<th>Never</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="http://dx.doi.org/10.29322/IJSRP.8.5.2018.p7707">http://dx.doi.org/10.29322/IJSRP.8.5.2018.p7707</a></td>
<td><a href="http://www.ijsrp.org">www.ijsrp.org</a></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>%</td>
<td>F</td>
<td>%</td>
<td>F</td>
<td>%</td>
</tr>
<tr>
<td>-----------------------------------------------------------------</td>
<td>---</td>
<td>----</td>
<td>---</td>
<td>----</td>
<td>---</td>
<td>----</td>
</tr>
<tr>
<td>1. How often does your English teacher use motivational strategies to familiarize you with the importance of English language?</td>
<td>-</td>
<td>-</td>
<td>35</td>
<td>58.3</td>
<td>15</td>
<td>25</td>
</tr>
<tr>
<td>2. During English class, how often does your teacher teach things step-by-step?</td>
<td>-</td>
<td>-</td>
<td>40</td>
<td>66.7</td>
<td>12</td>
<td>20</td>
</tr>
<tr>
<td>3. To what extent does your English teacher introduces various interesting content and topics which you are likely to find interesting?</td>
<td>-</td>
<td>-</td>
<td>12</td>
<td>20</td>
<td>18</td>
<td>30</td>
</tr>
<tr>
<td>4. During English class, how often does your teacher regularly remind you that the successful mastery of English is beneficial for the future?</td>
<td>15</td>
<td>25</td>
<td>28</td>
<td>46.7</td>
<td>17</td>
<td>28.3</td>
</tr>
<tr>
<td>5. How often does your English teacher work on increasing your' self-confidence in language instruction?</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>25</td>
<td>41.7</td>
</tr>
<tr>
<td>6. To what extent does your teacher create a pleasant and relaxed atmosphere in the classroom?</td>
<td>10</td>
<td>16.7</td>
<td>20</td>
<td>33.3</td>
<td>30</td>
<td>50</td>
</tr>
<tr>
<td>7. During English class, how often does your teacher show his/her enthusiasm for teaching English by being committed and motivating him/herself?</td>
<td>25</td>
<td>41.7</td>
<td>15</td>
<td>25</td>
<td>20</td>
<td>33.3</td>
</tr>
<tr>
<td>8. How often does your English teacher give you enough time for practice?</td>
<td>-</td>
<td>-</td>
<td>22</td>
<td>36.7</td>
<td>20</td>
<td>33.3</td>
</tr>
<tr>
<td>9. While you are learning, how often does your English teacher encourage questions and other contributions from students?</td>
<td>30</td>
<td>50</td>
<td>22</td>
<td>36.66</td>
<td>8</td>
<td>13.33</td>
</tr>
<tr>
<td>10. How often does your teacher create good relationship with you?</td>
<td>45</td>
<td>75</td>
<td>15</td>
<td>25</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>11. During English class how often does your teacher use arousal of curiosity to motivate the students?</td>
<td>-</td>
<td>-</td>
<td>15</td>
<td>25</td>
<td>12</td>
<td>20</td>
</tr>
<tr>
<td>12. During English class how often does your teacher teach at a pace that is not too fast and not too slow?</td>
<td>5</td>
<td>8.3</td>
<td>12</td>
<td>20</td>
<td>35</td>
<td>58.3</td>
</tr>
<tr>
<td>13. To what extent does your teacher encourage students to set learning goals?</td>
<td>-</td>
<td>-</td>
<td>15</td>
<td>25</td>
<td>38</td>
<td>63.3</td>
</tr>
</tbody>
</table>

The above table shows that students’ responses discussion how often their English language teacher use motivational strategies. To this end, item 1 was designed to obtain information from students if their teacher uses motivational strategies to familiarize the students with the importance of English language. To this end, 35 (58.3%), 15(25%), 10(16.7%) of them reported that they were motivated about the importance of English language by their teacher usually, sometimes and rarely respectively. This indicates that teachers understood the importance of English language and students’ ideas also go with the teachers’ questionnaire report.

In a similar way, students were asked (item 2) how often does their teacher teach things step-by-step in order to make the lesson clear and capture students’ attention towards the lesson. 40(66.7%), 12(20%) of them responded that their teacher teaches usually and
sometimes respectively. This is also confirmed with the teachers’ questionnaire. Whereas, 8(13.3%) of them reported as they were rarely motivated about the importance of English language.

With the idea of introducing various topic which students are likely to find interesting (item 3), 30(50%) of the respondents reported that as their teacher rarely introduce various interesting content and topics. This report indicates that the teachers did not use various contents which students are likely to find interesting. But 12(20%) and 18(30%) of the replied that as their teacher introduce various interesting content and topics usually and sometimes respectively. Lightbown and Spada(2006,p.65) state that: “one way of encouraging motivation in the classroom is to vary the activities, tasks, and materials to avoid decrease in attention and increase in boredom among the learners.”

In respect to Item 4, 15(25%), 28(46.7%), 17(28.3%) of the respondents answered always, usually and sometime respectively as their English Language teacher reminds them the importance of the mastery of English language during English class.

In the item number 5, 25(41.7%) and 38(58.3%) of the respondents reported that some times and rarely respectively. This point out even if encouraging students to develop self-confidence in language instruction is pivotal important, teachers did not make use of it frequently enough about the implication of providing students’ regular encouragement and positive feedback to develop self-confidence in language instruction. In their analysis, Cheng and Dornyei (2007) describe that teachers can inculcate the “can-do-spirit” in their students.

Regarding Item6, 10(16.7%), 20(33.3%) and 30(50%) responded always, usually and sometimes correspondingly. This indicates that teachers have seen the importance of creating a pleasant classroom atmosphere so as to motivate the students in language instruction. Students agreed with the teachers’ and also accredited the consequence of creating a supportive and soothing classroom environment in motivating them to learn English. However, there is still much to be done to make the class room atmosphere interesting as most of the students considered it and enjoy it in order to be motivated and to understand the lesson. Therefore, teachers can create a classroom environment that capitalizes on student interests and student engagement in the lesson through providing the right instructional behaviors and a well-organized lesson.

Concerning Item 7,25(41.7%),15(25%) and 20(33.3%) reported always, usually and some times which shows teachers have commitments and enthusiasms in teaching English language in the way that it motivate the students and catch their thoughts towards the target language. Because students’ and teachers’ commitment and enthusiasm were found to be the main factors which are leading to be motivated and success in the language instruction. According to Dörnyei and Ushioda, “Another factor which many believe to be the most important ingredient of motivationally successful teaching is enthusiasm (2011, p. 110).”

In Item8, students were asked whether their English teacher give them enough to practice language in the class or not. So, responses from students revealed that 22(36.7%), 20(33.3%), 18(30%) replied usually, sometimes and rarely respectively. But the teacher need to provide sufficient chances for speaking through which she/he monitors the amount of time they themselves spend talking and show genuine interest when students talk.

For statement number 9, half of the respondents i.e 30(50%) of them reported as their teacher encouraged them to ask questions and other contributions. Whereas 22(36.7%) and 8(13.3%) of the respondents responded usually and sometimes respectively. This indicates that teachers are very alert about this strategy to engage students with content encourage participation and increase
understanding which may lead to the students to be internalized in the lesson. So that questions inevitably generate good communication between teacher and students which is pivotal to increase students’ participation.

Regarding Item10, 45(75%) responded always whereas 15 (25%) of them said usually. This indicates that the relationship between teachers and students should not be ‘producer and consumer’ in language classroom. The motivational impact of teachers on their students’ learning process can be in positive or negative ways, which means that everything that teachers do and how they interact with their students in the classroom may affect their students’ motivation (Lightbown & Spada, 2006).

With respect to Item11, 15(25%), 12(20%) of the respondents said that usually and sometime respectively. Whereas, 22(36.7%) and 11(18.5%) of the respondents replied that rarely and never respectively. This indicates that teachers did not give due attention this strategy which is very essential to be alert, attentive, wide awake. Curiosity could be defined as a tendency to be interested in a wide range of areas (Pintrich, 2003).

Regarding Item 12, 5(8.3%), 12(20%), 8(13.4%) of them replied that always, usually and rarely respectively. But more half of the respondents which means 35(58.3%) of them reported as their teacher sometimes use the same pace during English language class.

Concerning Item13, 15(25%), 38(63.3%), and 7(11.7) of them replied that usually, sometimes and rarely respectively. Even if this strategy is very important through which everyone has their own needs, and everyone should have their own proximal and specific goals to achieve their needs, it did not get concentration. “Motivation requires setting goals either by you or with others (Smith I, 2000)

Conclusions

The findings show that both teachers and students are in strong agreement in terms of the teachers’ use of motivational strategies in the language instruction. Teachers come into sight to worth their role in motivating their students, and students also recognize this role to be important in motivating them in the language classroom. However, some of the motivational strategies are still need more attention which is not frequently used enough in the language instruction.

On the other hand, the teachers made it clear that a number of motivational strategies were not used frequently enough in class like motivating the students to familiarize with the importance of English language, and introducing various interesting content and topics which students are likely to find interesting has given less attention because they sometimes stick to the textbook. Therefore, it seemed that there was a gap between the teachers’ frequently use of different motivational strategies in language instruction.

Another noteworthy finding is that the students’ responses about their language practice in the class which should be given enough time for them so as practice accordingly and the arousal of curiosity to motivate the students has given less consideration.

In conclusion, the quality of learning engagement in the language classroom does not depend on students’ cognitive abilities alone, and it is also supported and influenced by using different motivational strategies to arouse their engagement in English language classroom, but teachers were less concerned with the use of different motivational strategies at similar usage of frequency since some of the motivational strategies were the most frequently cited strategy.

Recommendations

http://dx.doi.org/10.29322/IJSRP.8.5.2018.p7707
This study was to assess the use of motivational strategies in the English language instruction. Thus this study was conducted to give some insights into the use of motivational strategies at Lafto Secondary School and it may provide helpful knowledge and information for further research that should thus be conducted to find ways to improve and maintain students’ motivation better so that the students’ engagement in learning and outcomes would be ensured.

The research also obtained the data from 4 English language teachers and 60 students. So, it is recommended a larger sample size with a longer time frame that should be comprehensive to increase the degree of generalization of the study and in order to make the findings more valid and reliable.

References


Religion on Psychological Well-Being and Self-Efficacy among Secondary School Students

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Abstract- In recent years, psychological well-being has been critical element in a students’ life. This study has investigated the effect of religious faith on psychological well-being and self-efficacy among secondary school students in Kulim district of Kedah. Quantitative approaches of survey design were used for this study. A number of ninety four secondary school students comprised from form four, and form five were selected using purposive sampling methods as studied subjects. The modified version of Santa Clara Strength of Religious Faith Questionnaire (SCSRFQ), Psychological Well Being Inventory (The Ryff Scale) and Self-efficacy for Self-regulated Learning Scale were administered in this study. The finding of linear regression indicated that religious faith is a significant predictor of psychological well-being and self-efficacy among secondary school students in Kulim district of Kedah. The finding also revealed that psychological well-being is a significant predictor of self-efficacy among secondary school students in Kulim district of Kedah. As a conclusion, study disclosed that psychological well-being intensely related to an individual religious faith and proven to lead positive attitude among students in realize their own capability.

Keywords: psychological well-being, religious attitude, self-efficacy.

INTRODUCTION

The post-modern society of rising demands on economic stability and social instability instigates the feeling of depression and anxiety (Weaver, 2010). In order to flight from this undesirable bearing many begin to involve in various illegal activities and committed suicide. According to Weaver (2010), adding up to severe emotional maladjustment due to the poor coping strategies, individual inclined to unhealthy life style. Continuous depression and dissatisfaction in life due to the external difficulties devitalize the structural functioning of every individual in society.

Impaired social functioning leads to various misleading actions and elevates risk for suicidal tendencies. According to Dutton, Rojas, Badour, Wanklyn, Feldner (2016), poor social functioning increase the risk for suicidal tendencies. Furthermore, finding also suggested that, family system and power of peer must be a prime focus towards modify the risk for suicidal behavior. Apart from that, researcher also identified deficient problem solving skill and improper social connection has been explained as a major cause for the suicide attempt.

Various scholars has been identified that psychological well-being has been very important element towards to forms suicidal ideation. According to Ryff (1989), psychological well-being refers as an individual capability to elevate his instinctive capability and natural tendency. Study by Jin and Zang (1998) on 1433 respondent in the People’s Republic of China found that psychological well-being precisely self-esteem is a tenacious predictor of suicidal thoughts. Moreover, in Malaysia finding has discovered that adolescent who suffering from depression, stress, and anxiety more tend to have suicidal thoughts and unable to cope the frustrations due to the handful of issues (Norhayati, Amit, Suen, 2014). Significantly, suicide rates in Malaysia rise sharply over the years. Adolescent aged between 16 to 19 years old is at high risk of committing suicide (Norhayati et al.,2014).

For many, this sanctuary is found predominantly under the tenet of religion. Religion widely considered being the most important element in human life. By attending religious activities, many found access to huge social connection and provide greater sense of belonging and improve one’s psychological well-being. According to the Social Identity Theory proposed by Tajfel and Turner (1979), individual identification with any association such as religious community or any other institution helps improve their mental and physical health. Social identity is the individual’s self-concept emerged from interaction among widening group of in-group members. This connection subsequently, improves positive self-esteem by positively differentiating their in-group from a comparison out-group on several esteemed dimension.
Religion and Psychological Well-Being

“Religion necessarily consists in the permanent removal of pain and the realization of bliss or God and the actions that individual must adopt for the permanent avoidance of pain and the attainment of bliss are called religious”. Paramahansa Yogananda, 2012

Does religiosity contribute to individual psychological well-being? According to Parahamansa Yogananda (2012), a spiritual master explained that religion plays very essential part in human life since the beginning of time as a powerful mechanism to avoid pain and gain happiness.

Recent empirical development shows a growing numbers of literatures investigating the utmost benefits of religion on individual physical and emotional well-being. There are various reasons for an individual to engage in religious activity. Study revealed that while some people involves in religious activity due to eradicate the distressing element of their everyday life, others found immersed in praying in order to eliminate failure and boost their positive declaration to enhance confidence (Reinberg & Weaver, 2010). A study examining the effect of religion on psychological well-being among Greek cancer patient and significant result was revealed between religion and psychological well-being (Kaliampos & Roussi, 2017). The prospective design study with 86 cancer patients shows religion plays very important role in the well-being of cancer patients. Correspondingly, a longitudinal study by Park (2010) also suggested that is true. In his study focusing on religion and spiritual elements on students’ psychological well-being, he found that religion and spiritual have critical implication on students’ mental health.

Adolescent maintained their religious belief as an integral part of during their development transition. Individual exposed theological based moral values when they attend to their respective religious ceremony. A remarkable finding revealed that aspect of religion has profound tendency to minimize the occurrence of deviant behavior among adolescent (Laird, Marks, & Marrero, 2011). According to Green and Elliot (2010), individual who associated themselves in any religion reported to have greater mental health and happiness. Notably, study shows that people who holds extremist believe less happy than people with liberal religious belief. This group of extremist has narrow understanding of their respective religious text and their every action filled the earth with viciousness, crushed civilization and sent entire countries to despair. For instance, On July 2014, two British men were arrested for their associating with an extremist group in Syria. An investigation found that they had ordered two books from Amazon namely “Islam for Dummies” and “Koran for Dummies”. This phenomena clearly shows that the narrow religious literacy possessed by the individual who joined the groups of extremist (British Terrorist from Birmingham, 2014).

Apart from psychological well-being, other domain that benefits from religious faith is individual self-efficacy. Bandura (1977) defines self-efficacy as people belief about their capabilities to produce designated level of performance that exercises influence over events that affect their lives. Oyewumi, Ibitoye and Sanni (2012) founds that individual with stronger self-efficacy tend to approach difficult task by assuming it as opportunity to test their capability rather that seeing it as threat. Thus, it’s also maximized their problem solving capability and leads to life satisfaction. Based on Żołnier, Wac, Brzozowska, Sak (2017) study on 273 medical students founds that religion plays very critical role as coping strategy for dealing with problem.

Although there is growing body of literature agreed that religion plays the very important role on individual mental health, however there are several other notable finding revealed negative correlation between these variables. According to Dew, Daniel, Armstrong, Goldston, Tripplett, & Koenig (2008), plenty of studies using cross sectional data has found negative relationship between religious attendance and adolescent mental health. Nowadays adolescent tended to separate themselves from their religious social support system in order to lead an independent life. Therefore, they receive poor positive social support and likely to struggle with difficulties. Comparatively, numerous studies have shown positive contribution of religion element on individual mental health (Ellison & Levin, 2012; Swinton, 2011). Although most of the study correlates positively concerning religion on psychological well-being, there were only conducted in abroad and very limited study to explore and understand in Malaysian context.

As the result of limited research study, the current study seeks to examine the effect of religious faith on psychological well-being and self-efficacy among secondary school students in Kulim district of Kedah.

Henceforth, this study aimed to fulfill the following objective:

I. To identify the effect of religious faith on psychological well-being among secondary school students in Kulim district of Kedah.

II. To identify the effect of religious faith on self-efficacy among secondary school students in Kulim district of Kedah.

III. To identify the effect of psychological well-being on self-efficacy among secondary school students in Kulim district of Kedah.
Based on these, three hypotheses were formulated:

I. **Ha1:** Religious faith is significant predictor of Psychological well-being among secondary school students in Kulim district of Kedah.
   **Ho1:** Religious faith is not significant predictor of Psychological well-being among secondary school students in Kulim district of Kedah.

II. **Ha2:** Religious faith is significant predictor of self-efficacy among secondary school students in Kulim district of Kedah.
    **Ho2:** Religious faith is not significant predictor of self-efficacy among secondary school students in Kulim district of Kedah.

III. **Ha3:** Psychological well-being is a significant predictor of self-efficacy among secondary school students in Kulim district of Kedah.
     **Ho3:** Psychological well-being is not a significant predictor of self-efficacy among secondary school students in Kulim district of Kedah.

**METHODS**

**Research Design**
This research has been designed using the quantitative approach of survey design. Study focuses on investigates the significant effect between religious faith on adolescent psychological well-being and self-efficacy.

**Population and sample**
In this study the population was includes all form three to form five students from various socioeconomic background. A total number of ninety four (94) participants were involved in this study. The population of this study comprised one of the secondary school at Kulim district, Kedah. The participants have been divided equally according to gender. The number of respondents aged 15 is 18 which equivalents to 19.6% while the number of respondents aged 16 is 42 which equivalents to 43.5% and respondents who aged 17 is 34 which equivalents to 37.0%. Researcher used purposive sampling method to choose sample from larger population. The sample of this study has determined based on the sample size determination table initiated by Krejcie and Morgan's (1970). These groups were chosen because they were considered to be in their adolescent stage and most appropriate for this research. The participants that involve in this study were aged 15 to 17 years old.

**Instrument**
Researcher has used questionnaire which comprised three sections. The first section comprised demographic details such as gender, family income and religion. The second section comprised 10 questions from Santa Clara Strength of Religious Faith Questionnaire (SCSRFQ) developed by Plante and Boccaccini in 1997. Response range from strongly disagree to strongly agree. This questionnaire can measure individual religious strength and faith regardless spiritual affiliation and denomination. Significant Cronbach's alpha found ranging from .94 to .97 for this inventory in previous study (Plante, 2010). A second section contained 54 items (medium form) from The Psychological Well-Being Inventory (The Ryff Scale) originated by Ryff (1989). This instrument contained items covered 6 dimension namely Autonomy, Environmental mastery, Personal growth, Positive relation with others, Purpose in life, and Self-acceptance. Significant Cronbach's alpha 0.85 was produced for the scale in previous study (Albina, 2016). The third section contained self-efficacy for self-regulated learning scale originated by Bandura (1989). This inventory contained 11 items to have examined student ability to perceive academic tasks.

**Method of Data Analyze**
Initially, the researcher obtained permission from involved school administration and then administered the questionnaire to participants in their classroom. The researcher was explained the intention of the study and guide them to complete the questionnaire. The data collected through the questionnaire and entered in the Statistical Package for the Social Sciences (SPSS) software version 21.0 and analyzed using Simple Linear Regression test.
RESEARCH FINDING

Based on the above, this current study outcome has presented as follows and discussed in detail about the effect of religion on psychological well-being and self-efficacy among secondary school students in Kulim district of Kedah.

Table 1.0
Linear Regression Summary of the Religious Attitude on Psychological Well-being

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Independent Variable</th>
<th>Std. Coefficient Beta (β)</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychological Well-being</td>
<td>Religious Faith</td>
<td>0.347*</td>
<td>3.529</td>
</tr>
</tbody>
</table>

R² .485
Adjust R² .112
Sig. F .19.427*
R .639a

Note: Significant levels: *p < 0.05

Table 1.0 show that there was a positive linear relationship between the two variables, which were confirmed with a Pearson’s correlation coefficient of 0.639. Simple linear regression was calculated to predict psychological well-being based on religious belief. A significant regression equation was found (F(1,91) = 19.427, p <.000), with an R² of .485. The result showed that religious faith (beta = .347, p < .05) was found to contribute significantly and positively to their psychological well-being. The finding indicated that religious faith is a significant predictor of psychological well-being among secondary school students in Kulim district of Kedah. Therefore, the alternative hypothesis was accepted.

Table 2.0
Linear Regression Summary of the Religious Faith and Self-Efficacy

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Independent Variable</th>
<th>Std. Coefficient Beta (β)</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-Efficacy</td>
<td>Religious Faith</td>
<td>0.319*</td>
<td>0.326</td>
</tr>
</tbody>
</table>

R² .499
Adjust R² .094
Sig. F .19.325*
R .708a

Note: Significant levels: *p < 0.05

Table 2.0 shows that there was a positive linear between the two variables, which were confirmed with a Pearson’s correlation coefficient of 0.708. Simple linear regression was calculated to predict self-efficacy based on religious faith. A significant regression equation was found (F(1,91) = 19.325, p <.000), with an R² of .499. The result showed that religious faith (beta = .319, p < .05) was found to contribute significantly and positively to their psychological well-being. The finding indicated that religious faith is a significant predictor of self-efficacy among secondary school students in Kulim district of Kedah. Therefore, the alternative hypothesis was accepted.
The result suggested that individual with religious belief has profound capability to control their life event and facing challenges in a positive way. The finding extends the benefits of religion on enhance and encouraged an individual positive coping strategies because their praying intensity was stronger enough to maintain their level of self-esteem and also psychological stability. The result now have vast similarities. They suggested that individual began to assumed God as their sole protector and commit their struggles to Him. The result for the second hypothesis shows that religious faith is a significant predictor towards self-efficacy among secondary school students in Kulim district of Kedah. Therefore, the alternative hypothesis was accepted.

**DISCUSSION OF FINDING**

The finding for the first hypothesis indicates that religious faith is a significant predictor towards psychological well-being among secondary school students in Kulim district of Kedah.

The students sample comprised different religious denomination namely Hinduism, Islam, Christianity and Buddhism. A set of question from Santa Clara Strength of Religious Faith Instrument is appropriate and able identified the faith of an individual from various religions according to Plante & Boccaccini, 1997). The finding of the study identical with numerous works of literature, for instance, these values correlate favorably with Kaliampous & Roussi, 2017 and also confirms previous finding stated by Leondari and Gialamas (2009). Further study carried out by Ismail & Desmukh (2012) confirmed the finding of our study. According to their study with the sample of 150 Pakistani Muslim participants revealed a strong positive relationship between religion and life satisfaction. They assumed that this positive relationship due to the individual tendency to attribute everything that happens to the will of God. This types of attitude minimize regrets in life and maximize life satisfaction. This implies that religious faith have utmost tendencies to escalate the positive outlook of an individual. As is well known, individual with a religious faith likely to associate with respective religious community and this gigantic positive social system helps them providing social, emotional and psychological comfort. Other than that, our finding would seem to show the importance of religious faith in eliminating suicidal tendencies among students. The protective function of religion nurtured individual against suicide and act as reinforcement. The word “religion” itself derived from the Latin ‘religare’, to bind. The word ‘bind’ ascribed to the word religion because it’s profound capability to grouping all particular religious people together in one place to perform rituals or prayers. Health behavior researchers suggested that social belonging, appraisal and appropriate supports from one’s social network associated with several health behavior (Tang, Brown, Funnell, & Anderson, 2008). The finding of this study would have possibility to create awareness among school community concerning the utmost important of religion in student’s life.

It is important to highlight the fact that religious belief has massive influence in Malaysia. Almost 98 percentage of Malaysia identified them in any religious denomination (Department of Statistic Malaysia, 2011). Therefore, their belief system shows very promising repercussion on their way of thinking and behavior. Furthermore the result of this study in good agreement with the theoretical framework of our study and substantiate with Bronfenbrenner’s Ecological System Theory (1992). Bronfenbrenner (1992) claimed that various microsystem such as religious institution influence heavily on individual development. Bronfenbrenner (1992) explained ecological system in his theory to describe how settings and their developmental importance change over time. He traces the advance of religious institution by stating its crucial aspect in human life that would impact their social functioning. Furthermore, as reported by Ellison and Levin (2012), the evidence we found points to individual psychological well-being based on religious faith have vast similarities. They suggested that individual began to assumed God as their sole protector and commit their struggles to Him. Their praying intensity was stronger enough to maintain their level of self-esteem and also psychological stability. The result now provides evidence concerning the privileged aspect of religion on human life and plays as unifying element and massive force. The result for the second hypothesis shows that religious faith is a significant predictor towards self-efficacy among secondary school students in Kulim district of Kedah.

The result suggested that individual with religious belief has profound capability to control their life event and facing challenges in a positive way. The finding extends the benefits of religion on enhance and encouraged an individual positive coping strategies because

<table>
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<th>Dependent Variable</th>
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<th>Std. Coefficient</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychological Well-being</td>
<td>Self-Efficacy</td>
<td>-0.718*</td>
<td>-7.367</td>
</tr>
</tbody>
</table>

Table 3.0 shows that there was a positive linear between the two variables, which were confirmed with a Pearson’s correlation coefficient of 0.607. Simple linear regression was calculated to predict self-efficacy based on psychological well-being. A significant regression equation was found (F(1,91) = 28.627, p <.000), with an R² of .413. The result showed that psychological well-being (beta = .347, p < .05) was found to contribute significantly and positively to their self-efficacy. The finding indicated that psychological well-being is a significant predictor of self-efficacy among secondary school students in Kulim district of Kedah.
of having faith at heart. Every individual ultimate motive of the removal of pain and the attainment of happiness is looked under the tenet of religion. Therefore, every action that individual adopts in order to attain that happiness is called religious. The superiority of religion not only preaching positive thought among believer but also develops gradually the intensity of capability to comprehend the ability to process and overcome different situation and stress factor.

Our result has a similarities with Hegarwati, Pratiwi, Kahfi, & Sofyandi, 2016; Koenig, Carson and King, 2012; Levin, 2010. According Koenig et al.,(2012) stated that people reduce their feeling of hopelessness by praying and attending to worship house and seek external force to support. Additionally, this result also ties well with previous studies wherein study on examining the role of religion on self-efficacy revealed remarkable finding concerning the utmost benefits of religiosity in a student’s life. Study conducted by Żołnierz, Wac, Brzozowska, and Sak (2017) on 273 medical science students age between 19 and 27 points that religious individual has extraordinary capabilities to overcome struggles related to their academic and life events. Apart from numerous psychological benefits from religiosity, the evidences also had shown the essential element in developing positive view regarding one’s self capabilities. The content of this study also illuminated the previous finding by Bigdeloo and Bozorgi (2016). According to their study, religion remained appropriate in developing self-efficacy. Result showed the meaningful association between religious belief and self-efficacy. People with high self-efficacy more likely believe their high level of self-confidence and life satisfaction and less feel stress or anxiety as the health threatening factors. Self-efficacy depends on controlling the stresses, high self-esteem, physical and mental health, and higher adaptation and high resistance to the severe diseases. Self-efficacy improves the capability of individual competencies and helps maintaining the proper balance of desirable outcome in interpersonal and intrapersonal elements in life. Result of the current study so far shows very promising alternative which should implement by school community in order to nurture the innate ability. In general, this finding lead to conclude that every religious community should move forward to organize more faith based motivational and academic program to students in order to enhance social and individual self-efficacy.

The result for the third hypothesis concerned the effect of psychological well-being on self-efficacy. Finding shows that psychological well-being is a significant predictor towards the development of self-efficacy among secondary school students in Kulim district of Kedah.

Result suggested that, individual psychological well-being such as autonomy, positive relationship, environmental mastery, purpose in life, personal growth and self-acceptance direct students to gain realize their innate potential and enhance self-confidence to perform challenging task. Poor psychological well-being ended in depression, severe anxiety and helplessness and unable to stay consistent in their life challenges. Secondary school education is very critical part in student’s life. That level of education result determined students capability to pursue their further studies in university or college. Therefore, achieving success academically being a key goal of their life. During their schooling time, students exposed to various obstacles and responsibilities such as an individual assignment, group project, and summative examination, interpersonal and intrapersonal conflicts. It would be the prime cause for their stress and psychological maladjustment. Student’s with psychological maladjustment shows unsatisfactory attendance and behavior delinquency. While there are many students able to cope with difficulties but number of cases these difficulties may have a grave effect on the young person’s psychological well-being. This poor psychological well-being leads them to the destructive effect such as poor academic achievement, unable to comprehend individual capability and social interaction challenges.

In our view, the result emphasized that people with positive psychological well-being has a unique approach to view their challenges and set appropriate and attainable target consciously in order to avoid failure and dissatisfaction.

Several study, in good agreement with the current research finding (Siddiqui, 2015; Costa, Ripoll, Sanchez, Carvalho, 2013). This study also shares identical result with Caroli & Sagone, 2014. The finding in the literature explained that high level of psychological well-being influence students’ active participation in academic tasks and develop positive outlook that led to academic goals. As anticipated, result suggest that highly efficient individual tend to view their daily hassles in a positive lens and adapting all kind of life event in order to gain mastery to overcome and managing their external factors. They also exposed to new experiences and with a sense of realizing their individual potential, and were able to admit numerous and diverse facets of self-image. Apart from academic success, greater psychological well-being also influence an individual to hold more flexible and resilience approach in a problem solving and prevent from engaged in various immoral activities for instance committing suicide. With the appropriate comprehension concerning their capability and knowledge they able to choose proper strategies to overcome life struggles. Our finding appeared to be shown that, school counselor or any other related field teachers should organize mental health week or campaign to raise awareness and promote activities that release stress and anxiety.

IMPLICATION OF THE STUDY
Current research finding contributed to the growing body of literature which measuring the influence of religion on human psychological well-being and self-efficacy. The present finding of this study might contributed to school counselor and body of NGO to implement various awareness program at a school level targeting students to enhance their understanding concerning the utmost role of religion. Apart from that, authors also suggested in future it would be more benefits the community if therapist utilize individual religious social network as an element to receive immediate protection in many cases involve social deviants, disease and
addiction. This could potentially improve the social functioning of an individual to recover with assistance and support from each religious community. We believed that our result may improve the knowledge of practicing religion as one’s shield to protect themselves from evil thoughts and action.

LIMITATION AND SUGGESTION
Our work clearly shows some limitation. This study aimed to investigate the role of religion on psychological well-being and self-efficacy. As mentioned in a methodology section, respondent of this study were selected just from particular secondary school in Kulim district of Kedah. Given the small sample size, the finding of this study might not be generalized to the entire population. Therefore, we hope future study should comprised large sample at different level.

Secondly, this survey study just predicted the relationship of studied variables. Thus, to understand the causal relationship between variable a longitudinal research design is needed. Obviously, longitudinal study provides unique insight and useful to discover changes in development over time.

Thirdly, other than the religious factor, spiritual element, family socio-economic status, parenting style and national policy must take into consideration to examine its role in nurturing psychological well-being.

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Towards the digitalization of Restaurant Business Process for Food Ordering in Nigeria Private University: The Design Perspective. A Study of Samuel Adegboyega University Edo State Nigeria

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Abstract- The use of information and Communication Technology (ICT) has improved a lot of businesses by Digitalizing their business processes. Traditional (manual) Ordering of food in a Restaurant in the University Environment has been in practice for long, which brought about piles of Challenges. Digitalizing the Restaurant business processes in Restaurant was the focus of this paper. In view of this, the system developed in this paper was able to solve the challenges of the existing ordering of Food in the restaurant. This paper has provided an overview Food Ordering system (FOS) and has provided a digital design for such system. It also discusses the advantages associated with integrating the system across the Restaurant Business. The FOS developed in this work, when fully implemented, will go a long way to addressing the problem faced by the restaurant management in the area of managing their customer’s food ordering, management of customer’s information and having quick access to information.

Index Terms- ICT, Food Ordering, Restaurant Business process, Digitalization

I. INTRODUCTION

Food Business in Nigeria is not only a profitable venture, it cannot be affected by economic hard times. This is because regardless of the state of a person’s pocket; buoyant or broke, employed or unemployed he must eat. Restaurant business in Nigeria and anywhere in the world is more of a service business than commodity business. Restaurant business is no doubt a lucrative business in Nigeria because it’s an all season business. Everyone needs to eat at least once in a day while most people eat three times or more for every 24 hours. Nigeria being a country with huge population and large middle class earners contribute to a potential success of starting and running a restaurant business. According to (Ashutosh et al 2013; Patel et al 2015). Restaurants are one of the favorite’s premises with no regard to the actual reasons for visiting restaurants; customer will make orders and wait for the ordered meals. However, it is common if customers complain for not feeling satisfied about the services offered. Food ordering is a completely manual process where a waiter will note down orders from the customers using pen and paper, take the orders to the kitchen, bring the food and make the bill. According to Prema, Vijitha, Harinisrinivas and Kavitha (2017) traditional ordering of food is the method in which customers specify their desired menu to the waiter who takes the order on a paper. Personally he then takes the order to the kitchen department and then he supply the food items to the customer. But this type of business process is time consuming and not comfortable for customer. According to Shinde, Thakare, Dhomne, and Sarkar (2014), the rapid growth in communication technology emergence of wireless technology and android devices has created quite a stir in the business transactions. Business in the hospitality industry has been greatly influenced and competition has increased due to improved food ordering techniques.

According to Mayur & Piyush (2015) Today’s era is said to be the world of technology. So many efforts have been taken by restaurants owners also to adopt information and communication technologies. The advancement of Information and Communication Technology has led to an increasing number of industries to use electronic media and corresponding application for information exchange. Patel (2015) stated that, “In the fast paced time of today, where everyone is squeezed for time, the majority of people are finicky when it comes to placing a food order”. The customers of today are not only attracted because placing an order online is very convenient but also because they have visibility into the items offered, price and extremely simplified navigation for the order.

In this 21st century, we are living in a progressively Technology driven society. For too long, the restaurant industry has been relying on the same business model that the first restaurateur used so many ages ago: get customers, serve them food. And while that model still lies at the heart of every restaurant, the industry and the clients who frequent it has grown up and evolved since then. Technology is the prime mover of that change in almost every industry and the restaurant business is no exception. In Nigeria today, so many Nigeria private Universities restaurant owner or manager, runs restaurant business in a traditional way, as the case of Samuel Adegboyega University, Students, Staff and Visitors want to be able to order for food and have it delivered to them with much ease and still maintain cost effectiveness. Also they want to be able to do this anywhere and anytime. The manual method has required Staff to abandon their work, Student their studies leaving their state of comfort to meet
their need. It’s a good idea to stay current on this developing technology and to investigate the ways it can improve and expand business. With the challenges stated, there is need for a system that offers a wide range of publicity, allow people to place direct order, processing and delivering of food through online system. For this purpose, this research paper focuses on the design perspective of an online based ordering system, there will be a module to handle customers’ order, one that will allow the restaurant employees to retrieve and process customers’ orders and the third module for administrative operation system. This could also be applicable to any food delivery industry. The main advantage of this system is that it will greatly simplify the ordering process of Staff and Student, Visitors as well as the restaurant employees and the management. The system also greatly lightens the load on the restaurants as the entire process of taking orders is digitalized. Once an order is placed on the webpage that will be designed, it is placed into the database and then retrieved in real-time by any connected system from the restaurants by the restaurant employees. On this application, various items in the order are displayed, along with their corresponding options and delivery details. This allows the restaurant employees to quickly go through the orders as they are placed and produce the necessary items with minimal delay. In the overall this system will offer flexibility to food ordering and delivery.

Problem Statement

With the level of Information Communication Technology in Nigeria today, the manual method of food ordering in University environment is a big challenge this day. Students, Staff and Visitors to order for food and have it delivered to them at their door step with ease and still maintain cost effectiveness. Also they want to be able to do this anywhere and anytime. The manual method has required Staff and Student to leave their state of comfort to meet their needs, managing restaurant operations is more challenging than it appears. A restaurant generally relies on paper-based system for manual information flow. However, such system has its limitations. This is mainly because individuals in the restaurant have limited capability to handle massive information flow when the restaurant is at peak capacity.

II. RELATED WORK

The advancement in information and communication technology has greatly influenced the business transactions. In earlier days, food industry traditionally has lagged behind other industries in adopting new technology. However rapid advances in computer Technology and heightened expectations of consumers have forced the food industry to bring automation in the process. Nowadays, the adoption of wireless technology & emergence of mobile devices has led to automation in the food industry. The business and services in restaurants can be improved with the combination of wireless and mobile technologies. The competition in restaurants with respect to business has increased with the advancements in food ordering techniques (Bhandge, Shinde, Ingale, Solanki & Totare, 2015). Nowadays web services technology is widely used to integrate heterogeneous systems and develop new applications. Here an application of integration of hotel management systems by web services technology is presented. Digital Hotel Management integrates lots of systems of hotel industry such as Ordering System Kitchen Order Ticket (KOT), Billing System, Customer Relationship Management system (CRM) together. This integration solution can add or expand hotel software system in any size of hotel chains environment. This system increases quality and speed of service. This system also increases attraction of place for large range of customers. Implementing this system gives a cost-efficient opportunity to give your customers a personalized service experience where they are in control choosing what they want, when they want it – from dining to ordering to payment and feedback (Bhargave, Jadhav, Joshi, Oke, & Lahane, 2013).

At today’s advanced technologies, the mobile phone is brilliant smarter usage product one. With the help of this smart gadget we can make our usages as smart as possible. Some products are commercially available in market which allows restaurant food ordering through internet, android applications, GSM, Bluetooth, RFID, and Wi-Fi wireless technologies.

Food ordering is a process of ordering food from a local restaurant or food cooperative through a web page or app. Much like ordering consumer goods online, many of these allow customers to keep accounts with them in order to make frequent ordering convenient. (Rajesh, Prabha & Rao, 2015). The rapid growth in communication technology emergence of wireless technology and android devices has created quite a stir in the business transactions. Business in the hospitality industry has been greatly influenced and competition has increased due to improved food ordering techniques. In earlier days, food ordering was a completely manual process where a waiter used to note down orders from the customers using pen and paper, take the orders to the kitchen, bring the food and make the bill. Although this system is simple it requires extensive investment in purchase and storage of paper, large manpower and also is prone to human errors and greater time consumption has created fairly a stimulation in the business transactions. Business in the hospitality industry has been greatly influenced and competition has increased due to improved food ordering techniques (Shinde, Thakare, Dhomme & Sarkar, 2014).

According to the work of Mayur & Piyush (2015) he proposed the low cost touch screen based Restaurant Management System using an android Smartphone or tablet as a solution against the conventional paper based and Personal Digital Assistant (PDA) based food ordering system. The system consists of a Smartphone/tablet at the customer table contains the android application with all the menu details. The customer tablet, kitchen display connects directly with each other through Wi-Fi. Orders made by the customers will be instantly reach the kitchen module. This wireless application is user-friendly, improves efficiency and accuracy for restaurants by saving time, reduces human errors and provides customer feedback. This system successfully overcomes the drawbacks in earlier automated food ordering systems and is less expensive as it requires a one-time investment for gadgets. Likewise, Patel et al. (2015) in his work, the system, implements wireless data access to servers. The android application on user’s mobile will have all the menu details. The order details from customer’s mobile are wirelessly updated in central database and subsequently sent to kitchen and cashier respectively. The restaurant owner can
manage the menu modifications easily. The wireless application on mobile devices provides a means of convenience, improving efficiency and accuracy for restaurants by saving time, reducing human errors.

III. METHODOLOGY

This paper was carried out using a Design Science (DS) approach. This approach was implemented in Omogbhemhe and Awojide (2017) as defined in the work of peers, Tuunanen, Gengler, Rossi, Hui, Virtanen, and Bragge (2006) as a good approach that provides a method of conducting research provide a model for the research. Hence the process of the design science approach was demonstrated in this paper with the following steps:

- Identification and definition of the Problem: This requires a good understanding of the problem to be solved.
- Devising the method of solution: this stage involved is spelling out the detailed algorithm
- Developing the method of solution: This is developing the solution to the problem in form of a model.
- Demonstration: Demonstrating how efficient will the model solve the problem
- Evaluation: Observing how good the model supports the solution to the problem.

Similarly, the tools employed in development of the front-end and the backend include; Java programming languages, Hypertext Markup Language (HTML), Cascading Style sheet (CSS), JavaScript, Servlet, Java Server page (JSP), Oracle database, NetBeans and Java Runtime Environment.

The Proposed System Model, Architecture and Flowchart

The proposed system developed in this paper is a web based system which has every features and information of the existing system to manage ordering and delivery activities in University restaurant. It has an interface that allows business promotion and menu which allow the customers to make order, view order and make changes before submitting their order. It will also allow them specify mode of payment. It also provide an interface that shows customers' orders to the kitchen staffs for processing and delivery. Also provided in this web based system, is the feature of authentication. This will enable only eligible and registered staff of the restaurant to have access to customer's order for food in the restaurant, so that wrong attention will not be given to the user or customer. The system is model into four layers. Customer Application Interface, Application Processing, Database and Staff Application Interface
Fig. 2 Architecture of the System
Fig. 3 Proposed System Flowchart
Design of Customer Database Schema

Table 1 below is used to store the information about a customer, like CUSTNAME, PHONE, ITEM_ORDERED, ORDER_DATE, etc. The diagram below shows the schema of the Customer table. From the table we can see the various fields and the type of data to be entered into them.

Table 1. Customer Information

<table>
<thead>
<tr>
<th>Object Type</th>
<th>Table</th>
<th>Object</th>
<th>CUSTOMER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table</td>
<td>Column</td>
<td>Data Type</td>
<td>Length</td>
</tr>
<tr>
<td>CUSTOMER</td>
<td>CUSTNAME</td>
<td>Varchar2</td>
<td>50</td>
</tr>
<tr>
<td>PHONE</td>
<td>PHONE</td>
<td>Varchar2</td>
<td>15</td>
</tr>
<tr>
<td>ITEM_ORDERED</td>
<td>ITEM_ORDERED</td>
<td>Varchar2</td>
<td>50</td>
</tr>
<tr>
<td>ORDER_DATE</td>
<td>ORDER_DATE</td>
<td>Date</td>
<td>7</td>
</tr>
<tr>
<td>QUANTITY</td>
<td>QUANTITY</td>
<td>Number</td>
<td>-</td>
</tr>
<tr>
<td>ATTENDED</td>
<td>ATTENDED</td>
<td>Varchar2</td>
<td>20</td>
</tr>
<tr>
<td>ADDRESS</td>
<td>ADDRESS</td>
<td>Varchar2</td>
<td>100</td>
</tr>
<tr>
<td>REMARKS</td>
<td>REMARKS</td>
<td>Varchar2</td>
<td>20</td>
</tr>
<tr>
<td>REQUESTDATE</td>
<td>REQUESTDATE</td>
<td>Date</td>
<td>7</td>
</tr>
<tr>
<td>REQUESTTIME</td>
<td>REQUESTTIME</td>
<td>Varchar2</td>
<td>20</td>
</tr>
<tr>
<td>ORDERID</td>
<td>ORDERID</td>
<td>Varchar2</td>
<td>20</td>
</tr>
</tbody>
</table>

Table 2 below is used to store the information about Food items. The fields include ITEM_CODE, ITEM_NAME, ITEM_QTY, UNIT_PRICE, ITEM_IMAGE etc. The diagram below shows the schema of the Food items table. From the table we can see the various fields and the type of data to be entered into them.
Table 2 Food items Information

<table>
<thead>
<tr>
<th>Table</th>
<th>Column</th>
<th>Data Type</th>
<th>Length</th>
<th>Precision</th>
<th>Scale</th>
<th>Primary Key</th>
<th>Nullable</th>
<th>Default</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>FOOD ITEMS</td>
<td>ITEM CODE</td>
<td>Varchar2</td>
<td>6</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>ITEM NAME</td>
<td>Varchar2</td>
<td>20</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>ITEM QTY</td>
<td>Number</td>
<td>-</td>
<td></td>
<td>-</td>
<td>-</td>
<td>✓</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>UNIT PRICE</td>
<td>Number</td>
<td>-</td>
<td></td>
<td>-</td>
<td>-</td>
<td>✓</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>DATE CREATED</td>
<td>Date</td>
<td>7</td>
<td></td>
<td>-</td>
<td>-</td>
<td>✓</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>DATE MODIFIED</td>
<td>Date</td>
<td>7</td>
<td></td>
<td>-</td>
<td>-</td>
<td>✓</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>ITEM IMAGE</td>
<td>Blob</td>
<td>4000</td>
<td></td>
<td>-</td>
<td>-</td>
<td>✓</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

The System Testing Samples

Fig. 4 Staff or Admin Login Page
Fig. 5 this allows customers to view and/or change food items ordered and also get notification via sms.

Fig. 6 this menu option allows users to view their orders.

IV. CONCLUSION

Major areas that has to do with automating Restaurants in the University environment were captured in this system. Therefore, deploying a system such as this will be very effective and efficient in improving the services of the university Restaurant for Staff and Students. However, this system can be improved upon in terms of scope and robustness. Thus, we present a digitalized food ordering system with features of feedback. This system is convenient, effective and easy thereby improving the performance of restaurant’s staff. It will also provide quality of service and customer satisfaction. Thus, the proposed system would attract customers and also adds to the efficiency of maintaining the restaurant’s ordering and billing sections.

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Foreign Direct Investment (Influx) from different nations and its impact on Economic Development in India: - A detailed study in Service sector and its contribution in overall economic development

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Abstract- In these research paper researchers examines emerging economic as well as implications on overall economic development and growth of Indian economic globalization. The paper focuses on the main motives of the Influx Foreign Direct Investment (IFDI) by the MNEs and its economic implications on the Indian economy. The originality of the study lies in its analysis of the overall investment pattern of MNEs companies and the nature of their global operations in a view to invest in India. Furthermore researchers explore the contribution of Service Sector that is one of highly demanded sectors towards economic development and growth of India through FDI in the current economic scenario in India.

Index Terms- FDI, Economic Development, LPG, Economy, Investment Flows

I. INTRODUCTION

India witnesses its economy rapidly growing since post LPG reforms. It has two sides. One has been saying that this market is excellent. The other part argues that the FDI is violating economic rules and transactions. It was said that the money coming from outside is not being properly accounted for. In current scenario Foreign Direct Investment (FDI) especially Influx FDI plays a crucial role in the development of any nation. It has become an important force of economic globalization over the last many years. The previous approximately three decades witnessed major internationalization of industries from developing economies in terms of their greater participation in global trade, increase in the share of FDI, and a rush forward in their outsider merger and acquisition activity. Investment in FDI from different countries is not a new notion but now days; there has been a remarkable increase in the degree of inflows (influx). The rapidly growing internationalization of companies from two fastest growing developing economies, China and India are matter of debate in every sphere of business world. We are focusing India’s FDI in current fiscal year. Apart from all economic developments and growth exports of various goods and services have been a major feature of the growth of the Indian economy over the last few decades. Influx FDI from MNEs has grown rapidly in recent years and industries from India are increasingly involved in overseas mergers and acquisitions.

II. LITERATURE REVIEW

Chakraborty Chandana and Basu Parantap, (2002), the author is reconnoitered through an organizational co- assimilation model with vector inaccuracy rectification mechanism, by a two-way relation between FDI and extensive rapport transpires between FDI and GDP, i.e. unit labor cost and import duty in over-all tax revenue. Park Jongsoo, (2004), the investigator scrutinized the movement of FDI in India through industrial bunch: with exceptional allusion to Hyundai Motors. The study recapitulates that the approach of Indian government towards foreign direct investment has displayed a radical reform after 1991. The fresh modifications of FEMA have been drawing the FII’s but the article also encapsulates that dualistic principal restraints to investment in India are establishment and displaying leap of transformations. The study recommends that the progress of India has improved through mutual projects and Green belt investments. Rajalakshmi K. and Ramachandran F., (2011), the writer has reflected the foreign investment flows (FDI) from side to side the auto segment with distinctive allusion to customer Pullmans. The examination approach applied for scrutiny contains the use of ARIMA, coefficient, linear and compound model. The epoch of study is from 1991 to 2011. This article is a realistic investigation of foreign direct investment (FDI) flow after post liberalization era. The authors have also scanned the tendency ad composition of foreign direct investment (FDI) flow and the consequence of foreign direct investment (FDI) on fiscal progress. The writer has also acknowledged the difficulties confronted by India in foreign direct investment (FDI) progression of motor segment through recommendations of strategy insinuations.

Khan A.Q. and Siddiqui Ahmad Taufeeq (2011) studied the influence of foreign direct investment (FDI) on Indian
Influx or outward can be done in the following ways; In India as per guidelines from existing government FDI whether

1. In order to participate in the management of concerned enterprise, shares of existing foreign venture can be acquired.

2. Existing enterprises and factories can be taken on depending upon regulatory framework of respective country where investment is proposed.

3. A new subsidiary with 100% ownership can be established in India.

4. It is possible to participate in a joint venture through shareholding in India in accordance with SEBI.

5. New foreign branches, offices and factories can be established in India as per FIPB earlier and now DIPP (Department of Industrial Policy and Promotion).

6. Existing foreign branches and factories can be expanded and modified in operations as per guidelines issued by Foreign Investment Promotion Board (FIPB), falls under the Department of Economic Affairs as of now but later on abolished by present government and will now be processed.

Objective of the Study
- To analyze FDI influx in Service Sectors in India in present economy

Sub Objectives
- To identify sector wise FDI influx in India
- To explore FDI in economic development of India

Research Methodology

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Size</td>
<td>Sectors :- Service sector( Financial &amp; Non-Financial)</td>
</tr>
<tr>
<td>Data Collection</td>
<td>FDI influx during 2007-8 to 2016-17</td>
</tr>
<tr>
<td>Research Design</td>
<td>Descriptive and Quantitative</td>
</tr>
<tr>
<td>Sources of Data</td>
<td>Secondary data collected from RBI, Money Control, World Bank etc.</td>
</tr>
<tr>
<td>Data analysis methodology</td>
<td>Data gathered and analyzed by researchers</td>
</tr>
</tbody>
</table>

Types of FDIs
1. **Green Field Investment (GFI)** - Under GFI, a new foreign company can be established in India.
2. **Portfolio Investment (PI)** - Under PI, shares of a foreign company are purchased or the foreign company owned by them is acquired.

In India as per guidelines from existing government FDI whether Influx or outward can be done in the following ways;

- Under PI, shares of a foreign company are purchased or the foreign company owned by them is acquired.
- Under GFI, a new foreign company can be established in India.
- New foreign branches, offices and factories can be established in India as per FIPB earlier and now DIPP (Department of Industrial Policy and Promotion).
- Existing foreign branches and factories can be expanded and modified in operations as per guidelines issued by Foreign Investment Promotion Board (FIPB), falls under the Department of Economic Affairs as of now but later on abolished by present government and will now be processed.
Economic Development in India through FDI (Influx)

FDI (Foreign direct investment) is one of major economic factors indicating the investment environment in the economy of India that facilitates the confidence level as well as motivation of investors in domestic and international levels. FDI Influx in India definitely enhances technological upgradation, increases competitiveness in the industry, increases capital stocks, strengthens infrastructure base and thus in this way the overall level of prosperity in the economy is reflected.

After the post LPG (Liberalization, Privatization, Globalization) of Indian economy in 1991, India not only attracted various economies of the world in various fields to foreign direct investment but also proven substantial growth and development too. With the continuing improvement process till now in 2018, in many sectors 100 per cent foreign direct investment has been permitted in the Indian economy.

In present course of time India has witnessed one of the most preferred destinations for foreign direct investment (FDI) across the world. Total foreign direct investment flows in India have increased nine fold in the past fifteen years. Foreign direct investment Influx as per DIPP in the financial year 2007 was US $ 24,575 Million, that got increased to US $ 36,541 Million in the year 2017-18 that resulted 48.69% growth.

Advantages of FDI
At Supportive -Investing levels
Foreign investment from different countries can fill the gap between the desired investment and the investment from local level.

Upgradation of Technology
It further demonstrates that by transferring machinery and equipment to developing countries with an objective of investment for long time, there is a technical mingling with foreign investment and thus enhances technology support of higher grade and quality.

Employment Generation
Also through FDI facilitates in generating employment in modern areas in developing countries such as India.

Benefits to traders and consumers
Traders and consumers in developing countries like India witnesses to get benefitted from foreign direct investment (FDI) through launching of new products range which they deprived for earlier with improved quality of goods at competitive prices.

Improve EXIM policies

Demonetization cyclic process and its effects FDI in Indian Economic Development

Through robust FDI policies and commitments towards trade respective countries can improve their trade both import and export of goods and services.

Disadvantages of FDI
Apart from many advantages there are few ignorable disadvantages too as mentioned.

Technology and knowledge transfer
The minor disadvantage of FDI is that due to technology and knowledge transfer foreign countries take undue advantages over technology of host country and undue to this upgraded technology and expertise knowledge trade is adversely affected done by traders in host countries.

Cultural Differences
Due to cultural mismatch and differences between traders there is sometimes cultural differences and thus lead to business failure with one another.

Huge Capital expenditure
Although there is debate whether capital expenditure is considered as disadvantage or not but in our point of view it is considered as disadvantage since huge commitment of funds of required for investing in foreign country and if requirement of funds is increased drastically due to some reasons then it can increase cost of investment and may lead to failure of project.

Foreign Exchange and Inflation Crisis
In FDI many a times it happens that due exchange rate risk involved between two countries can further delay the project or even cancel if not hedged within time frame. Also sometimes due to inflation occurred after investment or during the investment, cost of project is affected that further affect other confounding factors associated to Foreign Direct Investment.

Political Corruption
Some foreign ventures interested in FDI try to influence political parties in order to achieve their professional objectives and that too sometimes unfair and unethical trade practices.

There are as many as many examples that due to this political corruption many undeserving foreign ventures captured the projects and later on leading to gain enormously and unethically from their investment be exploiting human as well capital resources.

World Bank and IMF
Although, there is an argument about the fair role of World Bank and IMF, in Foreign Direct Investment, that there is major discrimination about their role to provide some financial assistance among developing and developed countries.
## Share of Top Investing Countries FDI Equity Inflows (Financial Years):

**Money Rupees in Crores (US$ in Millions)**

<table>
<thead>
<tr>
<th>Ranks</th>
<th>Country</th>
<th>2014-15 (April – March)</th>
<th>2015-16 (April – March)</th>
<th>2016-17 (April – March)</th>
<th>Cumulative Inflows (April, 00 – March, 17)</th>
<th>%age to total Inflows (in terms of US $)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mauritius</td>
<td>55,172 (9,030)</td>
<td>54,706 (8,355)</td>
<td>105,587 (15,728)</td>
<td>585,950 (111,638)</td>
<td>34%</td>
</tr>
<tr>
<td>2</td>
<td>Singapore</td>
<td>41,350 (6,742)</td>
<td>89,510 (13,692)</td>
<td>58,376 (8,711)</td>
<td>315,042 (54,590)</td>
<td>16 %</td>
</tr>
<tr>
<td>3</td>
<td>Japan</td>
<td>12,752 (2,084)</td>
<td>17,275 (2,614)</td>
<td>31,588 (4,709)</td>
<td>142,260 (25,675)</td>
<td>8%</td>
</tr>
<tr>
<td>4</td>
<td>UK</td>
<td>8,769 (1,447)</td>
<td>5,938 (898)</td>
<td>9,953 (1,483)</td>
<td>125,545 (24,591)</td>
<td>7%</td>
</tr>
<tr>
<td>5</td>
<td>Netherlands</td>
<td>20,960 (3,436)</td>
<td>17,275 (2,643)</td>
<td>22,633 (3,367)</td>
<td>117,167 (20,682)</td>
<td>6%</td>
</tr>
<tr>
<td>6</td>
<td>USA</td>
<td>11,150 (1,824)</td>
<td>27,695 (4,192)</td>
<td>15,957 (2,379)</td>
<td>110,532 (20,323)</td>
<td>6%</td>
</tr>
<tr>
<td>7</td>
<td>Germany</td>
<td>6,904 (1,125)</td>
<td>6,361 (986)</td>
<td>7,175 (1,069)</td>
<td>52,045 (9,698)</td>
<td>3%</td>
</tr>
<tr>
<td>8</td>
<td>Cyprus</td>
<td>3,634 (598)</td>
<td>3,317 (508)</td>
<td>4,050 (604)</td>
<td>46,731 (9,156)</td>
<td>3%</td>
</tr>
<tr>
<td>9</td>
<td>France</td>
<td>3,881 (635)</td>
<td>3,937 (598)</td>
<td>4,112 (614)</td>
<td>30,637 (5,725)</td>
<td>2%</td>
</tr>
<tr>
<td>10</td>
<td>UAE</td>
<td>2,251 (367)</td>
<td>6,528 (985)</td>
<td>4,539 (675)</td>
<td>26,187 (4,705)</td>
<td>1%</td>
</tr>
</tbody>
</table>
In the above mentioned data compiled from RBI it has been found that Mauritius, Singapore and Japan are the top three Foreign Direct Investors shown their confidence in investing in India in diversified sectors as shown.

<table>
<thead>
<tr>
<th>S. No</th>
<th>Year</th>
<th>FDI Influx in US Million</th>
<th>% Growth as compared to previous year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2007-08</td>
<td>34,843</td>
<td>(+) 53%</td>
</tr>
<tr>
<td>2</td>
<td>2008-09</td>
<td>41,873</td>
<td>(+) 20%</td>
</tr>
<tr>
<td>3</td>
<td>2009-10</td>
<td>37,745</td>
<td>(-) 10%</td>
</tr>
<tr>
<td>4</td>
<td>2010-11</td>
<td>34,847</td>
<td>(-) 08%</td>
</tr>
<tr>
<td>5</td>
<td>2011-12</td>
<td>46,556</td>
<td>(+) 34%</td>
</tr>
<tr>
<td>6</td>
<td>2012-13</td>
<td>34,298</td>
<td>(-) 26%</td>
</tr>
<tr>
<td>7</td>
<td>2013-14</td>
<td>36,046</td>
<td>(+) 5%</td>
</tr>
<tr>
<td>8</td>
<td>2014-15</td>
<td>45,148</td>
<td>(+) 25%</td>
</tr>
<tr>
<td>9</td>
<td>2015-16</td>
<td>55,559</td>
<td>(+) 23%</td>
</tr>
<tr>
<td>10</td>
<td>2016-17</td>
<td>60,082</td>
<td>(+) 8%</td>
</tr>
</tbody>
</table>

Collected and Compiled by Researchers

<table>
<thead>
<tr>
<th>Industries</th>
<th>FDI influx in USD Million</th>
<th>% Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>Services Sector*(Financial &amp; Non-Financial)</td>
<td>59,476.49</td>
<td>17.92</td>
</tr>
<tr>
<td>Computer Software &amp; Hardware</td>
<td>24,669.49</td>
<td>7.43</td>
</tr>
<tr>
<td>Infrastructure and construction-development projects</td>
<td>24,293.08</td>
<td>7.32</td>
</tr>
<tr>
<td>Telecommunications</td>
<td>23,946.04</td>
<td>7.21</td>
</tr>
<tr>
<td>Automobile Industry</td>
<td>16,673.91</td>
<td>5.02</td>
</tr>
</tbody>
</table>

Collected and Compiled by Researchers
In is clear from the above tables that FDI Influx got increased drastically during 2007-08 with growth of approximately 53% as compared to previous year as calculated. As per our study as we have analyzed data available from 2007-08 we researchers have observed that since 2007-08, FDI Influx got increased except few years 2008-09, 2010-11 and 2012-13 (Minimum growth found).

Also it has been found that during year 2016-17 FDI Influx (in USD) got increased but growth as compared to previous years got down i.e. merely 8%.

During our study we have also noticed that after demonetization (8 Nov; 2016) FDI Influx get affected neutrally or bit negatively during current fiscal year 2017-18 because of poor response from foreign ventures but analysts see it for only short term until Indian economy comes on track to improve economically and boosting confidence level of domestic as well foreign investors (FDI).

It is also evident from the above data that Services Sector, Computer Software & Hardware, infrastructure and construction-development projects, Telecommunications, Automobile Industry have been top five sectors of Foreign Direct Investors worldwide and their choice of preferences was found to be in Service sector followed by other sectors have been top contributor in the current Indian Economy. During our selected years of study, Indian service sector (specifically Banking and Insurance) has seen enormous growth and potential that bagged Indian financial market huge FDI Influx.

Researchers closely monitor data available in different sectors and then dare to defend their research by statistics clearly showing that in each year starting from 2007 to 2017, major FDI inflow recorded nearly 17.92 % in service sector (Financial and Non- Financial) , which is highest in all sectors.

<table>
<thead>
<tr>
<th>Observed values</th>
<th>% Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>59,476.49</td>
<td>17.92</td>
</tr>
<tr>
<td>24,669.49</td>
<td>7.43</td>
</tr>
<tr>
<td>24,293.08</td>
<td>7.32</td>
</tr>
<tr>
<td>23,946.04</td>
<td>7.21</td>
</tr>
<tr>
<td>16,673.91</td>
<td>5.02</td>
</tr>
</tbody>
</table>

By observing this table considering mean values at 5% level of significance we have found T value 2.8668 that is greater than 2.57 and P value is 0.018512 at p<0.05% in the prescribed table value ,therefore the result is found to significant on aforesaid data shown in the table.

III. CONCLUSION

During our writing of this research paper we have closely monitored reliable and genuine secondary sources of data. On the basis of our analysis we strongly recommend that for the economic development, growth and foreign revenue generation,
FDI influx plays significant role and all sectors need to contribute in an economy since merely domestic investment cannot play substantial role to witness development and growth in its economy.

Therefore like other developed economies India also focus on Foreign Direct Investment (FDI-Influx) should be distributed in all sectors strengthening its running economy but as we have observed in our analysis that service sector has been major contributor with approximately 18% towards Indian economy that sounds motivating and strengthening for overall growth and economic development.

We have also noticed during our analysis that several confounding factors such as demonetization and complex GST structure in Indian Economic System that could further reduce and demotivate foreign ventures towards investment in India as mentioned in demonetization cyclic process.

**Research Gap and Further Scope of Study:-**

After intense exploration and analysis of many research papers and articles in this area we still find that there is vast scope to explore other various aspects of FDI in Indian context as a whole and of course sector wise influx of FDI in India in current economic scenario.

Although there is other confounding factors that are affecting FDI influx such as post demonetization phase and GST(Goods and Service Tax) but in this paper not described in details but touched in brief due to limited time frame and primary objective of study in this paper.

However to bridge the gap of many researches in this area we researchers have to an extent filled the gap and due to some constraints found and faced during research leave some essential areas for further study and research in FDI.

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Impact of Data Analytics in Changing the Future of Business and Challenges Facing It

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Abstract - Data Analytics refers to a comprehensive approach that makes use of both Qualitative and Quantitative Information in order to draw valuable insights and arriving at conclusions based on the extensive usage of statistical tools accompanied by explanatory and predictive models running over the data. It tries to understand the behavior and dynamics of businesses thereby leading to improved productivity and enhancing business gains by helping with appropriate decision making. Considering the intensified disruption caused by recent revolution in the field of Data Analytics, this article aims to cover the potential impacts that Data Analytics could have on the already existing businesses and how new entrants, especially across the emerging economies, could make the best use of Data Analytics in gaining an edge over their competitors. It also aims to deep dive into the challenges faced by businesses while adopting or moving to Data Analytics and how they can overcome those challenging barriers for a successful future.

"We are generating more data than ever before- 90% of the data that we have today is generated in last 2 years alone. This data is coming from a variety of different sources such as voice, text, transaction, sensor, chat, images, videos etc. To handle this fast-moving, heterogeneous and multimodal data we need to get more entrenched in machine learning and deep learning to make real-time analytics driven decisions that will bring maximum value to the customers and companies alike" – Ratnakar Pandey (Head Analytics, Kabbage)

Index Terms - Impact of Data Analytics, Decision Making, Challenges Facing Data Analytics, Business, Predictive Modeling

I. INTRODUCTION

There’s been a strong buzz going across the world with regards to Analytics which has been there for more than a decade and it has certainly undergone major changes but still one thing remains stagnant and that is “Data Analytics is still the hottest technology space around industries helping businesses to thrive and stay ahead in competition”. Analytics has become an imperative part of Digital Technology transformation, thanks to the amount and diversified datasets that have skyrocketed in the last few years where the last 2 years or so accounts for more than 90% of the current data that is being processed by the Industries. To come up with the solutions for raising concerns in future, we have to deep dive back into the data and data science processing.

Data Analytics is often conceptualized as a concept used only by Technology driven industries which is not a correct, speak about any industry ranging from logistics and supply chain management, healthcare, fashion, online e-commerce websites or manufacturing industries you will find Data Analytics making its presence over there and helping them to make better decisions. Data has become such a vital and integral part of every organization that you need to analyze and run statistics over your data to gain valuable insights about your customer behavior and future market prospects. This is where Data Analytics comes into the picture and help the organizations or businesses to improve their productivity and enhance profitability by attaining future goals.

With the proper usage of Data Analytics, Data can be easily transformed into actionable knowledge and mitigating potential risk to the organization. Data and Analytics are already shaking up multiple industries and their effects will be more pronounced and be dominating once the full effect of data analytics is realized and is being adopted by the majority of the masses. Data Analytics comprises of an array of technology solutions that starts from Data Generation and its collection, moving towards data aggregation and then running data analysis by making use of technologies like Big Data, Machine learning, Statistical analysis tools etc. Analytics comprises of different horizons like Data Science, Big Data, and Data Analytics, but one must understand that with the growing demands these all three horizons are working together in collaboration with each other in driving significant insights of businesses.

Data Analytics is concerned with taking out insights from raw data and when the data become humongous in size of volumes that’s where Big data comes into action helping in data aggregation and usage of innovative forms of information processing to get detailed actionable knowledge, valuable insights, decision making, and process automation.
Figure 1: Data Analytics Process (Source: Author)

The above diagram aims to show how data analytics process works in brief which usually starts from Initial stage of data gathering from various sources, after which data is analysis by doing cleaning and modeling, then moved into the Visualization part where data is visualized using sophisticated tools like Tableau or QlikView, post which it available for publishing and end user consumption.

II. HOW IS DATA ANALYTICS IMPACTING THE DIFFERENT INDUSTRIES WORLDWIDE

"Analytics will define the difference between the losers and winners going forward," says Tim McGuire, a McKinsey director.

If you aren’t aware how advanced analytics is reshaping the future of businesses, it’s high time you should figure out how your business can reap the benefits of Data Analytics. Established traditional business models are now under attack and are totally disrupted by Digital Transformation. No longer can companies now succeed if they try to aim blindly at their potential customers. You need to take a deep dive into the powerful world of data to draw informative insights and to understand the changing dynamics and behavior of your customers. Speak about any industry and you will find data analytics penetrating its waves in there ranging from customer experience management industry to heavy manufacturing industries, big data, internet of things and digital transformation are taking a toll on the already existing traditional business models, increasing efficiency, providing better profitability and adding to the bottom line.

Over 90% of the Companies are highly considering advanced analytics and big data as a strategic priority and as much as 80% companies are said to believe that their industry will be completely affected and revolutionized with data analytics in the next 5 years or so. Recently Tencent holdings limited announced an investment of whooping $1.1 billion in Ola, one of the leading players in the rideshare market, that will help to establish its operations in data analytics and to get better insights about their customers. Companies embracing the full benefits of data analytics won’t just hold a competitive advantage over their peers but also help to transform their existing business models and industries by driving growth in new emerging sectors.

Businesses are strongly affected by leveraging the powerful benefits of Data Analytics. Here below are few insights across different industry verticals how data analytics is helping them to make appropriate decisions.

(i) Financial companies and Investment banking companies are making use of Predictive modeling to analyze their fund performances and do competitive analysis. Also using tools for performing dividend and interest recalculations.

(ii) HR Industry is seeing a huge reform with the introduction of HR Analytics and People Analytics. Making use of advanced analytics to hire the best-fit candidate and to screen potential candidates for desired profile. Using ex-post CV analysis to check for the effectiveness of HR policies and procedures.

(iii) Logistics and supply chain management industries are gaining huge benefits where data analytics has helped to cut down their costs and increase their profitability. Analyzing GPS/Satellite navigational data that tracks the movement of fleets of vehicles carrying supplies to gain more detailed insights at a deeper level than before, where the vehicles are going and what supplies they are carrying with so that fewer can travel shorter distances and save costs.

(iv) Large Telecom companies are also benefiting hugely by making extensive and effective use of data analytics to analyze the bill related frauds. Companies have been well able to keep a track of the fraudulent use of mobile handsets, unauthorized usage of accounts and SIM card cloning.

(v) Data Analytics is being employed to evaluate the impact of health and safety training on accidents in extractive industries and thus helping to save lives.
III. BIG DATA AND DATA ANALYTICS IMPACT ON BUSINESS MODELS

Digital transformation has already disrupted the traditional business models and the newer business models relying on big data and data analytics are getting improved and evolving with changes. Below are some valuable key insights on how it is transforming the Business models.

(i) Generating Valuable Business Insights – Big Data has the capability to segment the data and channelize the insights by extracting data from potential resources. e-commerce companies like Amazon and Alibaba are using data to their advantage by carefully analyzing the behavior of customers, their preferences, their habits and changing needs. With an appropriate amount of data, they are effectively using data analytics to gain better insights into their customers and hence improving overall profitability.

(ii) Improving Operational Business Processes – Data Analytics is offering organizations to make better operations decisions by aggregating data from different sources, applying time series and statistical analysis to gain deep insights into company’s weak areas and strength zones. Banking and Financial companies are making use of analytics to track fraudulent transactions. Platform analytics in manufacturing industries and power plants is helping in preventive maintenance by forecasting the possible downtimes and thereby ensuring a preventive measure beforehand.

(iii) Exponential Growth in the Amount of Data – With each passing year and increased usage of social media and internet connectivity, businesses across the globe will continue to generate humongous volumes of data. Soon businesses will be going to shift from traditional SQL data analysis to more sophisticated advanced models like Spark.

Overall Organizations would be making use of data analytics to improve the customer experience and build big data into their offerings. Companies will be gaining more market share and improved customer intelligence thereby helping them in streamlining their business operations.

Key Data Analytics Models Used By Businesses for Maximizing Efficiency and Profitability:

(i) Customer Segmentation Models – These models are being used by businesses to design marketing strategies and tactics based on the group behavior of customers like understanding their similar characteristics, identifying buying behaviors, uncovering new insights etc.

(ii) Predictive Risk Models – Highly used by Banking and Financial Services in order to identify and mitigate potential business risks resulting from fraudulent activities.

(iii) Quality Assurance Models – With the Implementation of Quality assurance models, risk towards defective materials in production and manufacturing industries could be highly mitigated. It enables organizations to track defects by making use of historical data, solve
problems in production units and avoid headaches while delivering solutions to esteemed business customers.

(iv) Predictive Maintenance Models – These models are acting as a key element in aligning or streamlining the business operations by utilizing time-series analysis in order to determine the future unpredictable breakdowns thereby helping organizations to calculate and improve maintenance planning which in turns will lower down the operational costs during critical downtimes.

(v) Sentiment Analysis Models – Also referred to as “Option-mining” models that try to analyze and determine sentiments towards an organization and its products and services by identifying, extracting and categorizing information available from the public information portals like social media, blog reviews, e-commerce website product reviews etc. By gaining insights into the positive and negative feedback or opinions businesses are acting rapidly in adopting new strategies to counter these negative opinions and enhance positivity towards their business products and service offerings.

IV. CHALLENGES FACING DATA ANALYTICS: HOW BUSINESSES CAN OVERCOME?

There’s no doubt that successful implementation of Data Analytics is helping companies and organizations towards a better, smarter and productive decision making and it is rightly said that without data analytics businesses may go blind and deaf if they don’t realize the potential benefits of utilizing Data Analytics. Despite the benefits and proven results are shown by Data Analytics, businesses are still finding lots of building blocks and challenges in front of them in the implementation of Data Analytics. The challenges are appearing in the form of issues with data storage, privacy, and cost of implementation, lack of necessary skills within the organization and much more. The challenges can be categorized across five major verticals as shown below.

(i) Data Challenges

The key to Data Analytics is the analysis of data where data is its foremost an integral component. We are growing so fast and with companies showing a rapid increase in expanding their businesses, they are producing lots of data. As per research stats, it is estimated that we are producing around 2.5 quintillion bytes of data every day and as we keep on progressing this figure is set to increment only. Therefore the first challenge that businesses face is in the form of data where data storage and its quality come from prime importance. Gathering data from various sources and storing massive quantities of unstructured data in its raw form poses a big threat for organizations where inconsistency could lead to data duplicates, inconsistency, logical conflicts and even data loss in worst scenarios. In simple terms, Data challenges refer to challenges ranging from data volume, variety, velocity, veracity, volatility, quality, discovery, and dogmatism.

(ii) Financial Challenges

Data Analytics comes with substantial benefits and profitability in longer run but initially, it is very important to look at the ROI factor while implementing Data Analytics. The cost of implementation of Data Analytics is very huge and a majority of the cost lies in the software expense i.e. while building an analytical database. For implementing data analytics solutions businesses need to have data storage facility, robust servers, network connectivity and monitoring tools. To implementing analytics solutions over 3TB of monthly data, companies need to spend roughly over $150,000 per month. Therefore getting analytical building solutions for new startups is a real challenge unless they have a strong funding source and that’s why many developing countries are lacking behind in Analytics.

(iii) Process Challenges

Process Challenges basically refers to the challenges faced during Data Acquisition and warehousing, Data mining and cleansing, its interpretation and analysis. It describes the issues faced like how to collect the data, what transformation needs to
be applied to the data, what model fits best over the data for driving results.

(iv) **Human Resource Challenges**

Lack of talent is another big challenge that Data Analytics industry is facing and according to a report from McKinsey Global institute it is highly anticipated that there will be a shortage of around 1.7 million capable big data professionals. The amount by which the analytics industry is growing, the more it is widening the skill set gap. Therefore outsourcing appropriate talent in the Data Analytics industry has become a major challenge for the organizations.

(v) **Management Challenges**

The last but not the least challenge is encountered is in the form of management which deals with the compliances, data governance, privacy issues, security, data ownership and running the entire business operations. With the increasing peer to peer competition and latest advancements in technology, it is up to the management to decide which technology works out best for them without introducing any potentials risks and problems.

As the challenges look quite big and are on the rise over the time, it is important to address them effectively and that too at the earliest because everyone knows how data analytics could turn up the fortunes of a company. Though the challenge of cost remains a major issue and that could be overcome only once the technology gets widespread across the globe with additional support from the governing bodies of that particular country. While speaking about the lack of talent, various online portals and additional courses are being impacted by all the major universities across the world enabling the new students and existing employees to enhance their skill sets in the field of business and data analytics. It is expected that with time the gap between the corporate demand and desired talent would come down.

V. **CONCLUSION**

The amount of data that is being generated these days has taken the world by storm and there are no signs slowing it down, come 2020 and it is expected that every individual across the world will be creating around 7 MBs of data every second. Big Data is going to open big opportunities for the businesses to act and respond to. With the fast changing world, rapidly revolving innovations and challenging business situations, organizations are searching for alternatives to expanding their revenues while cutting down on their existing expenses, that’s where the field of data analytics comes in handy. For data analytics, the future will be a long evolutionary process wherein businesses that will invest in analytics and show faith in the outcome from advanced analytics will slowly gain an advantage ahead in terms of outsized financial performance, subsuming those who remain tied to traditional intuition-based, middle-manager driven decision making processes. The race of advanced analytics has already begun in terms of the powerful ‘tech giants’ having shown the outsized benefits of investing in and driving decisions through advanced analytics. Organizations across the world are demanding much more from their data analytics solutions, requiring immediate data insights that could help them drive business decisions and explore new areas of growth. Hot technologies like Machine learning, Artificial Intelligence, Deep learning, Big Data and Natural language processing are working in collaboration with advanced analytics reshaping the current business models.

According to IDC analysts, “Total revenues from big data and business analytics will rise from $122 billion in 2015 to $187 billion in 2019.” And more developers will be in the line of joining the Big Data Revolution. Considering the statistical reports and high adoption rate of advanced data analytics by businesses, data analytics definitely holds a promising future. But that’s on only one side of the story, in order to reap the full potential benefits of data analytics, it is imperative that organizations sort out ways to tackle some of the key challenges ahead in front of them like Data Privacy, bridging the skill set gap, a high cost of implementation etc. Certainly, the benefits coming out from data analytics is definitely worth giving a try despite the challenges that the industry owns, which for sure will come down with time as analytics spread its presence worldwide.

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Application of Lotka-Volterra model to analyse Cloud behavior and optimise resource allocation on Cloud

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Abstract- Cloud is a complex distributed environment which has occupied the center stage in the modern-day service computing; allowing permissive resource provisioning with minimalistic conflict and enabling on-demand, pay-per-use benefits. Provisioning of resources in a dynamic environment, such that none are under-provisioned or over-provisioned is a primal challenge. The problem is analysed, and an optimal resource allocation strategy is formulated by the quantitative analysis of a biologically inspired model called Lotka-Volterra.

Index Terms- Lotka-Volterra model, Cloud computing, Optimisation, CloudSim

I. INTRODUCTION

Traditionally, in a client-server architecture, each server in a datacenter was capable of having one operating system in it, which was very viable to be overutilized even with a limited number of user requests. This dilemma is resolved by the introduction of the disruptive Cloud architecture. Cloud computing provides IaaS, by integrating multiple operating system instances on a single host (server). The end user has the impression that he is accessing an independent server, which is, in turn, a layer of abstraction over the physical server by the virtual machines. Each of the virtual machines has a software component and the relevant virtual hardware, allocated from the physical servers. Cloud computing enables concurrent access to a shared pool of computing resources, which can be rapidly provisioned and released with minimized managerial effort. On-demand leasing of computational resources, either by pay-per-use criteria or by subscription is one of the privileges of a cloud-subscriber. Cloud computing allows companies to avoid the lump sum upfront infrastructure costs. Furthermore, the operating costs per server are comparatively lower in larger farms than small datacenters. Cloud provides virtual machines which accept the user requests and allocates the available physical resources accordingly. Cloud service provider acts as a broker between user requests and the cloud. The major challenge that confronts these cloud service providers is the provisioning of cloud resources in a dynamic environment without compromising the quality of service within limited cost margins.

Several implementations of biological concepts have shown good results in the computational platform. This paper is intended to implement an optimisation model for the cloud so that no resources are under-provisioned or over-provisioned. When the demand for cloud resources is highly volatile, the chances of the resources being under-provisioned or over-provisioned is inflated. We use a biological model called Lotka-Volterra (Predator-Prey model) to control the cloud system for stabilising the optimal provisioning of resources. Lotka-Volterra is one of the application areas of Biology which portrays the correspondence of the population interdependence of a predator and prey species. Here, we have adopted a similar kind of interdependency in the cloud ecosystem, with the predators being the user requests and the prey being the limited cloud resources. The parameters of the Lotka-Volterra model is altered to optimise the resource allocation and control the system breakdown. Lotka-Volterra model also provides us with a mathematical property known as limit cycles which are described in contour portraits also known as phase portraits of the system. Limit cycle describes a qualitative limit for the stability of a system. A system whose parameters can be differed in such a way that the system grows out of balance. The difference acquired by the configuration is measured to tell the domain of stability. Aforementioned has direct application in understanding the performance of a web server with incoming requests. Limit cycle of a system with the rate of incoming requests can help us understand the bound of the system. Dynamic acquisition or release of resources have to be implemented on the cloud system for improved scalability and streamlined performance.

As the paper is based on the predator-prey interaction dynamically, agent technology concept is implemented, so that the volatile and heterogeneous demands of the users are controlled in a cloud-like environment. In an unpredictable, dynamic environment, computer systems called agents, are proficient in extensible autonomous behavior. Single-agent systems are difficult to control and maintain, hence comes multi-agent technology. Replicating user tasks on his behalf can be performed by the programs embedded in the multi-agent systems. The entire architecture is optimized by implementing the multi-agent system, in [4] by the author. In our proposed approach, some degree of autonomy is obliged to permit the elements to counter to dynamically shifting conditions. Our paper addresses the problem mentioned above and focused on solving the allocation problem using biological

II. RELATED WORK

Resource optimisation in the Cloud platform is one of the most significant challenges for a cloud provider. Numerous research groups have stated diverse solutions for it. On-demand cloud resource allocation plan is costlier than reservation plan.
The author architected an algorithm for optimal cloud resource provisioning in the paper [1], and he implemented stochastic programming model to overcome that problem. In the paper [2] and [3] agent technology is used to control dynamic environment like the cloud. In paper [5] the author has proposed two models for cloud resources allocation and management. Static model deals with the distribution of resources in advance. Dynamic model uses Predator-Prey dynamics to control the cloud environment abstractly. This paper illustrates the same with a simulation model called CloudSim.

III. OUR CONTRIBUTION

Cloud is a complex ecosystem where the allocation of any resource can happen sporadically. We use Predator-Prey dynamics to control the cloud environment. Implementation of the multi-agent technology is a nuclear part of the project. An agent is an autonomous program that performs specific tasks on behalf of a user. These agents can control the behaviour of the dynamic cloud environment. We have used CloudSim for simulating the client-server Cloud system. User requests and cloud resources were represented by Cloudlets and Virtual machines respectively.

1.1 Predator-Prey Model and Population Dynamics: The Classical Lotka Volterra

Lotka-Volterra is a biological model for the growth of two interdependent populations. The models deal with any two species of animals and check the interdependencies for survival. The interdependence might arise because one species serves as food for the other species. Consider an example of Rabbits (Prey) and Foxes (Predators). These are two interdependent species where Rabbits are the food source for Foxes. The population change through time according to the pair of equations

\[ \frac{dP}{dt} = \alpha P - \beta PQ \quad (1) \]
\[ \frac{dQ}{dt} = \delta PQ - \gamma Q \quad (2) \]

Where,
P is the number of Rabbits (Prey)
Q is the number of Foxes (Predators)
\( \alpha \) is natural reproduction rate of rabbits in the absence of predation
\( \beta \) is the death rate per encounter of rabbits due to predation
\( \gamma \) is natural death rate of foxes in the absence of food
\( \delta \) is reproducing rate of foxes

\( \frac{dP}{dt} \) and \( \frac{dQ}{dt} \) represent the growth rates of two populations over time

Predicting how would the model behave when the population is stable. When population is stable, \( \frac{dP}{dt} = \frac{dQ}{dt} = 0 \), \( \alpha - \beta Q = 0 \), \( \delta P - \gamma Q = 0 \) (3)

Equation (3) evaluates to a stationary point \((\gamma/\delta, \alpha/\beta)\). Plotting a phase-portrait for the above gives Fig1. Notice from Fig1 that all variations of population encircle around a stationary point.

Fig. 1. Phase Portrait

1.2 The modelling approach in CloudSim

CloudSim is a framework used for simulating and modelling cloud computing foundations and architectures. Recently Cloud computing emerged as leading technology for providing reliable, secure, sustainable and scalable computing services. These extensive ecosystems of the cloud environment, coupled with the growing market for energy-efficient computational technologies, necessitate appropriate, oscillatory, and controllable techniques for processing of algorithms, frameworks, and policies prior to the actual construction of the cloud products. Since the application of the actual testbeds limit the test experiments to the order of the testbed and makes the replication of results a complicated undertaking, substitutional approaches for testing and analysis leverage the development of innovative cloud technologies. An appropriate choice is the application of simulations tools, which presents the probability of assessing the condition before software development in an environment wherein the user can reproduce test cases. Here in this paper, we use CloudSim to simulate in two different ways and compare the experimental results.

CloudSim is a java based framework, equipped with abundant customisation features for replicating the cloud environment. The system simulates user requests as cloudlets, and they get executed in the virtual machines, allocated on the physical hosts in the datacenters. The commencement of the lifecycle of the simulation is by the creation of the datacenters, followed by the generation of brokers, virtual machines and cloudlets. Moreover, CloudSim has the attributes to configure hardware requirements like the amount of RAM needed in a particular VM.

The initial approach is to allocate all the resources statically at the beginning of a simulation. When the resources are allocated statically, it results in over/under utilisation and/or over/under provisioning of resources. Over-provisioning of resources occurs when the user requests gets surplus resources than the demanded ones. Under-provisioning of resources happens when the user requests are addressed with less number
of resources than the demand. Both over-provisioning and under-provisioning of resources do not result in optimised resource allocation.

The next approach is to add the resources on-demand dynamically. Adding resources dynamically into the system avoids over or under-provisioning of resources. Here the dynamic simulation model is compared with a biological model called Lotka-Volterra. The resources on CloudSim compared with Lotka-Volterra model as,
P is the number of Virtual Machines (Preys)
Q is the number of Cloudlets (Predators) where Cloudlet specifies the user request
α is birth rate of Virtual machines in the absence of predation by Cloudlets
β is death rate of Virtual machines due to predation
γ is natural death rate of Cloudlets in the absence of Virtual Machines
δ is reproducing rate of Cloudlets
The simulation model is used to compute the parameters of Lotka-Volterra model. These parameters are used to control the system.

IV. EXPERIMENTAL RESULTS

When the model is simulated with stable population of 1000 Cloudlets and 200 VMs, Fig.2 is obtained which shows the dynamic behavior of Cloudlets. The same model is simulated multiple times with 250, 500, 750 and 1000 Cloudlets keeping the VM count 200 and a phase plot is obtained as Fig3. It can be intuited from Fig.3 that the resources are over-utilized.

33.3 percent of its allocated vm.

Time stamp 1.5 This phase signifies the ratio of vm vs cloudlets as 30/80 i.e 0.375. This implies every cloudlets can consume 37.5 percent of its allocated vm.

Time stamp 2.0 This phase signifies the ratio of vm vs cloudlets as 10/10 i.e 1. this implies a single cloudlets is consuming the complete Vm resource.

The overall experimental result implies timestamp 0.0 is the phase of system dynamics as overload. Whereas time stamp 0.5, 1.0 and 1.5 are overall equilibrium state with average cloudlet allocation 3 per vm. The time stamp 2.0 is the phase of underloaded system. To maintain the equilibrium, at timestamp 0.0 the additional vm need to be released so that the ratio come around 0.3. At timestamp 2.0 phase every Vm is underloaded, so it is better to kill some vm so that the ratio reaches as 0.3 average.

The above result explains the simulation scenario of cloud allocation dynamics with a finite Vm and fixed cloudlets. The static model results explains that the relation of predator (Cloudlets ) and prey ( Vm ) maintain a typical relation of nonlinear form of \( y = x^{1/m} \) while m is a positive real number. This graph provides a clear idea to predict the number of Predator over a particular value of prey with correct estimation of m. This hint us how many number of Vm should be there is the system dynamics as per the needed load factor.

Dynamic simulation of Cloudlets and VMs following the Lotka-Volterra model results in the computation of parameters which can be used to control the entire system. The values of the parameters computed from the Cloudsim for one simulation with 1000 Cloudlets and 200 VMs, where 50 VMs are generated dynamically is

\[ \alpha = 0.005 \]
\[ \beta = 0.0001 \]
\[ \gamma = 0.04 \]
\[ \delta = 0.001 \]

Initial Number of Cloudlets, Q= 30 Initial Number of VMs, P = 150

The whole system can be controlled by varying this parameters. This indicates that complex distributed dynamic environment like Cloud follows lower order non-linear dynamics.
The above graph is the result of system dynamics for dynamic model. Comparing with Fig.2 which indicates the static model, the decision can be obtained. The output signifies that both of them follow almost same nature of predator prey ratio with typical three phase of overload, balanced load and under load.

Fig. 5 explain the relation of predator-prey for dynamic allocation of Vm. Again as a comparison with static scenario this can be concluded both the case is able to provide a hint of availability of Vm vs the existing cloutlets on a given point of time.

Fig.7 is a classical Lotka-Volterra model obtained by plotting mathematically using the parameter values computed from a simulation model. Comparing Fig.4 and Fig.7, it can be stated that complex distributed environment like Cloud follows lower order non-linear dynamics.

**Fig. 6. Average CPU Utilization**

From Fig.6 it can be intuited that; the over utilization of CPU is relatively decreased. This is because over-provisioning of VMs is reduced as VMs are added dynamically on-demand into the system.

The above picture highlights the CPU consumption by VM on static model as well as in dynamic model. The both the scenario implies the ratio of Vm to cloudlets maintain 0.33 ratio as an average apart from the scenario of under load and overload situation.

**Fig. 7. Classical Lotka-Volterra plot for parameters computed**

**V. CONCLUSION**

It can be intuited from the experimental results that, a dynamic environment like cloud follows lower dimensional chaos (Non-linear dynamics). The motive of the project was to bring about the cloud configurations under the different situation and model them using non-linear dynamics. The parameters were calculated at the boundary conditions using a java based simulation platform called CloudSim. The dynamic creation of cloudlets allowed us to vary the number of cloudlets and the resources of the cloud to create a system which was able to showcase all possible scenarios. Lotka- Volterra model suited as the best model to describe the cloud parameters with reasonable accuracy. A phase portrait is used to determine over-utilisation of resources, leading the whole system into instability. A phase portrait is repeatedly plotted by using the cloud data. When there is a sign of uncertainty in the system, more re- sources can be added to bring the system into an equilibrium state.
VI. FUTURE WORK

The idea projected is going to be tested under different traffic load on a separate cloud server. The project has been analysed under various conditions, in a simulation-based environment called CloudSim. The real intricacies of the parameters measured would show up only when the model is subjected to actual traffic on a cloud server optimisation-threshold. Agent technology can be employed to control the whole system. It keeps monitoring the entire system and can be used to control dips and rises in the number of resources. Other non-linear models such as Lorentz model would be tested for better stability. The model used has mostly been representative of the vast majority of non-linear models available. Other non-linear models might have a better accuracy at predicting the balance of the system.

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The Relationship Between Natural Resources and Sustainable Development

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Abstract- The sustainable development aims at raising the societies' standard of living by means of fulfilling the basic needs from the product the economic resources generated, particularly; the natural resources. These resources, by its nature; is limited and scarce and fall short in meeting all human needs at the same time, accordingly; the importance of optimal and fair use of natural resources in a way that satisfies the needs of the current generation, without affecting the needs of the generation to come. This could be achieved by good and rationalized planning in using natural resources to realize the sustainable development, taking into account the economic, environmental, and social dimensions. The most significant challenges the sustainable development encounters is the excessive exhaustion of using natural resources resultant out of lack of awareness in terms of scarcity of these resources and their importance in development. We recommend that the existing natural resources to be maintained, and other energy resources to be found and used during the exceptional circumstance. Further, the awareness related to the rationalized use of natural resources should be outspread.

I. INTRODUCTION

Sustainable development plans and programs has encountered many obstacles, the most significant of them are poverty, demographic growth, debit, besides; the tendency to involve in more industrialization as an attempt to achieve higher rate of economic growth on the grounds that take into consideration the environment, scarcity of natural resources, thus; government had to get the people aware and more careful to the importance of natural resources, environment and the relevant problems, in order to gain knowledge, skill, means, incentives, and commitment to work out -as individuals and groups- solutions for the instantaneous problems, to avoid new problems in future, as to meet the needs of the coming generations.

It is well known that whenever the national economy grows, the burden that the environment sustains increases; subsequently; the final attention of the argument over the environment is that we reached to some final limits, the global economy may noticeably grow as the impact on the global environment will be substantial, in a way the environment will be unable to make the main systems that support life available, the evident of that represents in what is happened to Ozone layer and the climate change. (Aon, 2011: 56).

The natural resources include the wildlife, land, forests, climate and underground minerals, water, and the available energy resources. These resources are the main element of production, besides; along with human resources and capital. So, the increase of the quantity of the natural resources available to a national economy will enhance the possibility of productivity causing the curve of production possibility to move, also, the type and quantity of the natural resources affect by the human behavior, for example; the fertilizers improve the soil productivity, make it easy to be planted by new trees, from the other hand, the overuse, bad management, and pollution can reduce the quality and quantity of natural resources, that is; the air pollution and acid rain may reduce the forests area (Quraishi, 2010: 346).

During 1970s of the last century, the agenda of the states and international organizations began to witness more attention paid to the sustainability. In 1972 UN Conference on Human Environment held in Stockholm, which led to formulate UN Environmental Program, followed by several international symposiums and conferences emphasize the significance of appropriation between the economic growth and sustainable development by means of showing more care to the economic resources, particularly; the natural ones.

Along with the awareness of the world to the importance of the sustainable development, and through the reality we live, does the relationship between the natural resources and sustainable development represent an integral relationship or negative inverseone?

Subsequently; the significance of this research lies in that it tackles with one of the most important issue in the 21st century, by means of studying and analyzing the relationship between the natural resources and sustainable development. The research focuses on the following topics:

- The concept of sustainable development, its characteristics and dimensions.
- The concept of natural resources and the divisions.
- The difficulties the sustainable development encounters in the underdeveloped countries.
- The relationship between the natural resources and sustainable development.
First: Definition of Sustainable Development, Its Characteristics, Requirements, and Dimensions

1. The Concept Of Sustainable Development
   it is by far an ambiguous concept, difficult to be defined precisely. It is noticed that this concept bears every meaning the thinkers seek to set forth in different issues.
   Along with increase of the attention this concept drawn, many economists attempted to set a definition or explanation to the sustainable development. Some of the definitions that tackled with the concept are as follows:
   - Sustainable development is a renewable and livable development, and friendly to the environment.
   - Is the type of development that satisfies the needs of the present generations, and in the same time, not compromising the ability of the generations to come in fulfilling their own needs.
   - It is an ongoing economic, social development without prejudice to the type of natural resources used in the human activities and the economic development relies on (AlobeidAhmed, 2008:11).
   - It is the development that provides the needs of the present, without badly affecting the generations in the future.
   - It is the reduction of destitution by means of providing a secure sustainable life, restricting the disappearance of natural resources, deterioration of environment and, and the cultural disadvantage and social instability.

Despite the difference in defining sustainable development, but its content is to rationalize the employment of the renewable resources in a way that not lead to their deterioration or decline the use of the generations to come. It guarantees the wisdom of using the non-renewable resources as not to deprive the coming generations to make use of them. Also, sustainable development requires consumption of non-renewable energy resources in a slow rate in order to secure a smooth gradual transition to use the renewable energy resources. Sustainable development defined by Trotland Board as: ... the development that fulfills the needs of the present time as the same way as to the generations to come.

There are two entirely different meaning could obtained from this definition:
   - The reservoir of the natural capital can be saved for the coming generations, in other sense, the exhaustion of the non-renewable resources should be ended in order to not experience a consumption in the natural capital. Using "policies"term, this means that all activities lead to consumption of the non-renewable resources should be stopped, such as mining, types of activities that caused the Ozone layer, and the activities that badly affect the coming generations such as the production of radiating wastes.
   - The total of natural and manufactured capital should not be cut down from generation to generation, i.e., an equation should be set between the industrial capital and natural one, as the exhaustion of the natural capital is justified so long as that there is an investment in the natural or industrial alternatives in a way that maintains the total reservoir. This means that oil reservoir may depleted so long as it is replaced by investment in other assets able to provide the coming generations with living alternatives, as same as those the oil provides for the present generations. This explanation has some problematic aspects, as there are some assets irreplaceable such as Ozone layer, and protection of waterfalls in the tropical forests. Nobody is confident that the coming generations can positively accept or explain a decision concerning the alternatives, i.e., how any of us knows for sure what the needs of the coming generations are.

The standard definition raises some important questions, as the needs are not fixed, but in an ongoing change as the time passing. Also, needs differ from one civilization to other one, thus, the development is not a means to satisfy needs, but means that requires the needs themselves to be developed, accordingly; how could needs be set independently from the development while the economic development process the developed countries launched creates and set the needs (Donato Romano, 2003: 56).

2. Requirements Of Sustainable Development
   - The purpose of consumption the natural resources and fortunes : limiting the natural resources and fortunes available in the present time, and assessing the resources that we should have in the future.
   - Supply the human needs along with rationalizing the consumption: identify the human needs in the area and specify their priorities, in the present time and in the future.
   - Care should be paid to human development in the society : a knowledge-based society should be built, and the information resources should be made available, innovation encouraged, and local potentials exploited.
   - Rationalized economic Development : by adopting economic programs based on knowledge.
   - Maintenance of the environment : by paying care to special/private and general/public environment, maintain it on basis of knowledge, as it is well known; the goodness of the public environment reflects on the special/private one.
   - Partnership in the internal and external relationships : by strengthening partnership and cooperation relationships in terms of exchanging information within the territory, and with the world, starting with areas of similar nature.

3. Characteristics Of Sustainable Development
   Sustainable development has many characteristics which can be described as follows:
   - It is a Long-term process : time is a major dimension, along with the quantitative and qualitative aspects.
   - It pays care to the rights of the coming generations in the natural resources.
   - It maximizes the fulfillment of the individual's basic needs.
   - It maintains the living space in the natural environment with all its contents.
   - The human aspect, and its development, comes as priority, especially, the poor people.
- It pays care to maintaining the diversity and peculiarity of the societies in terms of culture, religion and civilization.
- Relies on international coordination and integration in using resources, organization the relationship between poor and rich states.

4. The Basics And Constituents Of Sustainable Development

The sustainable development depends on achieving two main issues: the right in the development and the right in protecting the environment, both are basic human rights, the most significant basics among them are as follows:
- Human being is the first responsible of the globe.
- The natures, and its resources, are under the service of mankind by God.
- The technology, including the scientific knowledge, in investing the resources, solving problems and addressing the risks it encounters (Zweilikha, Rahmani, 32008:16).

5. The Dimensions Of Sustainable Development

The sustainable development has three main dimensions: the environment, society, and the economy. If these viewed as equal-sized overlapping circles, when the crossing area at the center represents the welfare of the individual, so whenever these circles get closer to each other, provided that they are complementary, the crossing area will be larger.

The idea of sustainable development has been widely accepted and endorsed, though, to be translated into goals, programs and practical policies turned be difficult. That is; the comprehensive sustainable development requires attuning the different economic, social and environmental policies, as sustainable development calls out to a future that takes into account the balance between environmental, economic, and social aspects when achieving the development and improving the quality of life.

The efforts that aim to build a sustainable pattern of life requires bringing about an integration between the procedures taken in three main aspects:
- The economic growth and equity. Requires the existing international economic systems, as correlated, an integral method to dispose a long-term responsible growth along with guaranteeing no country or society falls behind this procession.

- The Conservation Of Natural And Environmental Resources

In order to conserve the international environmental heritage and the natural resources for the coming generations, solutions, that are economically viable, should be figured out to restrict the consumption of the resources, pollution and maintenance of the natural resources.

Social Development

Human being needs labor, food, health care, water and drainage services. Along with providing such needs, the international community should guarantee also the respect of heritage fabric represented in the cultural, social diversity and respect of human rights, empowering every member of the society to play his own role in determining his future (Alhaithi, Almuhandi, 2008:14).

The traditional economic and environmental accesses are in need to integrate with each other in order to make any progress in conceptual formulation of the sustainable development as a necessary goal of the elaborated practical policy.

The concept of sustainable development refers to the development in which the needs of the current generations fulfilled without prejudice to the ability of securing the needs of the coming generations, and in order to treat the environmental deterioration there is a need to additional resources or to adjust the current practices (for instance, reducing the consumption), of the biodiversity due to dying out of species the therapy will be so late. It is important to note that the depletion of inexhaustible or non-renewable resources does not necessarily include sustainable development. In fact, within the market mechanism, the rise of scarcities should be represented in the relative rise of the prices, which, in return, encourages the maintenance and preservation of environment, and development of alternatives, furthermore, the technological progress that allows the products to be produced with lesser of production inputs, and increases the inventories of human and material capital. This enhances and supports the aims of the economic development for the coming generations.

II. Natural Resources: Concept, Constituents And Their Relationships To The Economic Growth

Natural resources is the possibilities, means, and gifts created by God to human being to be used in production of commodities and services, following rationalized policies in exploiting these resources. They differ, by their own nature, in type and abundance from place to place.

Natural resources include wildlife, land, forests, metals, water and energy resources available to the community, as well as climate, atmosphere. They are the first constituent of production along with the human element and capital. Therefore, increasing of natural resources available to an economy will enhance the ability of the production to that economy, leading to the transfer in the curve of the production abilities.

Gifts differ from the natural resources across countries, we can find a reservoir of metals, such as copper and iron, and a great reserves of oil, coal and natural gas in parts of the world. Tourist countries, for example, have bigger outlets to fishery and other sea resources, while equatorial forests located in Latin America, while tropical forest existing mainly in Africa. The inequality of gifts of natural resources provided a basis for the international trade. In fact, for some countries, exportation of natural resources was considered to be the leading sector of their economic growth.

Natural resources classified as follows:
- Renewable natural resources: these resources have inventories that can be re-produced by, for instance, appropriately use and manage the land, forests, and fisheries.
- Non-renewable or depleted natural resources: this type of resources have an exhausted inventories, at least, for any planning horizons in the foreseeable future, such as metals and oil reserves.

The quality and quantity of the natural resource affected by human behavior, for example, the fertilizers can improve oil
productivity to accept new trees, from the other hand, the overuse and bad management can reduce the quality and quantity of natural resources, as air pollution and acid rain badly affect the forests.

Natural and environmental resources contribute in human welfare in the broad sense, whether directly or indirectly through the services that environment and natural resources provide, such as:

1. Environment provides the raw materials and elements enter in the production process, including; the renewable and nonrenewable energy, metals, water, oxygen and genetic resources.

2. Environment and natural resources provide the appropriate living space, they give us the context that we live within its boundaries, as the type of life greatly affected by the characteristics of the surrounding realm. In this consideration; what surrounds us in everyday life in the most significant. The environment also provides the milieu the other species live in (fauna and flora), especially; the oil, water, and the nitrates necessary for the growth.

3. The environment provides the environmental system functions, particularly; the ability of metabolism. The human consumption of materials and commodities generate wastes in the air, water, and soil, and we need the environment to break up and deconstruct the bio-products of our activities. Sometimes, this process occurs very slowly, for example, the nuclear wastes degenerate in many centuries, in certain cases, they never degenerate, i.e., this is one of the environmental problems (Shualli, 2009: 33).

Production process needs raw materials and energy, in returns, it generates wastes which should be got rid of. every action and activity requires an energy, and the first law of thermodynamics states that energy cannot be generated of destroyed. So, the total raw materials and the energy used in the economic processes should be seen in the end of the day as wastes. Sometime; raw materials placed intentionally in certain locations, sometimes to remove these wastes carried out in a unplanned ways, but, eventually, everything demonstrated in the environment either way.

These wastes mostly are resources for environmental problems, as the environment these wastes put in it is the same environment required to supply the environmental services.

We directly consume the environment, as we breathe air, eat food, sail through water, trip amid the valleys and mountains, for example; mines and mining removing trees from a planted land, erect buildings all contribute in destroying the quality of the environment.

III. SUSTAINABLE DEVELOPMENT & ENVIRONMENT

- The efficient economic management to the natural resources is a key step towards achieving the sustainable development. Therefore, it is important to illustrate the role ecological economics plays in facilitating introducing of environmental considerations to the developmental decision-making. Traditionally; the evaluation of project by economically analyzing them, besides; the economic policies was developed to assist countries in efficiently employ the scarce resources, but the external abundances which arise mainly out of environmental consequences or inverse results, mostly neglected in the past. It is important to identify the social and environmental goals which are a part of the sustainable development, and to coordinate these concepts and make them a process within the economic framework.

- The condition of the environment today is considered to be one of the major concerns worldwide. Pollution is viewed as a dangerous threat in the manufacturing countries in which the quality of life measured basically according to the material production growth. The deterioration of the environment became a serious obstacle in front of the economic development and restriction of poverty and the underdeveloped countries.

- The relationship between human beings and environment passed through several stages, as from the primitive time where mankind lived a cooperate life coexisting with nature, up to the industrial era which witnessed a rapid and intensive growth in 20th century, as this negatively affect the natural resources in many ways. The first reaction towards such damages to the environment was an access to increase the cleaning activities. Recently; the human beings attitudes towards the environment included policies and projects designed not as reactions, but as planned policies to help reduce the damages on environment (Elaish, 2006: 28).

Within this context, the world today, exploring the concept of sustainable development, which is an access allows many ongoing improvement on the quality of current live to be created when using natural resources al lower level and less intensity.

The assets of the environment we seeks to conserve provide three main types of services to the human society, along with the resulting damages, should enter in the decision-making process.

First type : it is well known that the base of the natural resources provide basic raw materials and production elements or the inputs that support human activities.

Second type: the environment serves as a medium that absorbs and recycles (mostly at a low cost or with out cost) the wastes resulted from the economic activity. This function has drawn much attention in modern era, especially; when the medium that absorbs the wastes suffers more burdens than it can takes.

Third type: it became known, particularly; within the last two decades of 20th century, that environment provides other general services began from creating appropriate climate and place for our comfort and entertainment up to irreplaceable functions that support lifesuch as climatic stability or purify ultraviolet beam through Ozone layer. These function tend to negatively interact, for example, as when the medium that absorbs the wastes sustains more that it can afford, will reduce the supply of environmental production elements, as well as it will reduce the general functions that support life.

As sustainable development represented in realizing the balance between the economic growth, from one hand, and conserving the environment, from the other one, it raises a major challenge for decision makers in underdeveloped countries in particular, owning to ongoing pressures to improve the levels of
consumption and rise of population grow rate in these countries (Al-Amin, 2000:348).

IV. OBSTACLES OF SUSTAINABLE DEVELOPMENT

The world, especially; the underdeveloped countries, encounters many challenges that block the efforts of achieving sustainable development, such challenges and difficulties represented in:

1. Security and political instability, and absence of stability of economic and developmental policies.
2. Poverty problem that increasingly gets severe, along with unemployment, rise of foreign debts and its interests. Poverty problem makes societies disregard the importance of natural resources and sustainable development.
3. The irrational use of natural resources represents a great challenge encounters the world currently, as the world believes that protection and good management of natural resources and is universal objectives and basic requirements for the sustainable development.
4. The high and increasing population grow rates, the severity of migration from rural areas to cities, especially in the underdeveloped countries, poses an developmental economic problem, considering the wide gap between the limited resources and the increasing needs of the population.
5. Some technologies and experiences imported from the developed countries are not appropriate to the economic, social and developmental conditions in the underdeveloped countries, besides, the lack of the qualified experts to deal with such experiences. (Alobeid Ahmed, 2008:13).
6. The absence of the societal awareness toward the importance of the natural resources, and the rationality in use them. This led to widen the gap between the scarce natural resources and the increasing and various use of them.

V. NATURAL CAPITAL AND THE NATIONAL ACCOUNTS

Sustainability can be included as transforming the natural capital to a capital made of the national accounts. Gross national product (GNP) is defined as the total market value of final commodities and services produced by the certain economy within a specific period of time. Net national product (NNP) is the total national product minus the expenses of depreciation of the capital (DM) as a measurement appropriate for the resources available to consumption, this means:

(1) NNP = GNP – Dm ……………………
(2) GNP = C + S ……………………
(3) NNP = C + S – Dm ……………………

Since saving equals to, or exceeds the depreciation, consumption will be lesser than the net national product, which can infinitely continue.

Right after a measurement for the balance of the natural capital became available, the annual depletion (Dn) can be estimated and taken into consideration to reach the result of the amended net national product (ANNP), that means:

(4) ANNP = GNP – Dm – Dn = C + S – Dm – Dn
…………………

Also, in this case, the economic can be able to achieve an ongoing level of consumption if enough saving realized every year to cover the depreciation of the made or natural capital.

VI. PRICE POLICIES AND NATURAL RESOURCES

Governmental price policies for the scarce natural resources, particularly; the water resources, are the most important reasons behind the bad exploitation and depletion of these resources, despite the severe shortage of water sources, for example, in the most underdeveloped countries, the governments supply these water in low price than its real costs, leading to waste of using water, but the most serious is the ill exploitation of water in irrigating plants which leads to the increase of salinity, and, accordingly; reduction of soil productivity. This also applies to the other natural resources that used as raw materials in some industries, forests, for example; removed mostly at no cost to be used in producing coal and for other purposes.

Thus, there should a re-consideration to the price policies of the scarce economic resources, besides; the police of price support for some foodstuffs, especially those depend on using natural resources. That is under social and economic criteria aim at putting an end to the bad exploitation of these resources, on the one hand, and to achieve the social justice, on the other hand. (Al-Amin, 2000:362).

VII. THE RELATIONSHIP BETWEEN THE NATURAL RESOURCES AND SUSTAINABLE DEVELOPMENT

The relationship between natural resources and sustainable development is an integrative relationship and goes in one direction. It is the direction that begins by rationalizing the use of natural resources, which scarce and limited. This happens by taking into account the scarcity of these resources and the human needs which are multiple and varied. The balance between the needs of the current generation and the requirements of the generations to come should be observed. One of the policies to address the integral relationship between natural resources and sustainable development is to effectuate the green economy program.

- Green Economy As A Tool To Realize Sustainable Development

Green economy aims to enhance the correlation between economy, on the one hand, and the environment and sustainable development, on the other hand. This could be achieved by
The efficiency of using these resources, reduce the squandering in enhancing the ability of natural resources management, increase the sovereignty of every state on its natural resources.

The conference acknowledged that green economy will realize sustainable development. The green economy should play on sustainable development, whereas stated in its annual conference convened in Beirut in 2011, released a report entitled "Green Economy in Changing World", in which, underlined many remarks, such as: reduction of energy price support in Arab countries to 25% will free more than 100 billion US dollar during 3-year period of time. This amount of money can be used in funding to move to green energy resources, by means of preparing 50% of transport sector in view of energy and usage of public transport and hybrid vehicles, cash abundances will be generated with an amount of 23 billion dollar every year, and by spending 100 billion dollar to prepare 20% of the existing buildings within the coming ten years, it is expected that 4 million jobs to be created. By enhancing the effectiveness of the irrigation systems and rationalizing the use of water, increase the treated drainage water to be re-used from 20% to 100% the cost of environmental deterioration which amounts to 95 billion dollar annually will be reduced. Despite there are some successful experiences and attempts in some Arab countries in green economy activities, but the total contribution of Arab countries in the systems of the green economy still poor.

The report indicated that more than 55 million person in Arab World lives in lack of health services, clean water, besides; the exhaustion of portable water, which already inconsiderable in the Arab states, who came last in the efficiency of using natural resources such as fresh water and energy resources.

The Land Summit conference, held in The Land Summit conference, held in Rue De Janeiro in 2012, emphasized the significance of the role that green economy plays on sustainable development, whereas stated in its closing declaration: the green economy, in the context of sustainable development, is an substantial tool available to realizing sustainable development. The green economy should contribute in eradicating poverty, and achieving a steady economic growth, and create new jobs. The closing statement said, also: the green economy policies should be complied with international law, further, these policies must respect the national sovereignty of every state on its natural resources.

The conference acknowledged that green economy will enhance the ability of natural resources management, increase the efficiency of using these resources, reduce the squandering in consequence of restricting the pollution and negative effects on the environment. With a view to build a model of an adequate green economy, there is no alternative other than turning to the new and renewable energy resources such as sun, water, wind, and underground heat, besides reducing the use of the traditional energy resources, rationalizing the use of, and recycling, water, treating poisonous wastes, increasing the organic agriculture, and restricting the effects of desertification, and draught.

Germany is a major pioneer in the area of green economy, that is; it made the products and services of the green economy its exporting priorities, which include the equipment relevant to the new and renewable energy resources, moreover, Germany has abandoned its nuclear alternative in producing electrical power by 2022. This makes Germany a pioneer in field of natural resources and sustainable development.

VIII. Results & Recommendations

Results:

1. There are different point of views on the concept of sustainable development, but; there is an agreement that it denotes the type of development that takes into consideration the needs of the current generation without prejudice to the need of the coming generations by rationalizing the exploitation of the available economic resources.

2. Natural resources are the gifts God gave to the mankind. There are exist in the nature disproportionately out of man's control, depending on this disproportionate, the costs of production and prices also are disproportionate in every country, thus, the international trade rise.

3. Green economy aims at improve man's live and achieve the social justice, restrict environmental risks, stop exhaustion of natural resources in order to guarantee the rights of the coming generations. The green economy adopts the green energy generated from the renewable resources of energy, and create green job, green production which includes organic agriculture, organic products, green stores, protect from the environmental pollution, reduce the global warms.

4. The governmental price policies of scarce natural resources, especially water, is considered the major reasons behind bad exploitation overuse of these resources.

5. The concept of sustainability could be understand as a process of transforming the natural capital into made capital in the national accounts.

6. The most significant challenges the sustainable development encounters is the over-exhaustion of using natural resources, as result of lack of awareness to the scarcity of these resources and their importance to the development, in addition to the poverty and pollution underdeveloped countries suffers.

Recommendations:

1. Preservation the natural resources by means of rationalized usage.

2. Finding alternative resources for energy, especially; as natural gas is less pollutant than other resources of
energy, further; Wind and solar energy to be used to generate electrical power.

3. In order to build a model of an effective green economy, there is no choice but to turn toward new and renewable energy resources such as sun, wind, water and underground heat, and necessarily, reduce the use of traditional energy resources, rationalize the use of water and recycle and treat the poisonous wastes, and to increase organic agriculture, restrict desertification and the shrinkage of the cultivated land. This requires a technological capacities to be built in the area of the green economy in Arab countries, know-how to be exchanged between them, and to make use from the expertise of the developed countries.

4. There is should an awareness to the seriousness of irrationalized use of natural resources and to their relative scarcity, in order to make sustainable development a goal of every member of the society.

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Online purchase intention: Purchase orientations and expected benefits

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Abstract-The aim of this article is to highlight the role of online purchase orientations and expected benefits of online purchasing in explaining the online purchase intention by taking into account a pivotal factor of the consumer’s behavior, which is the perceived risk. Given that the choice of the Internet as purchasing channel is explained not only by the perceived advantages. A purely theoretical research allows us to present a conceptual model including the antecedents of the intention of online purchasing.

Index Terms- Purchase orientations, expected benefits, online purchase intention, attitude and the perceived risk

I. INTRODUCTION

Today the act of shopping goes beyond the simple purchase function, indeed the frequentation of the commercial space is not only for shopping but also to live emotional and sensual moments strong. Purchasing consumer behavior differs depending on the consumer’s buying directions, ie the purchase motive and the benefits of the purchase, which influences the choice of channel (Swaminathan et al., 1999 Girard et al., 2003). These purchase orientations can be utilitarian, hedonic or social. So the arbitration between the point of sale and the Internet will be made according to what each channel can bring to the consumer.

While consumers recognize many advantages to online shopping, the choice of the Internet as a place to shop remains dependent not only on the expected benefits, but also on online purchase orientations on the one hand and on the other hand perceived risk because it is considered as the pivot of the consumer's behavior and makes it possible to understand the reasons for arbitration between a particular distribution channel (Cox and Rich, 1964). In the area of e-commerce, consumers select their buying channel by comparing the benefits and risks associated with it (Forsythe et al., 2006, Soopramanien and Robertson, 2007).

So our research aims to study the role of online purchase orientations in explaining online purchase intention. The first step is to determine the effect of online purchase orientations on the intention to buy online. Then study the effect of perceived benefits and perceived risk on purchase intention by taking into consideration the attitude towards online shopping.
II. CONCEPTUAL FRAME

1. Purchase orientations

The concept of purchase orientation first appeared in 1954 by Stone, through his purely sociological study, on the understanding of the social relations linking the residents of an urban community through their frequentation of the stores. Stone’s research then constitutes one of the founding references in this field, through which the author has identified four purchase orientations: the search for low prices, the different facets of practicality, the saving of time and the purchase lived as a constraint that we try to avoid (the "apathetic" buyer). It has been the subject of several occasions that have resulted in a number of definitions. Among which we can name Gehrt and Carter (1992) who define purchase orientation as a "general predisposition towards shopping activity".

In a French context, Filser (2001) indicates that the concept of purchase orientations makes it possible to characterize the attitude towards the act of purchase in general, regardless of the category of product considered.

Initially, the purchase orientations serve as a means of segmenting consumers in relation to their purchasing habits and trends and to explain the reasons for choosing a specific purchasing method. In this way, purchase orientations can explain the reasons behind the change of buying environment (retail stores, catalog purchases, supermarkets, Internet, etc.). The work of Darden and Reynolds (1971) in the American context, or those of Jallais (1974) in France, demonstrated the ability of purchase orientations to explain the behavior of frequenting different forms of sales. In other words, purchase orientations could explain the choice of buying online (Girard, Korgaonkar and Silverblatt, 2003).

In the literature, the purchase orientations have been approached in terms of the cognitive and affective characteristics of the consumer (Tauber, 1972; Westbrook et Black, 1985) which refer to the motivations (needs) of consumers and their expectations of the point of sale, and in terms of consumer typologies (Darden and Reynolds, 1971) that refer to a segmentation of buyers based on shopping motivations.

The works of Tauber (1972) constitutes an undeniable contribution to highlight that shopping can be experienced as a form of entertainment, they put forward another facet of shopping. These are social and / or personal motivations through an analysis of the speeches of about thirty women and men on their shopping activities.

Since the work of Tauber (1972), it is emphasized that purchase orientations can be of a psychological as well as a hedonic or sociological order. Dans le cadre de cette recherche, nous nous intéresserons aux orientations d’achat en ligne.

2. Online purchase orientations

In order to better understand what directs customers in their online shopping choice, we propose to study the purchase orientation as it allows the individual to arbitrate between the purchase on the Internet and any other distribution form and thus could explain the purchase or not on the Internet (Swaminathan, White and Rao, 1999). In the same sense some authors approach shopping as the "dark side of buying" (Fisher and Arnold, 1990).

2.1. The utilitarian dimension of online shopping
The utilitarian dimension refers to shopping with a purpose of buying, then the purchase is apprehended as a mission to accomplish that could be sometimes stressful. In this case the purchase is considered as a chore.

This utilitarian value reflects an individual’s desire to act as efficiently as possible by maximizing its utility. It is the consequence of reasoned and directed actions towards the realization of a task (Hartman and Samra, 2008). In other words, it gives importance to material attributes and appeals to the rationality and objectivity of the consumer. So the user will tend to plan his purchase while maximizing his effort, his time and his expenses (looking for the best combination price / quality).

2.2. The hedonic dimension of online shopping

Consumers buy online for utilitarian but also experiential or hedonistic reasons, guided by the search for pleasure.

The hedonic dimension corresponds to the subjective and personal aspect of the shopping experience including pleasure, fascination and escape (Holbrook and Hirschman, 1982, Dholakia and Uusitalo, 2002). It represents the playful side of shopping.

In other words, the purchase is an accessory and the consumer focuses on the intangible attributes of consumption. So shopping is perceived as an end in itself or as a pleasant activity that can be considered as a form of relaxation.

Through the “flow” concept advanced by Hoffman and Novak (1996), which refers to a particular case of total immersion or optimal experience (Fornerino, Helme-Guizon and Gotteland, 2006.), online shopping can be viewed as a source of hedonic rewards through immersion in the online experiential environment.

2.3. The social dimension of online shopping

Social value is the social aspect of the shopping experience, including social interactions, esteem and status. According to Tauber (1972) social interaction and communication with others can be motivations for shopping.

The Internet represents a virtual hypermedia environment that presents an "interactivity-person", which offers the user the opportunity to interact on an interactive basis with other users (Hoffman and Novak 1996). In addition to this, the growth of e-commerce and the development of the social web have given rise to a new form of online market called "social e-commerce".

According to Huang and Benyoucef (2013), social e-commerce is defined as "a commercial application on the Internet, based on social media and Web 2.0 technologies based on social interaction and content generated by Internet users to help consumers make decisions and acquire products and services in online markets and communities.". The goal of social e-commerce is to develop more social and interactive approaches that allow customers to express themselves and share their information with other customers as well as with businesses (Parise and Guinan, 2008).

The Internet contributes to the satisfaction of cognitive or hedonic needs but also to the satisfaction of social needs through the participation of Internet users in different virtual communities.
3. Link between online purchase orientations and online purchase intention

Works interested in the relationship between purchase orientations and purchase intention online are recent and rare (Girard, Korgaonkar and Silverblatt, 2003), however, the literature suggests that purchase orientations influence significantly the purchasing preferences of consumer (Girard et al., 2003, Levin et al., 2005, Shergill et al., Chen, 2005). Is it possible to say that purchase orientations are a determinant of the purchase mode, in other words they constitute a means of arbitrage between the purchase on the Internet and any other form of distribution and could explain the purchase or not on the Internet (Swaminathan, White and Rao, 1999).

In the context of online shopping, different features are more important for Internet users than for traditional consumers who do not buy online. Which joins the idea of a number of authors who assume that online consumers are more convenience-oriented, more innovative, variety applicants, less brand conscious and significantly involved in research information (Donthu and Garcia, 1999), Pan and Zinkhan, 2005, Zhou et al., 2007). Other research has shown that consumers who like to shop are unlikely to shop online due to pleasure from shopping made at the store in comparison to apathetic consumers who do not like shopping are more prone to shopping online. Thus the work of Pui et al. (2007) have shown that utilitarian orientation has a greater influence on online purchase intention than hedonic orientation, even though search for adventure is among the hedonic motives for online shopping. In the same vain, Sarkar’s (2011) work has shown that consumers with high hedonic purchase values tend to avoid online shopping because they cannot touch the product or interact with sellers directly. The direct interaction with the product or the seller is a stimulus in the creation of hedonic excitation. Sum of all, buying online is largely driven by utilitarian and non-hedonic dimensions.

In terms of social value, online shopping is generally viewed as a way to avoid contact with store sales personnel (Nicholson et al., 2002). However, the virtual community is a new platform of sociality where Internet users can share and update informations and experiences with others buying (Wolfinbarger and Gilly, 2001). Currently virtual communities influence assessments, aspirations, the shopping process, or the behavior of individuals through social interactions (Pentina, 2008).

4. The expected benefits of online purchase

The choice of online purchasing is strongly conditioned by the perception and evaluation of the environment. Its consequences are the benefits that the consumer can draw from his online purchase. In other words, the majority of studies that have studied the impact of purchasing orientations on the intention to buy online stop at the functional character of online shopping (Forsythe, Liu, Shannon, Gardner, 2006). Indeed, convenience, saving time and effort, financial gain, the ability to buy at home and self-control are the expected benefits most frequently mentioned when using this mode of purchase. However other benefits, such as the abundance of information, lack of pressure, expert references, access to the opinion of other people are cited. In addition to these benefits, online purchase offers the advantage of presenting a wide range of available options (de Ruyter et al., 2001, Kim and Kim, 2004).

The work of Cases and Fournier (2003) reveals the high utility value associated with an online purchase and the benefits associated with a purchase on the Internet are rather functional (convenience, time saving …). Nevertheless, it should not be neglect that the Internet can also provide hedonic benefits to its user (Powell, 2007). An analysis of utilitarian and hedonic motivations for online shopping behavior by Childers et al. (2001) found that both types of motivation are predictive factors.
of equal importance regarding attitudes towards the web. More specifically, they have demonstrated that the immersive character caused by the pleasure, the perceived usefulness of technology and the ease of use of a site have a positive influence on the attitude of shopping on the Internet.

In the same vein, Wolfinbarger and Gilly (2001) proposed a typology of the benefits associated with online purchases for consumers, depending on whether their motivation for visiting the site: was either buying a specific product, the search for experience in a field that arouses the interest of the buyer. This research has shown that the customer who engages in the search for a specific product values on the Net the impression of control of the situation and freedom that it feels there. If the goal is the search for experience, pleasure is the main gratification that the Net provides to the buyer.

In light of these studies, it appears that shopping on the Internet can provide both utilitarian and hedonic benefits, however consumers with strong hedonic values will tend to advocate the traditional environment. While consumers with a strong utilitarian orientation, will find an experience that corresponding to their values in the purchase over the Internet.

5. The perceived risk

Perceived risk to the Internet can be a potential brake or source of resistance to innovation for the uninitiated (Ram, 1987). According to Cunningham (1967), the perceived risk is presented as a construct that combines multiplicatively (Bettman, 1973), an uncertainty component (subjective probability of occurrence) and a potential loss component (amount involved).

This concept strongly conditions online purchase intentions, via the online shopping attitude (Van der Heijden, Verhagen and Creemers, 2003). The authors Frini and Limayem (2000) in their comparative study of buyers and no-buyers raised several variables such as the lack of security for online payment and the fear of no-respect of the confidentiality of personal information.

6. The conceptual model and research hypotheses

The set of theoretical observations allowed us to build our conceptual model (see Figure 1). We consider that online shopping intention to be a complex behavior determined by online buying motives, purchase orientations, perceived risk and the individual’s attitude towards online shopping.
6.1. Online purchase intention

As part of this research, the online purchase intention is the variable to explain. According to Triandis (1980), intentions represent the instructions that the individual gives himself to behave in a certain way. Heijdein et al. (2001) define the online purchase intention by the threshold at which the consumer is inclined to buy a product or service from a specific website.

6.2. Perceived risk

Perceived risk is one of the main obstacles put forward in the literature to explain the reluctance of consumers to engage in Internet shopping. According to Cases (2007), perceived risk is considered a key variable in the distance purchase decision. Yurcik and al. (2002) state that the fear of unsecured transactions is the biggest inhibitor of Internet buying. In the same vein, Lee and al. (2001) consider that the perceived risk related to the context of online shopping has a significant negative impact on the online purchase intention. Thus, we make the following hypothesis:

H3: The level of perceived risk of buying on the Internet has a negative impact on the online purchase intention

6.3. The attitude towards online purchase

Attitude is defined as the positive or negative evaluation of behavior (Ajzen and Fishbein 1980, Davis 1989). Behavioral theories have all proposed attitude as a determinant of intentions and agree that the consumer’s attitude is not directly correlated with his behavior, but rather with his intention.

In this research, we assume that a positive attitude towards buying on the Internet influences positively the consumer’s intention to use the Internet to shop. Thus, we state the following hypothesis:

H2: The individual’s attitude towards online purchase influences the online purchase intention

6.4. Online purchase orientations

Wolfinbarger and Gilly (2001) argue that buying on the Internet is not necessarily perceived as shopping in itself, but simply as “making a purchase”. In the same vein, many studies support the idea that customers with a high utility orientation tend to buy online and perceive more profits in online shopping (Girard., Korgaonkar and Silverblatt, 2003; Mathwick., Malhotra and Rigdon 2001, Rohm and Swamiathan 2004). On the other hand, consumers with a hedonic orientation are likely to avoid online purchase and perceive less the benefits of online purchase (Sarkar, 2011).

Some authors (Wolfinbarger and Gilly 2001, Pentina 2008) agree on the role that virtual communities can play through the sharing of information, content and experiences on the one hand and on the other hand by the influence of aspirations and behavior of individuals through social interactions;

We can advance the following hypotheses:

H4a: The utilitarian orientation of shopping influences positively the online purchase intention
H4b: The hedonic orientation of shopping influences negatively the online purchase intention

H4c: The Social orientation influences positively the online purchase intention

6.5. The expected benefits of online purchase

The choice of the Internet as a mode of purchase is conditioned by the benefit that the consumer can derive from it. Indeed the main benefits of online shopping raised by consumers are the saving of time, money and effort and convenience (Forsythe, Liu, Shannon, Gardner, 2006). Indeed the results of the work of Wolfinbarger and Gilly (2001) demonstrate that the expected benefits of online shopping could be both utilitarian and hedonic depending on the purpose.

We can advance the following hypothesis

H5: The expected benefits of online purchase influence online purchase intention

This assumption concerns both utilitarian and hedonic benefits.

III. CONCLUSION AND FUTURE PATHWAYS OF RESEARCH

The purpose of this article is to attempt to present a theoretical framework to identify the impact of online purchase orientations and the expected benefits of online purchasing on the online purchase intention by taking into consideration the role of perceived risk, which is one of the potential factors that hinder the adoption of this mode of purchase by consumers.

This research allows for very interesting managerial implications. It allows managers to know in which measures the purchase orientations influence the intention thus allowing the professional to play on the purchase orientations supposedly neglected in the virtual domain namely the hedonic and social dimensions that are less present in the virtual world. This would help them adjust their marketing strategies in order to attract the maximum number of potential consumers or develop in this new niche.

This one is at its beginning, it allows many future ways of research. This model can be tested empirically or it can be enriched by other variables characterizing the Moroccan consumer in order to adapt it to the Moroccan context and this through an exploratory study.

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Well Being, Fairness, and Supervisor’s Ability and Support

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Abstract- Abstract
To maximize work outcomes and increase the opportunity for organizations to achieve their goals in today’s society, organizations must prioritize their employees’ well-being. Research suggests that several factors can impact employees including: affective well-being, employee perception of fairness, perception of supervisors’ skills and Family Supportive Supervisor Behaviors (FSSB). To investigate the relationship between employees' affective well-being, their perceptions of fairness, their perceived ability and FSSB, a study was conducted using a total of 395 participants, who were selected using convenience sampling. Participants completed a survey by answering three questionnaires, which measured the constructs, and the pertinent demographics. The instruments used were the Job-related Affective Well-being Scale (JAWS), the Equity/Fairness subscale from the International Personality Item Pool, the Ability subscale, and the Creative work-family management subscale from the Handbook of Management Scales, respectively. Results of this study found a moderate positive correlation between employees’ affective well-being and the following variables: perception of fairness ($r = 0.301, p = 0.000$), perceived supervisor’s ability ($r = 0.401, p = 0.000$), and FSSB ($r = 0.377, p = 0.000$), as well as between employees’ perception of fairness and managerial skills of their supervisors ($r = 0.347, p = 0.000$). Findings confirmed hypotheses and the relationship among variables. The study’s findings have implications for managers’ performance and for HR practices.

Index term: affective well-being, perception of fairness, supervisor ability, family supportive supervisor behavior

I. INTRODUCTION
Job-related affective well-being is attached to the individual’s health and constitutes the core aspect of subjective well-being because individuals spend nearly of one-third of their waking time at work (Conrad, 1988). Previous research identified that in occupational settings, affective well-being of employees is related to the individuals’ emotions about work, as well as their perceptions of justice about procedures used by supervisors (Sparr & Sonnetag, 2008). The role of fairness perception in the workplace and its impact on work outcomes and employee's behaviors is included among the most frequently researched topics in industrial and organizational psychology, human resource management, and organizational behavior over the last decade (Copranzano & Ambrose, 2015). Different studies have been gathering evidence of how employees’ perception of their supervisor’s ability and supportive behaviors have major influences on employee behaviors and work outcomes, including their motivation, satisfaction, performance, dedication, and trust. Supervisor’s ability to communicate has been linked to employees’ satisfaction with their supervisors (Berman & Hellweg, 1989). The purpose of this study is to analyze these constructs and explore the relationship between employees’ affective well-being, their perception of fairness, and the supervisor’s ability and family support behaviors in the workplace.

II. LITERATURE REVIEW
1.1. Well-Being
In last decade, interest in employees’ well-being has increased. Well-being can have different meanings and definitions (Danna & Griffin, 1999). Moreover, researchers agree that the concept of well-being is attached to health (Warr, 1990). Warr (1990) attached health with well-being, building a framework by suggesting that “affective well-being” is a component of mental health (Danna & Griffin, 1999). Well-being can also refer to physical, mental, psychological, or emotional health. The concept of affective well-being can be compared with the medical criteria of ill or not ill (Danna & Griffin, 1999).

The main interest in well-being at work comes from the number of hours an individual works. Individuals spend one-third of their awake time at work (Conrad, 1988). This can lead to overlap personal and work life and affecting individuals’ subjective perception of how they experience life (Russell, 2008). Emotional well-being and positive functioning are dimensions of subjective well-being. The emotional well-being dimension consists of the perceptions of happiness and life satisfaction, positive affect, and negative affect (Keyes & Magyar-Moe, 2003; Russell, 2008). The positive functioning dimension consists of psychological and social well-being (Keyes, 1998). It is very important to promote these two dimensions between employee and employers. Is known that high levels of well-being can be beneficial for the organization and the employee work outcome (Harter & Schmidt, 2000; Russell, 2008).

Employees’ well-being can be influenced by the feedback they receive from their employers. The manner in which leaders interact with their subordinates determines the overall employees' perception of the treatment received (fair or
unfair) (Van Dierendonck, Haynes, Borrill, & Stride, 2004). Feedback is generally accepted when the employees perceive it as fair (McDowell & Fletcher, 2004). According to Sparr and Sonnetang (2008), fair feedback is relevant to the relationship employees have with their supervisor. Moreover, employees expect to be treated fairly all the time, because “fairness serves psychological needs” (Sparr & Sonnetang, 2008, p.200).

How individuals feel about work and their superior’s treatment can influence the way they perceive things. Moreover, based on a review of the literature on well-being, it is hypothesized that employees’ affective well-being is positively correlated with their perceptions of fairness (hypothesis 1).

### 1.2. Fairness

Workplace fairness has been a widely researched topic in the managerial field (e.g. Copranzano & Ambrose, 2015; Colquitt, Conlon, Wesson, Porter, & Ng, 2001; Colquitt, Scott, Rodell, Zapata, Conlon, & Wesson, 2013). The terms fairness and organizational justice are often used interchangeably by scholars (Colquitt & Rodell, 2011; Copranzano & Ambrose, 2015). The concept of organizational justice is applied to outcomes, processes, and behaviors which are linked to normative standards (justice rules), moral correctness, or ethical considerations (Copranzano & Ambrose, 2015).

The term equity involves economic advantages and outcomes distribution, workplace fairness implies a global perception of appropriateness that can be measured (Colquitt & Rodell, 2011). Justice can be measured either by evaluating an organization or a supervisor (Colquitt & Rodell, 2015).

Meta-analysis regarding organizational justice was conducted by Colquitt et al. (2001) with the purpose of illustrating the relationship between organizational justice and work outcomes during the past 25 years. Organizational justice is defined as the individual perception of fairness during outcome distribution or allocation, and the procedures used to determine such distribution or allocation (Colquitt et al., 2001). Concerns regarding resources and outcome distributions have become the center of Equity Theory, known as distributive justice (Adams, 1965), whereas evaluations about fairness in decision-making procedures define the procedural justice concept (Leventhal, 1980; Lucas, Zhdanova, & Alexander, 2011). The third type of fairness, termed interactional justice, assesses the interpersonal treatment received by employees from superiors (Bies & Moag, 1986; Kim, Lin & Leung, 2015). Some authors include informational justice as the fourth dimension in organizational justice, which focuses on providing others explanations about the outcomes distribution features (Colquitt et al., 2001).

The importance of fairness arises from the fact that employees’ perception of fairness has a positive impact and is directly proportional to their attitudes and behaviors within organizations (Copranzano & Ambrose, 2015). Employees’ perception of fairness generates justice judgments linked to outcomes in their organizations (Greenberg, 1990). Among others, job satisfaction, organizational commitment, productivity, and organizational citizen behavior (OCB) are considered work outcomes or work attitudes and behaviors. These variables are mostly related to an employee’s perception of fairness in organizations (Colquitt et al., 2001; Viswesvaran and Ones, 2002; and Copranzano & Ambrose, 2015).

Various studies published from a managerial perspective attempt to analyze relationships between organizational justice and leadership styles, as well as collective trust, ethics, administrative development, managerial discretion, work-life balance, and performance appraisal. Colquitt et al. (2001) and Viswesvaran and Ones (2002) concluded that distributive and procedural justice have a strong relationship with relevant outcomes, such as job satisfaction, organizational commitment, and performance. However, authors noticed that procedural justice had a direct impact on organizational outcomes, organizational commitment and a subordinate’s evaluation of a supervisor. Also, they identified work outcomes specifically related to procedural, interactional, and informational justice which were associated indirectly with the distribution or allocation decisions. Some work outcomes are trust, evaluation of authority, organizational citizen behavior (OCB), withdrawal based on an unfortunate interpersonal treatment by an authority, and a variety of negative reactions or counterproductive behaviors (e.g., retaliation, theft, sabotage).

Viswesvaran and Ones (2002) tackled the use of two dimensions of justice - procedural and distributive - and their different roles in organizational settings. They developed the classic Levensthal’s Six Rules Theory to explain the link between organizational outcomes (trust, OCB, and organizational commitment) and procedural justice, whereas they used Equity Theory to establish the relationship between distributive justice and other work outcomes (job satisfaction and productivity).

A meta-analytic evaluation assessed the patterns of correlation for both dimensions of justice with work attitudes and behaviors (organizational commitment, job satisfaction, OCB, and productivity). Results demonstrated high and positive correlations between procedural and distributive justice with work attitudes and behaviors. However, the correlation between procedural justice and organizational commitment, OCB, and productivity were higher than the correlation between distributive justice and the same attitudes and behaviors. Both dimensions of justice have a similar correlation with job satisfaction. Additionally, reports of the partial correlation and variance reduction ratios showed that procedural justice perceptions have a more significant implication than distributive justice on work attitudes and behaviors (Viswesvaran & Ones, 2002). The central thesis of the study was that employees acknowledge procedural justice over distributive justice because procedural justice provides close control over processes in organizations.

**Perceived supervisor fairness.**

Seppala, Lipponen, and Pirttila-Backman (2012) conducted an empirical study which emphasized the role of perceived supervisor fairness as a predictor of trust in coworkers. The article associates identity-related theories with leadership and collective trust. The group-valued model supports that individuals need to belong to a group where they are treated with consideration and respect by authoritarian figures. Consequently, individuals have concerns regarding the fairness of group authorities because that implies their inclusion within the group. If a prototypical leader represents a group’s essential characteristics such as beliefs and values, then the perception of the supervisor’s fairness is positively related to employees’ trust in coworkers. Perceived fairness of leaders was found as an
efficient mechanism that can a manager can utilize to prompt a positive relationship among their subordinates.

A research study carried out by Totawar and Nambudiri (2014) identified psychological capital (PsyCap) as a mediator to explain the influence of organizational justice on job satisfaction and organizational commitment. PsyCap is also a managerial tool used to control employee satisfaction and commitment. Using Social Exchange Theory, Equity Theory and the Theory of Positive Emotions, the article proposes that organizations should provide and promote positive stimulus allowing employees to perceive actions of fairness. By creating perceivable fairness in the distribution of resources at the workplace, employees’ positive emotions which are correlated to the core constructs of PsyCap are triggered.

There is a relationship between employees’ perception of justice and job satisfaction with leadership style and organizational commitment. According to Susanj and Jakopec (2012), active leadership styles (transactional and transactive) are positively correlated with the level of organizational justice perceived by employees, which determine job satisfaction, while job satisfaction leads to organizational commitment. Results showed that passive/avoidant leadership styles had an insignificant effect on the perception of fairness and organizational commitment. It was confirmed that the leadership style indirectly affects organizational commitment over fairness perception and job satisfaction; however, job satisfaction depends directly on the fairness perception of the employees. Other interesting findings that arose from this study include the importance of a leader’s fair treatment, the perceived organizational justice as a mediator between leadership style and organizational commitment, and the negative effect of leaders with avoidant responsibility attitude. Researchers concluded that when leaders exhibit fair treatment toward their subordinates, it is possible to prompt employees’ commitment which leads to higher level of job satisfaction (Susanj & Jakopec, 2012).

**Employee’s satisfaction.**

Employee satisfaction is defined as the satisfaction of an employee compared to their last performance rating, focusing on supervisor attitudes during the appraisal process, and towards the performance appraisal system in general (Sudin, 2011). Organizational justice is a source for individual evaluations of the ethical and moral standing of a manager’s conduct (Cropanzano, Bowen, & Gillilan, 2007). Taking into consideration that statement, Sudin (2011) evaluated the effects of fairness perception in employee satisfaction during the performance appraisal process. Satisfaction was measured through the assessment of employee perceived organizational justice using performance appraisals. Findings showed a positive correlation between distributive, interpersonal, informational justice, and employee satisfaction with performance appraisal, last performance rating, supervisor, and appraisal system. Unexpectedly, procedural justice was not found to be related to any satisfaction variable.

**The subjectivity of fairness.**

The subjective nature of fairness was examined from a variety of approaches. A qualitative study conducted by Daverth, Cassell, and Hyde (2016) among Irish managers exposed managerial discretion as a crucial human element of distributive justice. The authors evaluated how the perception of fairness affected managers’ decision-making process of supporting work-life balance within their organizations. Results demonstrated that decision-making processes were empowered by the manager’s subjective interpretation of fairness, gender roles, and beliefs. Hence, it was then inferred that the fair allocation of work-life balance programs was subjective to the managers’ beliefs and interpretations of their organizational context. Also, the study reported that managers’ subjective notion of fairness defines their position in the decision-making processes of how to address a work-life balance situation. Adopting one position rather than another depended on their interpretation of the context, equality, equity, and needs. In addition, managers selected a formal or an informal channel for allocating resources because they had concerns about their management role and how it would affect the operation of the business. Managers with traditional point of view chose to solve issues on an informal basis while taking into consideration loyalty and certain behaviors of their employees. On the contrary, managers who held egalitarian positions preferred formal channels of allocation, which are considered more transparent (Daverth et al., 2016).

Cojuharenc and Patient, (2013) designed a qualitative study with three scenarios (recall, active information exercise, and experiment) to verify that fewer dimensions of justice are recalled by employees when they focus on fairness versus unfairness. The study combined two perspectives for supporting that the employees’ interpretation of work experience at different levels of abstraction relies on their perceptions of fairness and unfairness. The two perspectives studied were construal level theory and feelings-as-psychological distance. However, findings revealed that distributive justice and interactional justice are equally salient when employees evaluate fairness versus unfairness. It was found that employees tended to associate unfairness to interpersonal treatment (interactional justice). Finally, the authors concluded that workers identified fairness using different levels of abstraction and used concrete details to identify situations of unfairness. Consequently, one relevant finding of this study was that the manner in which employees recall, construe, and transmit organizational events and experiences (fair or unfair) can affect processes, attitudes, and behaviors.

An alternative viewpoint was explored by Barclay, Bashshur, and Fortin (2017), who offered an integrative conceptual review from the perspective of the motivated cognition approach. Aspects included by Barclay et al. (2017) were the formation of fairness perception, fairness motives, fairness information processes, and individual perspective. Motivated cognition is a fundamental structure for understanding fairness perception (Barclay et al., 2017). Thus, authors showed the role of motives in the process to generate different perspectives of fairness. Also, it was highlighted the importance to distinguish between fairness and unfairness which have different antecedents because it provides insights for an effective management of these issues in organizations. Brockner, Wiesenfeld, Siegel, Bobocel, and Liu (2015) identified how an individual’s psychological states and motivations affect their fairness behaviors and perceptions. The research found that the fairness exhibited by managers is related to their status and power positions, their beliefs about employees’ trustworthiness,
the people’s desire for process fairness, and observers’ fairness judgments.

Research on this topic revealed that fairness perception is related to different work outcomes, or employees’ attitudes and behaviors. Also, leadership styles, collective trust, managerial ethics, work-life balance management, and performance appraisal procedures have a relationship with the dynamics of the fairness perception in the workplace. Based on the above literature review, it is hypothesized that employee’s perception of fairness within the organization is positively correlated with perceived managerial skills of their supervisors (hypothesis 2).

1.3. Ability

An analysis of previous studies by Hunter (1986) showed that general cognitive ability was a strong predictor of job performance in both subjective and objective rating systems. Hunter supported that cognitive ability, rather than specific abilities, is best to predict job performance because cognitive ability predicted job knowledge, and job knowledge predicted job performance. Furthermore, due to the evidence supporting that most major cognitive skills are used every day at work, the impact of ability on job performance is massive (Hunter, 1986).

Other researchers have delved into this concept, with many arriving at similar conclusions. Judge, Higgins, Thoresen, and Barrick (1999) found evidence supporting that mental ability and conscientiousness (one of the Big Five personality traits) impact career success. A later study evaluated the effect of mental ability on career success over time (Judge, Klinger, & Simon 2010). The study found that mental ability predicted a steeper rise in income and occupational prestige, the amount of job training and education individuals attain, and an increased gravitation to complex jobs (Judge et al., 2010). Schmidt (2002) argues that there is overwhelming evidence supporting the role of cognitive ability in job performance. In addition to ability predicting job performance, the perceived ability (competence, skills, efficiency, and dedication) of an individual’s supervisor can also influence an employee. The perceived overall competence of supervisors has been shown to improve work motivation and performance (Arman, Thalib, & Manda, 2016).

A supervisor’s moral competence, or the ability to consistently behave according to accepted ethical principles, has been shown to affect employees’ task performance and organizational citizenship behavior (Kim & Kim, 2013). The ability of a supervisor to effectively communicate, or their communication competence, is linked to employees’ satisfaction in their supervisors (Berman & Hellweg, 1989). A supervisor’s multicultural competence was observed to have a similar effect (Inman, 2006).

In addition to competence, the perceived dedication of a supervisor has an impact on their employees. Employees are more loyal to supervisors they perceive as dedicated, and these employees have increased job satisfaction and intent to stay at their current job (Chen, 2001). A supervisor’s affective commitment has a positive relationship with employees’ affective commitment, which in turn is positively related with their task and extra-role commitment (Loi, Lai, & Lam, 2012). Another study found similar results suggesting that a supervisor’s affective commitment is linked to increased extra-role performance by employees (Woznyj et al., 2016).

As the literature indicates, ability has a vast effect on job performance, and perceived supervisor ability (competence, efficiency, and dedication) has a positive effect on employees’ motivation, satisfaction, performance, dedication and trust. Therefore, it is hypothesized that employee affective well-being is positively correlated with their perception of their supervisor’s ability (hypothesis 3).

1.4. Family Supportive Supervisor Behavior

Family Supportive Supervisor Behavior (FSSB) involves a supervisor’s behaviors being sympathetic of employee’s family commitments while also encouraging flexibility within the work-family relationship (Mills, Matthew, Henning, & Woo, 2014). Recent studies have linked FSSB to decreased work-family conflict and a rise in work-family enrichment. This is specifically important because, according to Haar and Roche (2010), work-family conflict leads to lower job satisfaction, higher turnover rate, and increased levels of stress and anxiety.

Mills et al. (2014) defined four dimensions for FSSB. Emotional support focuses on an employee’s perception that his/her supervisor is considerate of their feelings and actively listens to them. Instrumental support encompasses the supervisor’s work-related behavioral support through organizational policies such as flexible work schedules, condensed working weeks, and childcare assistance (Haar & Roche, 2010). Role model behavior includes the supervisor’s own actions towards time management and family supportive policies as an example for employees to emulate. Finally, creative-work family management is comprised of the supervisor’s ability to manage effective work performance and a balance of employee work-family roles (Mills et al., 2014).

Odle-Dusseau, Hammer, Crain, and Bodner (2016) suggest that FSSB is influenced by organizational-level variables that are both formal (Policies) and informal (Culture). Family-supportive policies help employees alleviate work-family conflict but only when accompanied by intangible changes in an organization’s environment such as values and norms (Glaveli et al., 2013). A positive work-family culture fosters optimistic, future-oriented perceptions among employees, which enhances work commitment (Chang et al., 2014). This supports FSSB as a promising new avenue for organizations to inspire (formally and informally) organizational commitment through work-life balance. Therefore, it is hypothesized that an employee’s affective well-being, is positively correlated with Family Supportive Supervisor Behaviors (FSSB).

III. Methodology

A. Participants

A sample of 395 participants from United States, Canada, and Spain was collected by using convenience and snowball sample methods. A link with a standardized recruitment message and the designed survey were provided to participants through social media (i.e. Facebook, Instagram, and WhatsApp), email, and text message (see Appendix A). Participants recruited for this study were limited to individuals 18 years or older.

http://dx.doi.org/10.29322/IJSRP.8.5.2018.p7715

www.ijsrp.org
B. Procedure

A survey was generated on Google Forms to collect online data. The survey was composed by an informed consent form, the demographics, and three questionnaires. Results of the survey were exported to SPSS for statistical analysis.

C. Instrumentation

The first page of the survey consisted of a series of demographic questions. The construct job affecting well-being was measured using the Job-related Affective Well-being Scale (JAWS) (Van Katwyk, Fox, Spector, & Kelloway, 2000). The JAWS is a 20-item scale designed to measure people’s emotional reaction to their job. Each item covers an emotion and asks participants how often they have experienced each at work over the prior 30 days. Responses are rate based on a five-point scale with anchors never, rarely, sometime, quite often, and extremely often. The JAWS includes a wide variety of emotional experiences, both negative and positive. The results were scored by creating the JAWS Index which is an overall score of all items.

Fairness was measured by using the Equity/Fairness subscale from the International Personality Item Pool (Peterson & Seligman, 2004). The scale self-reported personal equity and belief in fairness. The survey included a 9-Item Likert-type scale questionnaire for responding a five-point scale with the options: Very Inaccurate, Moderately Inaccurate, Neither Inaccurate nor Accurate, Moderately Accurate, and Very Accurate. Equity Index was created with the total scale score (positive keyed items plus negative keyed items).

The final instrument used was the Supervisor Ability and Support subscale. This is a 10-item scale, which covers an individual’s perception of their supervisor’s ability (skill, competence, efficiency, and dedication) and support. This instrument represents a total score derived from self-reported Ability subscale and the Creative work-family management subscale from the Handbook of Management Scales (Mayer & Davis, 1999). Each item is a statement about the supervisor’s ability or supportive behavior, and participants are asked to indicate their level of agreement with each statement. Responses are rated using a five-point scale with anchors strongly disagree, disagree, neither agree nor disagree, agree, and strongly agree. In order to generate the Indexes, we created the SAS Index for Managerial skills, Supervisor Ability Index for Employee’s perception of supervisor’s ability, and FSSB Index for Family Supportive Supervisor Behaviors.

IV. RESULTS

A total of 413 responses were collected, however, 18 responses were excluded because they did not meet inclusion criteria, or because the survey was missing essential data for the study. Descriptive statistics showed a sample of 395 respondents between 18 and 72 years old, with an average age of 42 years old. From the sample, 233 (59%) individuals were female, and 162 (41%) were male. The average age for females was 40.5 years-old, and the average age for males was near to 44 years old. The majority of the respondents were Hispanic/Latinos (81%), with 12.4 % White/Non-Hispanic, and 5.3% Black/African-American. The average years of education were 15.54, which represents some college or an associate’s degree. However, 51% of the sample confirmed have been completed a Bachelor’s degree (16 years). The modal response for category of current job was professional (N=186) which is nearly half (47%) of the total responses. Therefore, the respondents to this survey were predominately college educated Hispanic/Latinos professionals in their 40’s. (See Figures 1 and 2).

In order to verify the relationship between well-being, employees’ perception of fairness, managerial skills, and supervisor’s ability and support, four correlation and regression tests were selected as hypotheses testing. A Person correlation test was executed to determine if there is a correlation between affective well-being and perception of fairness. The result of the correlation indicated a relatively weak (r = .301) statically significant (p=.000) correlation between variables. (Table 1). Furthermore, a slightly stronger, but still relatively small (r=.347) statistically significant (p=.000) relationship was found between employee’s perception of fairness and perceived managerial skills of their supervisors (Table 2). In addition, a third Pearson correlation test indicated as relatively weak (r = .401) statically significant (p=.000) correlation between affective well-being and perceived supervisor’s ability (Table 3). Finally, a fourth Pearson correlation test indicated a relatively weak (r = .377) statically significant (p=.000) correlation between employee’s affective well-being and FSSB (Table 4).

V. FINDINGS AND LIMITATIONS

The main objective of this research was to explore the relationship between the following variables: employees’ affective well-being, employees’ perceptions of fairness, supervisor ability, and supervisor family support behavior. Based on the previous findings gathered in consulted literature, four hypotheses were stated predicting a positive correlation between affective well-being with the rest of the variables, and between employees’ perception of fairness with managerial skills of their supervisors. Thereafter, separate correlation analyses were conducted to test the relationships described by the hypotheses.

The first finding of this study validates the positive correlation between employees’ affective well-being and their perception of fairness in the workplace. This result is compatible with the results showed by Cropanzano et.al (2007), where it was demonstrated that employees’ perception of fairness can satisfy psychological needs, including control, belonging, self-esteem and meaningful existence. Moreover, employees that believe they are treated fairly tend to have a better well-being, and as a result they are more satisfied with their job. Prior research has also proved that employee well-being is affected by psychosocial work environment which managers have a big impact (Gilbreath & Benson, 2004). In addition, the result verifies previous findings regarding the influence of manager’s decisions on employees’ work lives (Gilbreath & Benson, 2004; Harris & Kaemar, 2006).

One central finding of this study confirmed the second hypothesis by showing a moderate positive correlation between employees’ perception of fairness and managerial skills of their supervisors. The result indicated that the managerial abilities of supervisors and their family supporting behaviors are associated
with the perception of fair treatment by subordinates. The finding is consistent with the results of previous meta-analysis conducted by Colquitt et al. (2001) and Viswesvaran and Ones (2002), which identified a relation between employees’ work attitudes and behaviors (organizational outcomes) with the employee’s fairness perception about the supervisor’s decision-making procedures (procedural justice, interactional justice, and informational justice). Also, the outcome is compatible with results found by Susanj and Jakupec (2012), which was obtained a positive correlation between active leadership styles (transformational and transactional) and the level of organizational justice perceived by employees. The correlation determined job satisfaction, while showing that passive/avoidant leadership styles had an insignificant effect on the perception of fairness and organizational commitment. Finally, the result connects solely with one of the findings of Cojuharenco and Patient (2013), whose study showed that employees tend to associate unfairness to interpersonal treatment (interactional justice).

Another significant finding involved the observed positive correlation between affective well-being and perceived supervisor ability. This result is consistent with what is suggested by previous research. The perceived overall competence of supervisors has previously been linked to improved work motivation and performance in employees (Arman et al., 2016). In addition, a supervisor’s moral competence, communication competence, and multicultural competence have all been linked to employee satisfaction (Kim & Kim, 2013; Berman & Hellweg, 1989; Inman, 2006). The perceived dedication of a supervisor has been positively correlated with employee job satisfaction, loyalty, and commitment (Chen, 2001; Loi et al., 2012; Woznyj et al., 2016). The results observed in the current study seem to align with the current literature in that the increased perception of supervisor ability is correlated with positive changes in employees, in this case, pertaining to their affective well-being.

The study’s findings have implications for managers’ performance, for the general perception of fairness within organizations, and for HR practices. Focusing on the connection between employees’ well-being and their perception of fairness, it is a priority to implement fair treatment practices in corporations. By accessing to the same opportunities into the workplace, employees will perceive a fairness environment, which can lead to their job satisfaction, motivation, and good health. Understanding the relationship between fairness treatments perceived by employees with the managerial skills and supervisors’ supportive behaviors contributes to improving the overall fairness perception among employees at an organization level. Aspects of procedural justice (interpersonal and interactional) cannot be underestimated in work settings because the manner in which employees recall, construe, and transmit organizational events and experiences (fair or unfair) can affect processes, attitudes, and behaviors. Furthermore, the observed positive correlation between affective well-being and perceived supervisor ability may carry real world implications for organizations moving forward. Given the significance of employee affective well-being, it may be beneficial for organizations to ensure that their employees have supervisors who they perceive as being capable and competent. While organizations benefit from capable supervisors in terms of job performance, having capable supervisors appears to also be related to healthier and happier employees.

A major limitation of the study stems from the methods used from sampling. The mix of convenience and snowball sampling is a non-probability sampling, which does not have external validity. Consequently, the results obtained cannot be generalized to the overall population. Another limitation was the lack of diversity in current jobs and formal education of the sample. Most participants are Hispanic/Latinos, professionals, and have completed a bachelor’s degree; as such, this sample is not representative of the normal social distribution in the U.S. A further limitation is found in the pretest criterion of normality performed in the first and second correlation tests. The Equity Index used in both correlations has a slight negative skew. Because this study had various limitations, findings could not be generalized. However, the results contain valuable information to use within organizations.

APPENDIX

### Tables

**Table 1** Correlation test results between employees’ affective well-being and their perception of fairness.

<table>
<thead>
<tr>
<th>Jaws Index</th>
<th>Pearson Correlation</th>
<th>Equity Index</th>
<th>SAS Index</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>N</td>
<td>395</td>
<td>.301**</td>
<td>.000</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).**

**Table 2** Correlation test results between employees’ perception of fairness and managerial skills of their supervisors.

<table>
<thead>
<tr>
<th>Equity Index</th>
<th>Pearson Correlation</th>
<th>SAS Index</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>N</td>
<td>395</td>
<td>.347**</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).**

**Table 3** Correlation test results between employees’ affective well-being with their perceptions of their supervisors’ abilities.

http://dx.doi.org/10.29322/IJSRP.8.5.2018.p7715
**Table 4. Correlation test results between employees’ affective well-being with Family Supportive Supervisor Behavior.**

<table>
<thead>
<tr>
<th></th>
<th>SA Index</th>
<th>JAWS Index</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>JAWS Index</strong></td>
<td>Pearson Correlation</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.401**</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>395</td>
</tr>
<tr>
<td><strong>SA Index</strong></td>
<td>Pearson Correlation</td>
<td>.401**</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>395</td>
</tr>
</tbody>
</table>

**Correlation is significant at the 0.01 level (2-tailed).**

**APPENDIX B**

Figure 1. Distribution by ages.

**APPENDIX C**

Email recruitment:

Greetings!

My name is ___________ I am a student at Carlos Albizu University in the Master’s Program in Industrial and Organizational Psychology. I am doing a class project together with a research team about affective well-being, equity, and creative work management, and I am inviting you to participate using your experience in work settings.

I appreciate your support in completing a survey found below, which will take approximately 15-20 minutes. This survey is voluntary and anonymous. Use the following link to participate in the survey

https://docs.google.com/forms/d/e/1FAIpQLSdLyRwnGySUf411a9DJ0EE5xttcbGlff1vsI1H5Oii0ghVgAg/viewform

It would be especially helpful if you can forward this survey to your friends, family, coworkers, and classmates who meet the criteria and who may also be interested in learning about this research study.

Thank you in advance for your participation

Team member

Phone number

Text message recruitment:

I am conducting a survey about affective well-being, equity, and creative work management in the workplace for my research class. I’d appreciate your participation completing it and if you can forward to friends and coworkers. The link is

https://docs.google.com/forms/d/e/1FAIpQLSdLyRwnGySUf411a9DJ0EE5xttcbGlff1vsI1H5Oii0ghVgAg/viewform

Thank you in advance. Team member name

Social media recruitment:
I am conducting a survey about affective well-being, equity, and creative work management in the workplace for my research class. I’d appreciate your participation completing it and if you can forward to friends and coworkers. The link is https://docs.google.com/forms/d/e/1FAIpQLSdLyRwnGvSUf411a9DJ0E5xttcbGlff1vsI1H5Oi0ghVgAg/viewform

Thank you in advance. Team member name

**APPENDIX D**

Affective Well-being Scale (JAWS)

<table>
<thead>
<tr>
<th></th>
<th>Neve r</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Quite often</th>
<th>Extremely often</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>My job made me feel angry.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>My job made me feel anxious.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>My job made me feel at ease.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>My job made me feel bored.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>My job made me feel calm.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>My job made me feel content</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>My job made me feel depressed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>My job made me feel discouraged.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>My job made me feel disgusted.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>My job made me feel ecstatic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>My job made me feel energetic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>My job made me feel enthusiastic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>My job made me feel excited</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>My job made me feel fatigued.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>My job made me feel frightened.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16.</td>
<td>My job made me feel furious</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.</td>
<td>My job made me feel gloomy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
18. My job made me feel inspired.
19. My job made me feel relaxed.
20. My job made me feel satisfied.

The Items Included in Each of the 24 Revised IPIP-VIA Scales
(Values in Action [VIA]: Peterson & Seligman, 2004)

### Equity/Fairness [Equ] (9 items; Alpha = .70)

<table>
<thead>
<tr>
<th>Item</th>
<th>Scale</th>
<th>Response Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I admit when I am wrong.</td>
<td>1- Very Inaccurate</td>
<td>1- Strongly Disagree</td>
</tr>
<tr>
<td>2. I treat all people equally.</td>
<td>2- Moderately Inaccurate</td>
<td>2- Disagree</td>
</tr>
<tr>
<td>3. I take advantage of others.</td>
<td>3- Neither Inaccurate nor Accurate</td>
<td>3- Neither Agree nor Disagree</td>
</tr>
<tr>
<td>4. I am a good listener.</td>
<td>4- Moderately Accurate</td>
<td>4- Agree</td>
</tr>
<tr>
<td>5. I believe that everyone's rights are equally important.</td>
<td>5- Very Accurate</td>
<td>5- Strongly Agree</td>
</tr>
<tr>
<td>6. I treat others differently if I don't like them.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Supervisor ability & support subscale

<table>
<thead>
<tr>
<th>Item</th>
<th>Scale</th>
<th>Response Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. I give everyone a chance.</td>
<td>1- Strongly Disagree</td>
<td></td>
</tr>
<tr>
<td>8. I am committed to principles of justice and equality</td>
<td>2- Disagree</td>
<td></td>
</tr>
<tr>
<td>9. I believe that everyone should have a say.</td>
<td>3- Neither Agree nor Disagree</td>
<td></td>
</tr>
<tr>
<td>10. My supervisor is very capable of performing his/her job.</td>
<td>4- Agree</td>
<td></td>
</tr>
<tr>
<td>11. My supervisor is known to be successful at the things s/he tries to do.</td>
<td>5- Strongly Agree</td>
<td></td>
</tr>
<tr>
<td>12. My supervisor has a lot of knowledge about the work to be done.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. I feel very confident about my supervisor’s skills.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. My supervisor has specific capabilities that can increase our performance.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. My supervisor is well qualified.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. My supervisor thinks about how the work in my department can be organized to jointly benefit employees</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
8. My supervisor asks for suggestions to make it easier for employees to balance work and non-work demands.

9. My supervisor is creative in reallocating job duties to help my dept. work better as a team.

10. My supervisor is able to manage the dept. as a whole team to enable everyone’s needs to be met.

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Abstract- The research study sought to establish the influence of foreign television cartoon programs on children’s social behavior in Kenya. It sought to achieve this by; 1) Investigating the influence of foreign cartoon programs content on children social behavior in Kenya, 2) Determining the influence of foreign television cartoon characters on children social behavior in Kenya, and 3) Analyzing the influence of foreign television cartoon viewership patterns on children social behavior in Kenya. The study found out that Kenyan children are spending a lot of time viewing foreign television cartoons programs with minimal/no parental guidance and that based on their gender, they identified with their favorite cartoon characters.

Index Terms- Television, Cartoon Programs, Children, Social Behavior

1. INTRODUCTION

Television has through the years proven to be an important socialization agent in children’s lives; (Prot, et al., 2015) affirm this and acknowledge that socialization is no longer reserved to the influences of family, peers and other people in children’s immediate environment. According to (Gonzalez-Mena, 2009) television is the one medium with greatest socialization effects exceeding all other media in its influence on young children. Time spent by children watching television has been directly linked with anti-social behaviors such as bullying and improper verbal utterances (Brodeur, 2007). The amount of time children are spending glued to television screens continues to gradually increase especially in the developing countries including Kenya with the shift from analogue broadcasting to digital broadcasting thus it’s important to consider the likely effects that this could have on their social behavior. It would be safely assumed that being children content, television cartoons are the ideal option to keep children entertained with no need to supervise what they are watching. In Kenya for instance, cartoons as a safe entertainment option for children has been questioned following introduction of two interracial gay characters in Nickelodeon’s Loud House cartoon series which triggered fears that it would negatively affect the morals of Kenyan children (Ondieki, 2016). This study therefore sought to determine the influence of television on Kenyan children’s social behavior and the extent to which television has altered or augmented their social behavior. Though children can acquire both acceptable and unacceptable social behavior from various sources, it is important to find out the contribution of television and more so of cartoon programs which are specifically designed for the children.

1.1 Statement of the Problem

The social behavior of Kenyan children continues to mutate as opportunities to access a variety of children themed television programs increase in this digital age. With no set limit for television viewing in Kenya, the average time of watching television for a child based in Kenya is most likely to go up with switch from analogue to digital broadcasting which has seen the television content available considerably increase. Stifled with challenges of funds and infrastructure, Kenya has not been able to invest in children content production opting for already foreign produced children content. With longer periods of exposure to foreign cartoon programs, social behavior of Kenyan children could be influenced to some extent thus it is important to consider the likely effects this could have in modifying their social behavior either positively or negatively.

1.2 Research Objectives

The study was guided by three specific objectives:

i. To investigate the influence of foreign television cartoon programs content on children social behavior in Kenya

ii. To determine the influence of foreign television cartoon characters on children social behavior in Kenya

iii. To analyze the influence of foreign television cartoon viewership patterns on children social behavior in Kenya

2. THEORETICAL BACKGROUND (LITERATURE REVIEW)

2.1 Foreign Television Cartoon Programs Content

The kind of content children are exposed to when viewing television cartoons is an essential consideration in how it influences their social behavior. According to (Kirkorian, Wartella, & Anderson, 2008), the content children watch on television is at least important as, and probably more important than, how much they watch. (Wilson, 2008) also concludes that media influence on children is dependent more on the type of content they are exposed to than on the time they spend in front of the screen. The contribution of foreign television...
cartoon content in influencing social behavior of Kenyan children therefore, ought to be considered. Though prominence is put on the anti-social aspects of children television cartoon programs content and their negative impact on children’s social behavior, it’s equally important to consider the pro-social aspects of children television cartoon programs content and their positive influence on children’s social behavior. (Wilson, 2008) agrees to this view remarking that if television can impart antisocial behavior such as violence and aggression in children then it can as well teach them beneficial behavior such as altruism, friendliness, cooperation and sympathy. The language used in the children television cartoon programs is of interest; in the same way children imitate what they see on the television cartoon programs is the same way they pick up words they hear on the television cartoon programs and integrate them in their vocabulary. Research studies done over the years on language acquisition have demonstrated that children aged 2 and above years can readily learn vocabulary from television programs (Kirkorian, Wartella, & Anderson, 2008) (Kondo & Steemers, 2007).

2.2 Foreign Television Cartoon Characters

Children are likely to identify with heroic cartoon characters which could subsequently lead to imitation of the characters’ behaviors. According to (Lamraoui, 2016), cartoon heroes have great influence on children who almost always try to play the role of those heroes in the actual world. Animated cartoon characters according to (Klein & Shiffman, 2006) help in forming children’s initial notions of what it means to be pretty, handsome, ordinary-looking or unattractive. It is imperative therefore to understand how foreign television cartoon characters could impact on the social behavior of Kenyan children. According to (Gökçearslan, 2010) television is one of the most effective factors in children’s internalization of gender stereotypes. Gökçearslan notes that many children television cartoon programs consolidate gender discrimination intensively with male cartoon characters dominating female cartoon characters. In the television cartoons, the white cartoon characters dominate colored cartoon characters. (Götz, et al., 2008) affirm this noting that the dominant color of the main characters in children cartoons is white. According to (Lacroix, 2009) media images of animated cartoon characters contribute to the centering of white experience as normal and natural. This limited representation of minority characters could suggest to children that whites are more important than minorities, with majority of African countries including Kenya, relying on foreign television cartoon programs for their children audiences where there are no African cartoon characters that they can identify with, children are likely to identify with foreign cartoon characters they deem ideal which could consequently influence their social behavior not only in the short term but long term. Foreign television cartoon characters are not only being utilized in entertaining children but also in marketing and advertising various products and services in the Kenyan market. Branded cartoon characters are increasingly being used to market various things to children including clothes, range of accessories, fast food and soft drinks. Brookside Dairy Limited, a Kenyan firm and Walt Disney Company have recently entered into a strategic partnership to provide new range of dairy fresh milk products featuring Disney, Disney-Pixar and Marvel cartoon themed characters such as Sofia the First, Spiderman among others branded on packs (BusinessToday, 2017)

2.3 Foreign Television Cartoon Viewership Patterns

According to (Common-Sense-Media, 2013) television viewing is the most popular form of media exposure for young children notwithstanding the increasing exposure to other multiple forms of screen technology. Though scanty information is available on the average children television viewership time in a majority of African countries, it is expected that with the digital migration that has recently been adopted in Africa, the time an African child spends watching television and especially the cartoon programs has considerably gone up. Children television viewers could be categorized in three major profiles as heavy television viewers, moderate television viewers and light television viewers. Few research studies in African countries such as Nigeria and South Africa reveal that compared to a decade ago, children are spending a considerable amount of time watching television (Oyero & Oyesomi, 2014) (Healthy Active Kids South Africa Report Card, 2014) which could spell out an emergence of heavy viewership tendencies. Mediated viewership by parents of children watching television cartoons could mitigate potential negative effects in their social interactions; mediation could be passive or active with parents either setting up rules pertaining television viewing or actively watching the television programs with their children. Parental or guardian intervention while children are watching television is not however popular with many children left to watch television unsupervised; studies done over time suggests that very few parents impose television viewing limits or get actively engaged in discussing television content with their children whatever their ages (Schmidt & Vandewater, 2008). Lack of mediated viewership, is not only a situation that characterizes parents in developed countries but also in the developing countries where parents are increasing working for longer hours as they strive to keep the households running effectively leaving the older siblings to take care of the younger children or leaving the children with a caretaker. (Kabiru & Njenga, 2007) note that parents in Kenya as in other developing countries are away from home most of the day in order to supplement family income. This is strong indication that parents and guardians don’t monitor the amount and content of exposure to foreign television programs on their children. Further research by (Gitahi, 2011) affirms that majority of Kenyan parents don’t watch television programs with their children and entrust them in the hands of caretakers and other older siblings.

3. METHODOLOGY

This research study was based on literature review related to media effects especially television and its influence on children’s behavior. Previously published journals, reports, unpublished theses among other publications were reviewed.

4. CONCLUSION

With the digital migration taking over in the developing countries, there is an influx of round the clock foreign television cartoon programs. 24 hour children programming is a phenomenon that until recently was not incorporated in the television programming of most developing countries including Kenya. Now, children can watch their favorite cartoons any time at the touch of the dial notwithstanding their parents are not always around to supervise what they are
watching. With the changing television viewing habits of the children, media effects are likely to take toll on their lives in the short term and even in the long term. Children are a vulnerable audience and the media effects on them are likely to have greater consequences than on adults. It is the high time that this is put in consideration and the relevant authorities step in to take measures before the situation gets out of hand.

5. RECOMMENDATIONS

Awareness campaigns on negative cartoon effects on children social behavior need to be held so that people and especially parents/guardians know that in as much there are positive effects that emanate from children watching cartoons they can have long term negative effects on their social behavior. There is a general lack of awareness that cartoon programs could actually influence children negatively.

The parents/guardians also need to supervise their children when watching cartoons. Through guided supervision, children can be advised on behaviors to shun as offensive language or violent acts. Parents/guardians may not always be there to supervise their children and in their absence they could leave an adult they can trust to guide their children as they watch cartoons. Alternatively they could use the parental controls to lock up cartoon programs that have content they deem inappropriate for their young ones.

More local children content especially cartoons need be produced from the developing countries other than on the current extensive reliance on foreign television cartoons which the children can’t relate to. The African child needs Africa content produced for them.

Governments in the developing countries need to work in partnership with other relevant stakeholders such as the media institutions and the civil society organizations keen on children rights to develop comprehensive policies on children programming that are in tandem with international laws. This will encourage investors from within and without to support content production of children programs such as cartoons.

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Review on Epidemiology and Management of Faba Bean (\textit{Vicia fabae}) Chocolate Spot (\textit{Botrytis fabae}), Root Rot (\textit{Fusarium solani}) and Rust (\textit{Uromyces vicia fabae}) in Ethiopia

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Abstract- Of all pulse crops grown in Ethiopia, faba beans stand 2nd after common beans and before chickpeas which are all considered to be the top export crops accounting 90% by volume and 85% total earnings. However, diseases such as chocolate spot, root rot and rust are the major biotic constraints affecting yield wherever the crop grows. Yield losses of up to 61% on susceptible cultivars and 30-50% under favorable conditions for chocolate spot were reported. Root rot was also recognized to cause complete crop loss during severe infections and yield loss may reach 100% in susceptible cultivars. Rust epidemics in addition identified to reduce faba bean yields with losses of up to 30%, while, in combination with chocolate spot, yield reductions of up to 50% have been reported. Control options for disease in general include high levels of resistant cultivars, planting good quality seed and fungicide applications integrated either with cropping system or early planting to manage faba bean chocolate spot. Integrated management was also reported to control faba bean root rot with the help of biocontrol agents. In this regard, soaking seeds in biocontrol agents (Bacillus megaterium and Trichoderma viride) and the use of Trichoderma harzianum as seed dressing or soil application with improved faba bean cultivars and fungicidal seed treatments consistently found to improve emergence and seed yield of faba bean. Artificially inoculated faba bean seedlings with the native antagonistic Bacillus isolates found to suppress black root rot. Integration of improved faba bean cultivars with protective fungicides application was also reported to gain higher monitory advantage. Similarly, faba bean-maize row intercropping and compost fertilization using host resistance and other crop management practices have found best to manage faba bean rust. In this review, developments discussed on management of chocolate spot, root rot and rust of faba bean were focusing on an integrated management either through host resistance with cropping systems and fungicide applications or host resistance with biocontrol agents. However, almost all the earlier findings were mainly limited either to research stations or greenhouse and laboratory experiments. This is, therefore, the current review is initiated with the objective that future research works to explore these best practices under farmers’ field condition along with supplementation of greenhouse and laboratory experiments considering mass production of the locally identified indigenous biocontrol agents in particular for seed or soil borne diseases such as faba bean root rot.

Index Terms- \textit{Botrytis fabae}, Faba bean, \textit{Fusarium solani}, Management, \textit{Uromyces vicia fabae}

I. INTRODUCTION

The pulse sector has the potential to be a key accelerator of agricultural development and growth in Ethiopia. Of all pulses in the country, common beans, faba beans and chickpeas are the top export crops accounting for 90% of export volumes and 85% of export earnings [44]. Faba bean (\textit{Vicia faba} L.) is one of the earliest domesticated food legumes in the world, mainly used as human food in developing countries and as animal feed in industrialized countries [30]. The crop covers nearly 370,000 hectares of land with annual production of about 450, 000 metric tons and grows from 1800 to 3000 m a s l with annual rainfall of 700-1000 mm in Ethiopia [32].
The growing importance of faba bean as an export crop in Ethiopia has led to a renewed interest by farmers to increase the area under production [38]. However, the average yield of this crop under small-holder farmers in the country ranges from 1.0-1.2 t ha\(^{-1}\) [2], as compared with its potential (more than 3 t ha\(^{-1}\)) under farmers’ conditions that employ improved crop management practices [28]. In spite of its huge importance, the productivity of faba bean has been constrained by several biotic and abiotic factors among which chocolate spot (\textit{Botrytis fabae}), root rot (\textit{Fusarium solani}) and rust (\textit{Uromyces vicia fabae}) are considered to be the most important biotic factors and destructive in Ethiopia. Yield losses of up to 61% on susceptible cultivars and 30-50% under conditions favorable for disease development due to chocolate spot were recorded [16, 35].

Chocolate spot can result in flower abortion or poor seed set so monitoring your fields closely and being able to act quickly when symptoms appear is important for protecting healthy tissue [22]. Control options for disease include choosing more resistant varieties, fungicide applications, and planting good quality seed with low infection levels. Integration of faba bean varieties with foliar sprays protected high chocolate spot epidemics, increased yield, yield components and maximized marginal benefit compared to a single control approach [13]. It was also reported from Northern and South-Eastern Ethiopia that fungicide applications integrated with cropping systems (faba bean with cereals), considerably reduced disease severity and increased faba bean grain yield and system productivity [36].

Root rot is another threat to production of faba bean in the high lands of Ethiopia [8] resulting in complete crop loss during severe infections and yield loss may reach 100% in susceptible cultivars [31]. It was reported [18] that the pathogens causing root rot live near the rhizosphere and survive for a long period by forming resistant structures that make management of the disease difficult.

Rust epidemics can significantly reduce faba bean yields. Alone the disease has caused losses of up to 30%, while, in combination with chocolate spot, yield reductions of up to 50% have been documented [34]. Disease survey [26] also revealed that the incidence and severity of faba bean rust showed higher association with altitude, and high occurrence and distribution in different districts of the Hararghe Highlands of Ethiopia. Effective management of faba bean diseases is paramount importance to ensure food security in the country and to improve availability of raw material for local industry and export markets. Effective disease management in general relies on selection of suitable disease resistant variety, most suitable field and clean seed, best agronomic practices and fungicide applications integrated with resistant hosts, cropping systems and biocontrol agents where it is feasible in particular for faba bean diseases. Therefore, the current review is initiated with the intention that future research works to explore the integrated management

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practices under end users (farmers’) field condition considering mass production of the locally identified indigenous biocontrol agents along with supplementation of greenhouse and laboratory experiments in particular for seed or soil borne diseases such as faba bean root rot. In the future especially in our country full exploitation of the indigenous biocontrol agents should be emphasized above all.

II. DISEASE EPIDEMIOLOGY

1.1. Chocolate spot of faba bean

Chocolate spot of faba bean caused by Botrytis fabae has developed worldwide, occurring in almost all regions where faba beans are grown and is capable of devastating unprotected crops up to 67% [9, 17].

The pathogen Botrytis fabae induces lesions or symptoms equally on the upper and lower leaf surfaces of faba bean with large number of spots called “chocolate spots” appear on the leaflets, petals and pods, elongated on the stems, and tend to be evenly distributed [25]. The disease is first seen as reddish to chocolate brown, slightly flattened spots appearing on lower leaves. This is its ‘non-aggressive’ phase, which is thought to have little effect. However; if mild, wet conditions persist for several days, the disease will spread quickly and be termed ‘aggressive’. The disease progresses up the canopy, with the spots rapidly expanding into large patches, which blight the leaves. Plants defoliate and lose flowers and pods. Stems can become reddish-brown and weakened, with a strong tendency to lodge. Young leaves expanding at the top of the plant may outgrow the disease if conditions dry out; lost flowers and pods cannot be recovered [29]. The greatest risk period is normally from late July to late September in most faba bean growing areas. Chocolate spot is considered to be the most important and destructive in Ethiopia causing the yield loss of up to 61% on susceptible cultivars [16].

A mean disease severity of 35.4% and 68.9% was reported from two locations on local faba bean:barley unsprayed intercropping in the Arsi Highlands, Southeastern Ethiopia [40]. The disease is favored by warm temperature (15-22°C) and humid weather (above 90% RH) conditions. Mean disease incidence of 47 to 100% and disease severity of 17 to 49% were reported from surveys conducted in 2004 and 2005 in Northern Ethiopia [37]. Chocolate spot epidemics occur frequently and caused yield losses since farmers grow local susceptible landraces and do not apply fungicides to manage the disease especially in the highlands of Ethiopia. Planning and implementing of successful fungicide spray programs that relay on crop monitoring, correct disease identification and timeliness of spraying with the correct product are crucial. Be aware of the critical periods for disease management.

Disease progress of chocolate spot based on severity scores of selected representative varieties in greenhouse at Ambo Plant Protection Research Center revealed resistant faba beans, moderately resistant and susceptible varieties showed different reactions to the disease [6] (Table 1).

<table>
<thead>
<tr>
<th>Genotype</th>
<th>GDS (%)</th>
<th>Reaction</th>
<th>RAUDPC (AUDPC)</th>
<th>Grain yield (t ha⁻¹)</th>
<th>Rank based on GDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gebelcho</td>
<td>14.848</td>
<td>MR</td>
<td>0.30 (516.6)</td>
<td>3.99</td>
<td>47</td>
</tr>
<tr>
<td>Moti</td>
<td>16.493</td>
<td>MR</td>
<td>0.36 (629.5)</td>
<td>4.69</td>
<td>57</td>
</tr>
<tr>
<td>Doshá</td>
<td>17.707</td>
<td>MR</td>
<td>0.33 (584.3)</td>
<td>4.09</td>
<td>66</td>
</tr>
<tr>
<td>CS-20-DK</td>
<td>23.468</td>
<td>S</td>
<td>0.39 (680.9)</td>
<td>2.68</td>
<td>94</td>
</tr>
<tr>
<td>NC58</td>
<td>24.554</td>
<td>S</td>
<td>0.38 (662.5)</td>
<td>2.59</td>
<td>96</td>
</tr>
<tr>
<td>Bulga-70</td>
<td>24.557</td>
<td>S</td>
<td>0.37 (649.8)</td>
<td>3.42</td>
<td>97</td>
</tr>
<tr>
<td>Kasa</td>
<td>32.251</td>
<td>S</td>
<td>0.40 (698.9)</td>
<td>2.66</td>
<td>100</td>
</tr>
<tr>
<td><strong>Trial Mean</strong></td>
<td>15.402</td>
<td></td>
<td>3.43</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1. Disease progress of chocolate spot based on severity scores of selected representative faba bean varieties in the greenhouse at Ambo plant protection research center (APPRC).
Disease surveys of faba bean [10] have also shown that Fusarium root rot is an important soil-borne disease and approximately 30% of several commercial fields had infected taproots and damaged fibrous roots, which resulted in stunting, wilting, and yield loss.

2.3. Faba bean rust

Faba bean rust is among the most important fungal foliar diseases which provoke partial defoliation and decreases photosynthesis and yield [41]. The disease is first seen on leaves as small, light green spots which erupt into red powdery (rusty) lesions. These increase in time to densely cover the leaf surface, and later to develop on the stems [29]. If the fungus infects a young plant, it can seriously stunt bean growth, leading to severe yield loss.

The presence of a high weed population in a field increases the humidity within the crop canopy which is more favorable for Uromyces viciae-fabae infection and the development of rust epidemics. Once inside the plant, the fungus grows and develops in the leaf. Leaves wither and die: as the fungus grows through the leaf, it reduces the area that can be used for photosynthesis. It steals food from the plant using specialized feeding structures (haustoria). The fungus matures after 10-12 days and forms pustules, which burst back through the breathing holes and release more rusty colored spores into the environment. The fungus grows best in July and August, as it requires warm and prolonged wet conditions to infect bean plants. Bean rust can reduce the crop yield by up to 30% on its own and when combined with the chocolate spot, yields can drop by 50% [7].

Rust can survive on crop debris or on volunteer crops. Rust pustules can often be found on the lower leaves of volunteer plants surviving in the previous year’s fields. However, spore production is encouraged by high humidity and warm temperatures. Spores are released from the maturing pustules and can be blown large distances by wind until they are deposited on a susceptible host crop. Spore germination occurs quickly in the presence of a light film of moisture on the leaf surface. Infection of the rest of the foliage and the surrounding plants follows further production of spores from the new pustules [7]. Survey conducted [26] in the Eastern Highlands of Ethiopia indicated that environmental and cultural variables were associated with faba bean rust incidence and severity either singly or in combination. It was identified that in different districts, altitude, growth stage, sowing date and weed management influenced faba bean rust epidemics. There were also a higher number of rust-infected plants within fields when faba bean was planted as sole compared with fields intercropped with field pea, barley, wheat, maize, and sorghum. Accordingly, integration of resistant varieties, better cultural practices and fungicide applications are considered suitable if they are combined with cereal-faba bean cropping system.

III. DISEASE MANAGEMENT

3.1. Chocolate spot

Faba bean total harvested area is increasing in Ethiopia which is attributed to the demand of the crop in the country. This is a challenge to breeders and therefore, management should be prioritized for the major problem to improve faba bean productivity [12]. Chocolate spot can result in flower abortion or poor seed set, so monitoring fields closely and being able to act quickly when symptoms appear is important for protecting healthy tissue. Once tissues become infected there is no way of curing it. Control options for disease include choosing more resistant varieties, planting good quality seed with low infection levels and fungicide applications [22]. Several methods may be applied to manage the chocolate spot of faba bean which include cultural practices, chemical control, and integrated pest management.
Applications of fungicide integrated with faba bean:barley intercropping considerably reduced disease severity and increased faba bean grain yield and system productivity (LER) by a mean relative yield advantage of 35% in the Arsi Highlands, South-Eastern Ethiopia [40]. Study by Samuel [36] also revealed that the mixed cropping of faba bean with barley and maize contributed to the slowing of chocolate spot epidemics and increased grain yield of faba bean. Participatory evaluation of a high yielding and disease resistant faba bean variety such as Hachalu has a yield advantage than the local varieties and the highest seed weight for export purpose to increase farmers’ income in Northern Ethiopia [43]. Early sowing integrated with fungicide application had enabled growers’ to effectively manage chocolate spot on faba bean in Central and South-Eastern Ethiopia [14, 19]. As reported from Northern Ethiopia [39], Biocontrol agents, particularly of Trichoderma species are prevalent on faba bean leaves and can be further explored and developed into effective mycofungicides for faba bean chocolate spot management.

3.2. Faba bean root rot

Integrated management is the most promising alternative to control faba bean black root rot that cause up to 70% on farm yield loss in severe conditions in Ethiopia [1]. Soaking faba bean seeds in biocontrol agents (Bacillus megaterium and Trichoderma viride) and chemical inducers [salicylic acid and hydrogen peroxide (H2O2)] individually or in combination significantly reduced damping-off, root rot and increased survival of plants either under green house or field conditions. Habtegebriel and Boydom [24] also reported that the use of antagonistic indigenous fungus Trichoderma harzianum as seed dressing or soil application treatment in combination with three faba bean varieties viz. Kasa (susceptible), Wolki (moderately resistant) and Wayu (resistant) in two consecutive cropping seasons in a sick plot showed significantly less percentage of dead plants (65.64%) than the treatments without Trichoderma harzianum (86.04%) (Figure 3).

Figure 3. Percentage of dead plants due to black root rot for three faba bean varieties and drainage methods on raised and flat beds.

Fungicidal seed treatments with Apron Maxx (Fludioxonil + Metalaxyl) and Vitaflo 280 (Carbathiin + Thiram) consistently improved emergence and seed yield in trials inoculated with Fusarium avenaceum and Rhizoctonia solani in Canada [11]. Study conducted in North Shoa of Ethiopia by Habtegebriel and Boydom [24] also revealed that the integration of varietal resistance (either Wolki or Wayu), drainage method and sowing date’s adjustment are important for effective management of faba bean root rot. However, emphasis should be given to varietal resistance and use of raised beds especially on vertisols for higher yield and variety improvement programs. In vivo experiment on artificially inoculated faba bean seedlings showed the native antagonistic Bacillus isolates kept black root rot severity lower than 50% disease suppression, compared to the untreated control [20]. The above promising results can initiate more widespread faba bean cultivation through exploitation of the indigenous biocontrol agents in combination with resistant hosts and appropriate fungicide applications particularly in the highlands of Ethiopia where there is heavy clay soil condition that can aggravate the risk of faba bean root rot. Integration of appropriate cultural practices and native biocontrol agents are also supposed to be crucial for sustainable crop productivity and faba bean root rot sound management.

3.3. Faba bean rust

Climate change resilient cultural practices alone and in integration found to be effective to slow the epidemic progression of faba bean rust and improve crop productivity in
the prevailing climate change effects in the Hararghe Highlands, Eastern Ethiopia [42]. According to this report, faba bean-maize row intercropping and compost fertilization in row intercropping in particular using host resistance and other crop management strategies to manage faba bean rust had significantly reduced disease progress rate, AUDPC and severity by up to 36.5% and 27.4% during the 2012 and 2013 cropping season, respectively. Study in the United Kingdom [7] revealed that there are several ways to prevent faba bean rust which include growing different crops each year and removing left over plants to prevent fungal spores building up. Planting faba bean varieties that are resistant to rust and spraying fungicides as an integrated management strategy should be considered best option to kill the fungus.

Survey results from the Hararghe Highlands, Eastern Ethiopia [26] suggested the importance of research on weed management and other related cultural practices to supplement effective rust management options in the surveyed areas and elsewhere with similar agro-ecological settings. Moreover, extensive and consistent survey is recommended to know the intensity of the disease in similar agro-ecology of the country where the crop is widely grown. It was also reported that improved faba bean cultivar Gebelcho when integrated with fungicide (mancozeb) applications gave higher monitory advantage than the other treatments. Therefore, according to this study, mancozeb can be recommended to manage faba bean rust on both local (NC58) and moderately tolerant (Gебelcho) cultivars and when mancozeb is not available it is possible to use the systemic fungicide, triadimefon. Preventative fungicides (mancozeb and chlorothalonil) application at early time have a season lasting effect through delaying build up of faba bean rust inoculum under field condition [45].

IV. FUTURE TRUST

Faba bean diseases particularly chocolate spot, root rot and rust are more serious in Ethiopia now days than they were in the past unless more effective and sustainable methods of management strategies are applied of which the following options will be considered best.

i) Make faba bean part of a cropping system: Involving either crop rotation or mixed/row intercropping of faba bean associated with cereal crops (wheat or barley or maize) is crucial.

ii) Choose the right variety and disease free-seed: Grow varieties with resistance; sow disease-free seed; sow away faba bean from bean residues of the previous year more than 500m (including self-sown plants) [7]. This will isolate the crop from sources of infection by fungal diseases. Volunteer faba bean plants appearing in late seasons can help to carry over diseases and should be eradicated.

iii) Sowing time: Minimize the risk of foliar diseases such as chocolate spot and faba bean rust due to excessive vegetative growth. Early emergence leads to early exposure to disease and early canopy closure, increasing development of disease. However, early planting integrated with fungicide applications was found the most promising strategy to manage faba bean chocolate spot [19].

iv) Sowing rate and spacing: Higher than ideal seeding rates and plant populations lead to a dense crop canopy and increase disease risk. Risk of chocolate spot is greatest in dense, early sown or lodged crops. Wider rows can delay canopy closure, reducing the risk of chocolate spot in particular. Any increased lodging may increase the chance of foliar disease. Therefore, optimal seeding rates and proper spacing can be considered ideal methods to control the disease and to maximize seed yield of faba bean.

v) Fungicide application: Know the disease threats to faba beans in specific locations, and how to manage them. The impact of fungal diseases on yield can be diminished in most areas through the use of fungicides either by seed dressing or foliar applications: (a) Success is dependent on monitoring, correct disease identification, coverage, rate and timeliness of sprays with the correct fungicide, (b) Reduce seed transmission of disease with Thiabendazole + Thiram application (helps control Botrytis fabae of faba bean and seedling root rots). (c) Chlorothalonil, mancozeb or metiram used as a foliar spray to control chocolate spot has the added benefit of controlling ascochyta seed staining and rust [27].

vi) Integrated disease management (IDM): To reduce the risk of disease damage growers will need to implement an integrated disease management strategy. This strategy should give more emphasis above all to a combination of cultural practices (crop rotation, cereal-faba bean mixed or row intercropping, etc.), resistant host plants, scheduled fungicide applications and the use of indigenous biocontrol agents for effective, economical, safe and sustainable management of faba bean chocolate spot, root rot and rust to increase the crop productivity that can help in ensuring food self-sufficiency in the country.

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Design of High pass and Low pass Filter using CMOS Operational Trans-conductance Amplifier

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Abstract - Low Power Consumption is the main target in today’s Technological aura and as Very large scale integrated circuit (VLSI) designing is very complex and it require much conceding nature to realise application precise objective. With increasing the efforts to reduce Power Consumption and to reduce W/L ratio, Low pass and high pass filter structure have widespread application and using CMOS Operational Trans-conductance amplifier gives capability to perform well in Nano-meter range as it has better control over short channel effect and other scaling problem like gate leakage, sub-threshold conduction. Low pass and high pass filter based on OTA for VHF and UHF frequency applications. At high frequencies, the OP AMP based active filters has limited performance. We cannot change the values of resistors and inductors but OTA-C filter provides ability to change their values by changing trans-conductance of OTA. The proposed filter consists of OTA and capacitors. This filter shows low sensitivity to passive components, low component count and ease in design. The simulations are done using Tanner EDA version 16.2 at 0.25nm technology.

Index Terms - AC characteristics; CMOS; DC characteristics; High pass filter; Low pass filter; OTA-C; Slew Rate;

I. INTRODUCTION

Analogue filters play a very significant role in every electronic system. Low pass filter passes signal with a frequency lower than a certain cut-off frequency and attenuates signal with frequencies higher than the cut-off frequency. The designing of filter using passive ladder filter as a prototype for active filters, such as operational trans-conductance amplifiers and capacitors (OTA-C), has become very popular. There is a increasing concern in continuous time filters because of applications such as portable electronic equipment, wireless receivers, continuous-time analogy-to-digital converters and etc. and for low power consumption here the most important part of the modulator is the OTA.[1] The main specifications of loop filter are very high linearity, high tune-ability and high DC-gain. The minimum input of the modulator is determined by the input referred noise seen at the trans-conductor, and the maximum input is limited by the linearity of trans-conductor, because transistors have nonlinear behaviour at high frequency and introduce harmonic distortions.[2]

The Designing of OTA is done on Tanner EDA software. It is a suite of tools for the design of integrated circuits. These tools allow us to enter. There are mainly three tools S-edit, W-edit, and L-edit. In S-edit that is Schematic, is a representation of the elements of a system using abstract, graphic symbols rather than realistic pictures. Design of the High Pass and Low Pass filters are first done on Schematic to check it Simulation and waveforms it generates T-Spice file and that shoe the results of the circuits. Another tool of Tanner EDA is L-Edit and it is an integrated circuit Physical design tool it allows us to draw layout of a circuit and look at cross-section, perform DRC (Design Rule Check) and generate a Netlist of your Layout so that we can perform LVS (Layout Versus Schematic) using a different tool.[3]

II. OTA DESIGN

Design of operational trans-conductance amplifier (OTA) is the main focus of this paper for designing high pass and low pass filter. The simplicity and linearity are the essential features of the OTA intended for any application. Filters using OTA and capacitors are called OTA-C filters or Gm-C filters. The Schematic of OTA is shown in Figure 1. An OTA integrator is the simplest OTA-C filter, which can be called as a first order low pass filter. It consists of only OTA and a capacitor. For designing of OTA-C filter, the passive ladder is taken as prototype and then using signal flow graph, and finally the required filter circuit is designed. There are numerous unlike OTA’s are used in which this OTA is a simple OTA with low supply voltage and high gain. The Op-amp is considered by various constraints like open loop gain, Bandwidth, Slew Rate, Noise and etc. [4]. The performance Measures are fixed. Due to Design parameters such as Transistors size, Bias current and etc. In this paper we describe design of OTA amplifier and this design is done in 0.25μm technology. The higher order filter can be designed to improve the frequency response and increase the sharpness of filter. They can be designed using different topologies like- cascade and passive ladder. The different types of filters like band pass, high pass and band reject filter can be realized using OTA and capacitor.
III. BACKGROUND

Today Power Consumption has become an increasingly important issue in filter. Previously filters were designed using Operational Amplifier which is a circuit that deliver high-gain amplification of the difference in Voltage between two inputs [3] [4]. Op–amp provide a very effective mean of creating low pass and high pass filter without the need for inductor. Low pass and high pass filter using op-amp can be used in many areas power supplies to the output of digital to analogue converters to remove alias signals and many more application. But as the advancement takes place in technological world Operational Trans-conductance Amplifier attains some merits over Op-amp [5]. OTA are “Voltage Controlled Amplifier” and has three inputs while op-amp has only two. Besides the two differential input terminals that an OTA and an Op-amp share, the OTA has third input that lets us set the gain of the amplifier by applying a current and the OTA is able to multiply two time varying signals, although both Op-amp and OTA has their own purpose of work.
but Op-amp is used in closed loop circuits while OTA are open loop [3].

IV. SCHEMATIC IMPLEMENTATION

The Schematic end user interface provides a diverse tool set for quickly and efficiently organizing element within the schematic views manually or with out-of-the-box or custom algorithm. However, to successfully deploy the functionality to the end user, Schematics project parameters configuration is required to tailor the application to the client’s environment and deliver functionality to the end user. The schematics designer interface provides the tools to configure the schematics project, and developer can use object to extend the base application to meet specific requirement.[6]

V. LAYOUT IMPLEMENTATION

Layout is essential a drawing process. You are drawing the two-dimensional geometries that will end up on your mask. Layout tools are essentially CAD drawing tools, but include additional useful features. We had implemented these techniques in Low Pass and High Pass filter using OTA. Filters were designed by using two NMOS and two PMOS and OTA was designed using four NMOS and two PMOS [7].

figure 6: Schematic of LPF

figure 7: Schematic of HPF

figure 8: Layout of Low Pass Filter
VI. SIMULATION RESULT

We had implemented these techniques in Low Pass and High Pass filter. Low pass and High pass filter were designed by passive elements using capacitor and register and were designed by CMOS transistors. After designing schematic of filters using OTA T-spice file got generated and from that T-Spice file layout was implemented. Layout design gave result as net list file which was then taken to the LVS and being compared. We got the output.

VII. CONCLUSION

There is a huge demand of filters either low or high pass in technological era at the same time low power consumption is great challenge. Through OTA filter design becomes modest hereafter in this design technique OTA as a basic active element has been consulted. This paper has shown that how a low pass and high pass filter designed using operational trans-conductance amplifier can reduce the power consumption in the circuit and it adds controllability to a number of circuits commonly implemented with the conventional op-amp. The design allows very low trans-conductance values to be achieved, and the clock signal facilitates easy digital tuning. In comparison to previous low pass filters from the literature, the proposed topology provides the lowest power consumption, in addition to very wide tuning range.

VIII. FUTURE SCOPE

As power consumption is going to be utmost demand in the upcoming technology and so as Operational Trans-conductance Amplifier is the basic change which can control the power consumption. To reduce heat dissipation in device due to leakage current very often in device most of power supply is wasted due to heat dissipation and in the battery devices it reduce the backup of that device. To design second order low pass and high pass filter devices(Schematics and layout design) and then go for power optimization.

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Design and Implementation a BPSK Modem and BER Measurement in AWGN Channel

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Abstract- Modems, in the beginning, were used mainly to communicate between data terminals and a host computer. Later, the use of modems was extended to communicate between end computers. This required more speed and the data rates increased from 300 bps in early days to 28.8 bps today. Today, transmission involves data compression techniques which increase the rates, error detection and error correction for more reliability. This research includes the design, implementation and simulation of a transmitter, a receiver of a BPSK based system. We implement a BPSK modem and BER measurement with an AWGN channel. We detect and count Error by this modem. With increasing SNR we reduce BER by the BPSK Modem.

Index Terms- AWGN Channel, BER Measurement, BPSK, SNR, White Noise.

I. INTRODUCTION

This experiment is based on an elementary transmitter and receiver design which implements binary phase shift keying (BPSK) as the modulation scheme for transmitting data across a wire. The data is generated in the transmitter and detected in the receiver. To vary the signal to noise ratio at the receiver we add artificial noise using a random voltage generator prior to the receiver. Objectives:

- To gain familiarity with the components of a simple data transmission system.
- To gain experience in constructing an experimental communication system and determine its performance in white noise.
- To calculate Bit Error Rate.
- To reduce Bit Error Rate.

II. BASIC BPSK COMMUNICATION SYSTEM

For constructing a BPSK modem we need a Transmitter, a Receiver, Error detector and counter. We also add a white noise generator with this system because our main goal is detect error when receiver receives noisy data from baseband transmitter. Figure 1 depicts a simplified block diagram of a baseband transmission system.

Generating the data signal: The message generator provides a sequence of binary pulses which are then converted into antipodal pulses to give the transmitted signal. The data rate is determined by the clock, which drives the pseudo-random message generator.

The Channel: The channel is simulated by the addition of the white Gaussian noise to the signal. The noise has a bandwidth of $\Omega$ Hz which is greater than the bandwidth of the filter in the receiver.

The Receiver: The receiver consists of a filter, which is matched to the transmitted signal, followed with a comparator, which is just a two-state device giving an output voltage of V volts if the input is greater than zero and an output of 0 volts if the input is a negative voltage.

Figure 1: Simplified Transceiver Structure

Figure 2: Baseband Transceiver Signal
Under high signal to noise ratio (SNR) values, the comparator will generate the correct data sequence with very small probability of error, although the data transmissions are likely to be displaced slightly from their true positions. To determine the probability of error, the data sequence at the comparator output is compared with the transmitted data sequence. The comparison is made by the error detector, which gives an output pulse for every bit error that occurs. These error pulses are counted over a known time period and the probability of bit error is determined for various SNR values. The SNR values are measured at the input to the detector’s filter. Note from figure 2 that sampling of the detector filter output effectively occurs in the error detector, where an error is defined to occur if the received data has a different polarity to the transmitted data during the period of each sampling pulse. The sampling pulses are aligned in time with the peak signal output from the detector filter and for simplicity are derived directly from the transmitter clock in this laboratory. The operation of the error detector is shown in Figure 3, which shows the waveforms in the presence of severe noise, with errors occurring.

The BPSK Modem:
The Transmitter’s Components: This is where we generate the baseband signal and convert it to a modulated band pass one. Data Sequence Generator: A TTL or CMOS logic shift register could be used as a pseudo-random sequence message generator. In this particular experiment we will utilize the clock pulse to generate a sequence of repetitive ones and zeros, i.e. 10101010………. To generate the message signal of 10101010…………….we feed the clock pulse into a 2nd order Butterworth Lowpass filter. Construct and add this second filter in series with the first one.

BPSK Modulation Stage: To modulate the phase of the sinusoidal waveform using the message signal (signal at the output of the frequency divider), we use an analogue switch (DG211 integrated circuit) which has the sinusoidal signal generated in signal generator at one of its inputs and an inverted copy (180° shifted copy) of this signal at its second input. The message signal is connected to a third input and used to control the analogue switch which produces a 0° shifted sinusoid when the message signal is high and a 180° shifted sinusoid when the message signal is low.

Before connecting the sinusoidal signal to the analogue switch, we remove the DC component of that signal to convert it to a non-return to zero sinusoid. To do this, we pass the signal through a simple RC high pass filter. To generate a 180° shifted copy of this sinusoid, we pass this signal into an operational amplifier inverter circuit. To produce the BPSK modulated signal, we take both outputs from the analogue switch circuits and connect them to an op-amp adder circuit implemented by the LM741 IC.

Note: the inverter and adder op-amp circuits are designed to both have a gain of 1

The channel: White Noise Adder The simplest kind of channels available is the memory-less additive white Gaussian noise (AWGN) channels. Additive white Gaussian noise (AWGN) is a channel model in which the only impairment to communication is a linear addition of wideband or white noise with a constant spectral density (expressed as watts per hertz of bandwidth) and a Gaussian distribution of amplitude. The model does not account for fading, frequency selectivity, interference, nonlinearity or dispersion. However, it produces simple and tractable mathematical models which are useful for gaining insight into the underlying behavior of a system before these other phenomena are considered.
Wideband Gaussian noise comes from many natural sources, such as the thermal vibrations of atoms in conductors (referred to as thermal noise or Johnson-Nyquist noise), shot noise, black body radiation from the earth and other warm objects, and from celestial sources such as the Sun. The AWGN channel is a good model for many satellite and deep space communication links. It is not a good model for most terrestrial links because of multipath, terrain blocking, interference, etc. However, for terrestrial path modeling, AWGN is commonly used to simulate background noise of the channel under study, in addition to multipath, terrain blocking, interference, ground clutter and self-interference that modern radio systems encounter in terrestrial operation.

To test our BPSK modem is such channels we use a Gaussian Noise Generator to produce a wideband signal with randomly varying waveform.

This noise signal is added onto the BPSK modulated signal using an op-amp adder circuit with a gain of 1.

The Receiver’s Components:
This is where we detect the modulated band pass signal and demodulated it back to baseband to detect the information transmitted and count the symbol error rate of the system under a variety of different signal to noise power ratio (SNR).

RC Low pass filter:
The first stage of the receiver is then to pass the BPSK noisy signal through a low pass filter. In this experiment, we use an RC filter with a cut-off frequency equivalent to the transmitted signal’s frequency.

The Correlator:
The correlator circuit consists of two stages, an analogue multiplier and an op-amp based integrator circuit. The multiplier used as the AD633 IC which has at its inputs both the received signal from the RC low pass filter and the original sinusoidal signal generated or its 180° inverted image from previous section. The output signal from this multiplier is then passed into the integrator circuit which is re-set to zero at the beginning of every symbol. The resetting of the integrator is performed using the fourth switch in the analogue switch circuit. This switch is left is triggered to close by the pulses delayed to occur at the positive edge and negative edge of every half cycle. The switch remains open during the integration of the remainder of the half cycle.

Synchronization (sampling and reset pulses generation):
In order to be able to compare both the transmitted signal and the detected one, it is highly important to synchronize both signals using the correct sampling and reset pulses. In this experiment the two types of pulses are generated from the reference data provided by the frequency divider. To generate all the required pulses, three “retriggerable monostable multivibrators” are needed. These can be built using the SN74121 IC circuit. By connecting the monostables as shown in the receiver’s circuit, the error detector’s sampling pulse of width 0.125ms can be obtained from the second monostable. This pulse is generated every half cycle of the reference data which would correspond to the moment when the integrator reaches the most positive (or negative depending on which symbol is being detected) peak voltage. The reset pulse of width 0.08ms (for the analogue switch connected to the integrator circuit of the correlator) can be obtained from the third monostable. This pulse is generated at the beginning of every half cycle to reset the integrator to zero.

The Comparator Circuit:
The comparator circuit is designed using an op-amp circuit using the LM311 integrated circuit. This circuit produces an output voltage of 5 volts when it receives a positive input and zero volts when it receives a negative input. This results in regenerating the original baseband signal.

The Error Detector:
This circuit performs a comparison between the signal at the output of the comparator and a delayed copy of the original signal from the frequency divider. It must be noted that this comparison only takes place during the sampling pulse only. If the reference data and the received data have different polarities during the sampling pulse this will produces an error pulse. The error detector is designed using two logic circuits which include an XOR gate DM74LS86 and NAND gate SN7400 ICs. Two monostables, SN7421 ICs, are also used here to generate the delayed version of the reference data. Connecting the monostables as shown in the receiver figure produces an x ms long delayed version of the original data signal at the output of the second monostable. This signal and the received copy from the comparator are connected to the XOR circuit which will only produce a high voltage when the two inputs are different. The output from the XOR is connected to the input of the first NAND gate which also has the sampling pulse connected to its other input. The NAND gate will produce zero voltage at its output only if both inputs are high. The output of this NAND gate is applied to the input of the second NAND gate in the same IC circuit along with a voltage of 5 volts on its second input. If the output of the second NAND gate is high it indicates there is an error otherwise there is no error. This output is connected to the counter to determine the error rate over a certain signal to noise ratio (SNR).

- Measure the bit error rate (BER) for different SNR values, where

$$SNR = \frac{V^2_{rms}}{V^2_{n}} \cdot W \cdot T$$ and  $$BER = \frac{\text{number of errors counted}}{\text{number of bits transmitted}}$$

- Compare the measured BER with the theoretically estimated one using:

$$BER_{\text{theoretical}} = 0.5 \cdot erfc(\sqrt{SNR})$$

III. DESIGN AND IMPLEMENTATION

Tools and Components: Transmitter: Clock IC NE555, Frequency Divider IC DM74LS74, Op-Amp Inverter IC LM74,

**Receiver:** Low pass filter, Frequency Divider IC 7474, Monostable IC SN74121, Analogue Switch IC DG211, Analogue Multiplier IC AD633, Op-Amp Integrator IC LM311, Error Detector, XOR Gate IC DM74LS86, NAND Gate IC, SN7400, Resistors, Capacitors, Power source, Breadboard, Oscilloscope.

**Design of Transmitter and Receiver:**

**Transmitter**
- Arrange all the components needed for the transmitter circuit.
- Connect the circuit properly showed in figure 4.
- Connect the circuit with a 5V DC power supply.
- Use the oscilloscope to observe Transmitter output signal showed in figure 2.

**Receiver**
- Arrange all of component needed for receiver circuit
- Connect the circuit properly showed in figure 5.
- Connect the circuit with power supply.
- Connect the output of transmitter to the input of the receiver.
- Use the oscilloscope to observe the output showed in figure 3.

IV. SIMULATION

For simulations we have used MATLAB for BPSK Modem BER measurement with AWGN channel and reduce the error rate.

**BPSK Modulation and Demodulation:**
Using MATLAB we design BPSK modem modular and demodular. Collect all parameters from MATLAB library and produce a module like following figure.

![BPSK Modulation and Demodulation](image)

Figure 6: the BPSK Modem Modulation and Demodulation

The Transmitter output and The Receiver output of BPSK modem shown in figure below.

![Modulated and Demodulated signal curve](image)

Figure 7: Modulated and Demodulated signal curve

**Bit Error Rate calculation:**
For BER (Bit Error Rate) calculation we design BPSK modem with AWGN channel.
For design this system we need Binary Symmetric Channel block, BPSK Modulator Baseband block, AWGN Channel block, BPSK Demodulator Baseband block, Error Rate Calculation block and a Display block.
The combination of system parameters from MATLAB library Shown in figure below:
Figure 8: the BPSK Modem with AWGN

**System Parameter 1:**
- Probability of a zero=0.5
- Initial seed=61
- Sample time=1
- Output data type=Double
- Receive delay=0
- Computation delay=0
- Target number of errors=100
- Maximum number of symbols=1e6

**Result:**
- The bit error rate=0.01162
- The number of errors=100
- The total number of bits that are transmitted=8604

Figure 9: BER measurements with probability 0.5

**System Parameter 2**
- Error probability=0.01
- Line seed=2137
- SNR 4.2

**Result:**
- The bit error rate=0.01184
- The number of errors=100
- The total number of bits that are transmitted=8447

Figure 10: BER measurement when error probability 0.01

**System Parameter 3**
- Error probability=0.01
- Line seed=10
- SNR=4.2

**Result:**
- The bit error rate=0.01183
- The number of errors=100
- The total number of bits that are transmitted=8454

Figure 11: BER measurements with changed Line seed

**System Parameter 4**
- Error probability=0.01
- Line seed=10
- SNR=7

**Result:**
- The bit error rate=0.0007574
- The number of errors=100
- The total number of bits that are transmitted=1.32e+005

Figure 12: BER measurements with changed SNR

**System Parameter 5**
- Error probability=0.01
- Line seed=10
- SNR=3

**Result:**
- The bit error rate=0.02217
- The number of errors=100
- The total number of bits that are transmitted=4511

We also measure Bit Error Rate (BER) using MATLAB code. Figure 13 depicts the curve BER Vs Signal to noise ratio (Eb/No). Where the signal to noise ratio denoted by dB form.
Reduction of the Error Rate Using Cyclic Code: In coding theory, cyclic codes are linear block error-correcting codes that have convenient algebraic structures for efficient error detection and correction. The Binary Cyclic Encoder block creates a systematic cyclic code with message length K and codeword length N. The number N must have the form $2^M - 1$, where M is an integer greater than or equal to 3. This block accepts a column vector input signal containing K elements. The output signal is a column vector containing N elements. The Binary Cyclic Decoder block recovers a message vector from a codeword vector of a binary systematic cyclic code. For proper decoding, the parameter values in this block should match those in the corresponding Binary Cyclic Encoder block. If the cyclic code has message length K and codeword length N, then N must have the form $2M - 1$ for some integer M greater than or equal to 3. This block accepts a column vector input signal containing N elements. The output signal is a column vector containing K elements. Here by adding channel coding reduction of error rate has been done in the model shown in the figure 14 BPSK Modulation Model, for certain noise levels.

To design this system here we have used Binary Symmetric Channel block, Binary Cyclic Encoder, BPSK Modulator Baseband block, AWGN Channel block, BPSK Demodulator Baseband block, Binary Cyclic Decoder, Error Rate Calculation block and a Display block. Wide window model and connections between the blocks have been shown in the following figure.

Figure 13: BER Vs Eb/No using BPSK in AWGN Channel

![Figure 13: BER Vs Eb/No using BPSK in AWGN Channel](image)

Figure 14: Reduction of error rate of BPSK modem

**Calculation**

**Simulation Parameters:**
- **Bernoulli Binary Generator:**
  - Probability of a zero = 0.01
  - Samples per frame = 21
- **Binary Cyclic Encoder and decoder:**
  - Codeword length N = 31.
  - Message length K = 21.
- **AWGN channel**
  - Mode = Signal to Noise Ratio (Eb/No) = $7 + 10 \times \log_{10}(\frac{21}{31})$
  - Symbol period = 21/31
- **Error-Rate Calculation**
  - Maximum number of symbols = 1e7

**Results:**
- The bit error rate = 8.025e-005
- The number of errors = 103
- The total number of bits that are transmitted = 1.284e+006

![Figure 14: Reduction of error rate of BPSK modem in AWGN channel](image)

V. CONCLUSION AND FUTURE WORK

In this study, the performance of the BPSK modem is to detect error at different data rates. It also counts the BER (Bit Error Rate) at different signal to noise ratios:

- It is observed that when Transmitted data is 8604bps then the BER is 0.01162 and total error is 100. In this section Signal to noise ratio is 4.2dB.
- It is observed that when Transmitted data is 1.32e+005bps then the BER is 0.0007574. In this section Signal to noise ratio is 7dB.
- Finally it is observed that with increasing Signal to Noise Ratio decreasing Bit Error Rate (BER).
- In this project, The BPSK modem also reduce error rate using cyclic code.
- It is observed that the total number of bits is transmitted is 1.284e+006bps then the Bit Error Rate is only 8.025e-005 and the total number of error is 103.
Following are the areas of future study which can be considered for further research work.

- This research can be easily implemented as a Satellite Modem. A satellite modem or sat modem is a modem used to establish data transfers using a communications satellite as a relay. The main functions of a satellite modem are modulation and demodulation. Satellite communication standards also define error correction codes and framing formats. These functions are easily designed by BPSK.

- We can use this modem where we need data transmission and detect error.

- We can also use this modem to reduce the Bit Error Rate in data communication.

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Impact of Social Media among Students’ Behaviors in Tertiary Institution of Adamawa State, Nigeria

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Abstract- The impact of social media among students behavior in tertiary institution has become worrisome. Social media is a means of connections among people in which they create, share, and exchange information and ideas in virtual communities and network. This craze for social media has led to a host of question regarding its impact among students behavior particularly in tertiary institution. This paper is set to study the impact of social media among students in tertiary institution in Adamawa State, Nigeria. A 5 likert scale questionnaire comprises of 19 questions was used as an instrument for data collection. 300 respondents sampled from 6 selected tertiary institutions in Adamawa State formed the population of the study. Descriptive statistics was used to analyze the data. The study revealed that social media has positive impact as well as negative impact on students behavior. The study further recommended that students need to be trained on better usage of social media so as to minimize its misused, School management should train and encourage students on how to use skype and other video conferencing tools to have discussion with lecturers and group members academically.

Index Terms- Social media, tertiary institution, students behavior, impact of social media

I. INTRODUCTION

Knowledge is power and information is life. This is a common saying, however many recognized this saying but few understand the empowering role social media has played to justify the saying. Through social media, anyone online is empowered by an unrestricted flow of information to add or contribute to their knowledge bank. In our modern society, it is undeniable that social media plays vital role in impacting our culture, our economy and our overall view of the world. Social media is a recent forum that brings people to exchange idea, connect with, relate to, and mobilize for a cause, seek advice, and offer guidance. Social media has removed communication barriers and created decentralized communication channel and open the door for all to have a voice and participate in a democratic fashion including people in repressive countries. This media outlet accommodates a wide variety spontaneous, formal, informal, scholarly and unscholarly writings to flourish. It enables common interest based groups such as students to work in a collaborative group projects outside of their class. It fosters creativity and collaboration with a wide range of commentators on a number of issues such as education, the economy, politics, race, health, relationships, religion etc.

Shrestha (2013) described that social media is a means of connections among people in which they create, share, and exchange information and ideas in virtual communities and networks. Walter and Riviera (2004) defined social media as “the relationships that exist between network of people”. Schill (2011) states that the social media sites encourage negative behaviors for teen students such as procrastination (catching up with friends), and they are more likely to drink and drug. However, every day, many students are spending countless hours immersed in social media, such as Facebook, MySpace, Whatsapp, or skype. At first glance this may seem like a waste of time; however it also helps students to develop important knowledge and social skills, and be active citizens who create and share content.

Through social media, people can use networks of online friends and group memberships to keep in touch with current friends, reconnect with old friends or create real life friendships through similar interests or groups. Besides establishing important social relationships, social media members can share their interests with other likeminded members by joining groups and forums.

People get connected to one another after registration and then post news, information, fake news and other things including videos and pictures etc. (Kuppusswamy and Shankar, 2010). Although social network can be used for good purposes but it is generally used for involvement of digital snapshots, illuminating demographic material and information, exposing securities, and conducting online conversations, because many communities motivate user for this kind of inappropriate actions and these communities has almost spoiled the image of social networks (Cain, 2008). In Modibbo Adama University of Technology Yola, Adamawa State Nigeria on 09th February 2018 the school was to commence its second semester examination for 2018/2019 academic session, the school was closed down on the 9th of February 2018 as a result of religion upraise on 18th February, 2018 that claimed the life of a student and left many others injured while school facilities was burnt down by the aggrieved students. This was as a result of a Whatsapp group chart in social media where a student posted a chart that other religious body sees it as blasphemy. Social media lack the ability to check post before sharing whether it is negative or positive. Hence this paper is set to study the impact of social media among students in tertiary institution.
students’ behaviors in tertiary institution in Adamawa State, Nigeria.

II. RELATED WORK

To educate a child is to ensure his future. Providing education is very essential part of an individual’s life for every teenager, education is more important than anything. Today teenager shows very much interest for using social networks but unfortunately Social Networks affect education badly (Kuppuswamy and Shankar, 2010). Previous research has calculated that more than 90% of college students use social networks (Elison, Steinfield and Lampe, 2007). Technology has shown a fast development by producing small communication devices but these small communication devices can be used for accessing social networks any time anywhere, these devices include pocket computers, laptops, iPads and even simple mobile phones (which support internet) etc. Technology is step towards betterment, no doubt but any technology which can provide ease of social networks can be dangerous for social network addicts. Providing ubiquitous facility of social networks is a straight invitation of addiction to any teenager and even an adult, as academic satisfaction is not enough for those students who suffers from social isolation (Tiftany, Yevdokiya and Sandra, 2009).

Consequently, harassment among peers has become unlimited thanks to the youth’s access to the modern technologies. Bullying has occurred in a new territory, online (Li, 2006). Studies suggest that offline bullying usually increases in middle school but online harassment happens later and continues into high school (Wolak et al, 2006).

This social media has also resulted in the development of dangerous online behavior. Thus, not only the exposition to unwanted material has been considered as a serious risk, but also the participation and the facility to become a member of controversial groups. Some students may identify strongly with this sort of material and they may feel validated and encouraged to practice it (Wolak, et al., 2003). Ybarra et, al. (2007) study found that —engaging in many different kinds of online risky behaviors explain online interpersonal victimization more than engaging in specific individual behaviors. Interestingly, according to Ybarra et al., (2007) engaging in online risky behaviour takes place while youth is using the internet with friends or peers. Bannink, Broren, Van and Petra (2014) pointed that Cyber bullying has become a major issue among youths in the last couple of decades, as it allows its victim's to post things in front of their peers and humiliate them. Bullying is defined as an aggressive act that is carried out by a group or an individual repeatedly and over time against a victim who cannot easily defend him or herself. With the use of Internet and mobile phones, a new form of bullying has emerged, often called ‘cyber bullying’. In cyber-bullying, aggression occurs via electronic method, via the Internet and especially through social media (Bannink, Broren, Van and Petra, 2014).

III. METHOD AND MATERIAL

The sample population of the study consisted of 300 students drawn from 6 selected tertiary institutions out of the 10 in Adamawa state. These schools are Adamawa State Polytechnic, Yola, Adamawa State University Mubi, Federal Polytechnic, Mubi, College for Legal Studies Yola, College of Education Hong, and College of Agric Ganye.

The descriptive research design was used for this study, the main method employed to collect data was questionnaire which was designed in three sections. Section A contained the bio-data of the respondents, section B is a multiple choice questions for the respondents in line to the study and section C contained five likert scale questionnaire comprises of 16 questions on the impact of social media on students behavior. A total 50 students from each of the selected schools will be issued a questionnaire to fill for the study.

**Table 1. Selected schools**

<table>
<thead>
<tr>
<th>S/N</th>
<th>Name of School</th>
<th>Local Government</th>
<th>Sampled respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Adamawa State Polytechnic, Yola North</td>
<td>50</td>
<td></td>
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<tr>
<td>2</td>
<td>Adamawa State University Mubi</td>
<td>50</td>
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<td>3</td>
<td>Federal Polytechnic Mubi</td>
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<td>4</td>
<td>College for Legal Studies Yola South</td>
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<td>5</td>
<td>College of Education Hong</td>
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<td></td>
<td>College of Agric Ganye</td>
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</tbody>
</table>
IV. RESULT AND DISCUSSION

**Figure 1**

![Bar chart showing the most common activities when using the internet: Chart room is the most common activity at 50.00%, followed by Surfing internet at 30.00%. Game and Research activities are the least common at 10.00%.](image)

**Figure 2**

![Bar chart showing the most commonly used social networking sites: Facebook leads with 45.00%, followed by Whatsapp at 35.00%. Other sites like Twitter, Skype, Youtube, and Instagram have lower usage.](image)
Table 2: Summary of the opinion by 300 respondents in line with the key questions

<table>
<thead>
<tr>
<th>S/N</th>
<th>Key question</th>
<th>SD</th>
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<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>183</td>
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<td>2</td>
<td>3</td>
<td>106</td>
<td>185</td>
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<td>3</td>
<td>5</td>
<td>192</td>
<td>97</td>
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<td>28</td>
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<tr>
<td>5</td>
<td>8</td>
<td>23</td>
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<td>161</td>
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<td>6</td>
<td>9</td>
<td>178</td>
<td>109</td>
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<td>7</td>
<td>11</td>
<td>203</td>
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<td>8</td>
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<td>9</td>
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<td>109</td>
<td>134</td>
<td>0</td>
<td>36</td>
<td>21</td>
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</tbody>
</table>

Table 3: Shows responses on key question 1: Students frequently upload and share videos and photograph on social media.

<table>
<thead>
<tr>
<th>S/N</th>
<th>Key question</th>
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<tr>
<td>1</td>
<td>1</td>
<td>183</td>
<td>110</td>
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</tbody>
</table>

Table 3 shows responses on students frequently upload and share videos and photograph on social media. 60% respondents said they strongly agreed that students upload and share videos and photograph on social media, 36.6% agreed, 0% undecided, 1.6% disagreed while 0.6% strongly disagreed. The result of the findings affirmed that 60% of the students strongly agreed to the assertion that they upload and share videos and photograph on social media.

Table 4: Shows responses on key question 3: Students love visiting social networks because they meet new people.

<table>
<thead>
<tr>
<th>S/N</th>
<th>Key question</th>
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<td>106</td>
<td>185</td>
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</table>

Table 4 shows responses on students love visiting social networks because they meet new people. 35.3% respondents said they strongly agreed that students love visiting social media networks because they meet new people, 61.6% agreed, 0% are undecided, 2% disagreed while 1% strongly disagreed. The result of the findings affirmed that 61% of the students agreed to the assertion that they love visiting social networks because they meet new people.

Table 5: Shows responses of key question 5: Students chart on forum/group where messages are share to the whole group.

<table>
<thead>
<tr>
<th>S/N</th>
<th>Key question</th>
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<tr>
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<td>192</td>
<td>97</td>
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</tr>
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</table>

Table 5 shows responses on students chart on forum/group where messages are share to the whole group. 64% respondents said they strongly agreed that students chart on forum/group where messages are share to the whole group, 32.3% agree, 0.6% are undecided, 2% disagreed, while 1% strongly disagreed. The result of the findings affirmed that 64% of the respondents strongly agreed to the assertion that they chart on forum/group where messages are share to the whole group.

Table 6: Shows responses of key question 6: Students use the internet to do assignment and enriching class note.

<table>
<thead>
<tr>
<th>S/N</th>
<th>Key question</th>
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<tr>
<td>4</td>
<td>6</td>
<td>28</td>
<td>59</td>
<td>0</td>
<td>136</td>
<td>77</td>
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</tbody>
</table>

Table 6 shows responses on students use the internet to do assignment and enriching class note. 9.3% respondents said they strongly agreed that students use the internet to do assignment, 19.6% agreed, 0% of the students are undecided, 45.3% disagreed while 25.6% strongly disagreed. The result of the findings affirmed that 45.3% of the students disagreed with the assertion that students use the internet to do assignment and enriching class note.

Table 7: Shows responses of key question 8: Students use skype and other video conferencing tools to have discussions with lectures and group members academically.

<table>
<thead>
<tr>
<th>S/N</th>
<th>Key question</th>
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<td>83</td>
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</table>

Table 7 shows responses on students use skype and other video conferencing tools to have discussions with lectures and group members academically. 7.6% of the respondents said they strongly disagreed that students use skype and other video conferencing tools to have discussions with lecturer and other group members, 9.6% disagreed, 1.3% are undecided, 53.6% disagreed while 27.6% strongly disagreed. The result of the findings affirmed that 53.6% of the students disagreed with the assertion that students use skype and other video conferencing tools to have discussions with lectures and group members academically.
tools to have discussion with lecturers and group members academically.

Table 7: shows the responses of key question 9: Social media makes students lazier

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<tr>
<th>S/N</th>
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<td>178</td>
<td>109</td>
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Table 7 shows responses on students that social media makes student lazier. 59.3% respondents said they strongly agreed that social media makes students lazier, 36.6% agreed, 0.3% are undecided, 3% disagree, 1% strongly disagreed. The result of the findings affirmed that 59% of the respondents strongly agreed to the assertion that social media makes students lazier.

Table 8: shows the response of key question 11: Social media can facilitate negative ethnic-religion conflict among students

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Table 8 shows responses on social media can facilitate negative ethnic-religion conflict among students. 67.6% respondents said they strongly agreed that social media can facilitate negative ethnic-religion conflict among students, 29% agreed, 0% were undecided, 2.3% disagreed while 1% strongly disagreed. The result of the findings affirmed that 59.3% of the respondents strongly agreed to the assertion that social media can facilitate negative ethnic-religion conflict among students.

Table 9: shows the responses of key question 12: Due to social media, many students have been accidentally introduce to pornographic sites

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Table 9 shows responses on due to social media, many students have been accidentally introduce to pornographic sites. 42.3% respondents said they strongly agreed that due to social media many students have been accidentally introduced to pornographic sites, 47% agreed, 1% are undecided, 7-3% disagreed while 2.3% strongly disagreed. The result of the findings affirmed that 47% of the respondents agreed to the assertion that due to social media many students have been accidentally introduced to pornographic sites.

Table 10; shows the responses of key question 15: Social media has given a viable platform for hate speech among students

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</table>

Table 10 shows responses on social media has given a viable platform for hate speech among students. 36.3% respondents said they strongly agreed that social media has given a viable platform for hate speech among students, 44.6% agree, 0% are undecided, 12% disagreed while 7% strongly disagreed. The results of the findings affirmed that 44.6% of the respondents agreed to the assertion that social media has given a viable platform for hate speech among students.

V. CONCLUSION

The study found out that most common activity that students do in social media is charting as indicated in figure 1. 49% of the respondents indicated that they always chart while on social media. Figure2 shows that the most commonly used social networking site is whatsapp followed by Facebook with 42% and 31% respectively.

The study further revealed that social media had various effects on student’s behavior. For example table 7 indicates that 59.3% of the respondents strongly agreed that social media makes students lazier, table 8 also indicates that 67.6% of the respondents strongly agreed that social media can facilitate negative ethnic-religion conflict among students and table 10 indicates that 44.6% of the respondents agreed that social media has given a viable platform for hate speech among students.

The study further revealed that, students frequently upload and share videos and photographs in social media as indicated in table 3. Table 4 indicates that students love visiting social networks because they meet new people and also connect to friends and family members.

VI. RECOMMENDATIONS

I. Students need to be trained on better usage of social media so as to minimize its missuses. For instance table 5 indicates that students don’t mostly use social media to do assignment and enriching class note.

II. School management should train and encourage students on how to use skype and other video conferencing tools to have discussion with lecturers and group members academically.

III. Nigeria communication commission (NCC) and network providers should set up a means of filtering information that is shared or post on social media to avoid inciting statement and minimize pornographic and unwarranted materials through chart or post.

IV. Parents and security agencies should monitor the activities of students on social media.
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Grey Multi Criteria Decision Making Methods

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Abstract - Multi-Criteria Decision Making is the most well-known branch of decision making. In some cases, determining precisely the exact value of attributes is difficult and their values can be considered as Uncertain data. This paper presents two different Multi Criteria Decision Making methods based on grey numbers. The two methods are used to obtain the final ranking of the alternatives and select the best one under grey numbers. Finally, an illustrative example is presented and the results are analyzed.

Index Terms - Grey Numbers, Multi-Criteria Decision Making Methods, subjective weights, objective weights.

I. INTRODUCTION

Multi-Criteria Decision Making (MCDM) is a branch of a general class of Operations Research (OR) models which deal with decision problems under the presence of a number of conflicting decision criteria. The MCDM is considered as a complex decision making (DM) tool involving both quantitative and qualitative factors. Some of the most widely used MCDM methods are Simple Additive Weighting (SAW), Weighting Product (WP), Analytic Hierarchy Process (AHP), Preference Ranking Organisation Method for Enrichment Evaluations (PROMETHEE), COMplex PRoportional ASsessment (COPRAS), ELimination and Choice Expressing Reality (ELECTRE), and the Technique for Order Preference by Similarity to an Ideal Solution (TOPSIS) method [1].


This paper presents two novel different Multi-Criteria Decision Making (MCDM) methods with grey numbers; grey Operational Competitiveness Rating Analysis (GOCRA) and Grey multi-objective optimization on the basis of simple ratio analysis (GMOOSRA). The two methods are used to choose the best alternative among the various alternatives under the grey numbers. The Subjective and Objective Weight Integrated Approach (SOWIA) method was presented to determine the weight of each evaluation criterion.

I. Grey Theory

Grey theory, which was proposed by Deng [2], is one of the new mathematical theories born out of the concept of the grey set. It is an effective method used to solve uncertainty problems with discrete data and incomplete information [2].

Basic Operations of Grey Numbers

Let $\otimes x_1 = [x_1, \bar{x}_1]$ and $\otimes x_2 = [x_2, \bar{x}_2]$ be two interval grey numbers. The basic operations of grey numbers $\otimes x_1$ and $\otimes x_2$ are defined as follows [10]:

\[
\begin{align*}
\otimes x_1 + \otimes x_2 &= [x_1 + \bar{x}_2, \bar{x}_1 + \bar{x}_2] \text{ addition}, \\
\otimes x_1 - \otimes x_2 &= [x_1 - \bar{x}_2, \bar{x}_1 - \bar{x}_2] \text{ subtraction}, \\
\otimes x_1 \times \otimes x_2 &= [x_1 \times \bar{x}_2, \bar{x}_1 \times \bar{x}_2] \text{ multiplication}, \otimes x \\
\otimes x_1 \div \otimes x_2 &= \left[\frac{x_1}{\bar{x}_2}, \frac{\bar{x}_1}{\bar{x}_2}\right] \text{ division}.
\end{align*}
\]

Whitened Value [11]:

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The whitened value of an interval grey number, $\bigotimes x$, is a deterministic number with its value lying between the upper and lower bounds of interval. For a given interval grey number $\bigotimes x = [\underline{x}, \overline{x}]$ the whitened value $\mathcal{X}(\lambda)$ can be determined as follows:

$$\mathcal{X}(\lambda) = \lambda \overline{x} + (1 - \lambda) \underline{x}$$  \hspace{1cm} (5)

Here $\lambda$ as whitening coefficient and $\lambda \in [0, 1]$. Because of its similarity with a popular $\lambda$ function formula is often shown in the following form:

$$\mathcal{X}(\lambda) = \lambda \overline{x} + (1 - \lambda) \underline{x}$$  \hspace{1cm} (6)

For $\lambda = 0.5$, formula gets the following form:

$$\mathcal{X}(\lambda = 0.5) = \frac{1}{2}(\overline{x} + \underline{x})$$  \hspace{1cm} (7)

II. USED METHODS

This section is made for illustrating and analyzing the methods and techniques used in this paper.

A. **Subjective and objective weight integrated approach (SOWIA) method:**

SOWIA method was used in this study to determine the weight of each criterion. This method based on a combination of objective and subjective weights that gives its superiority over the subjective and objective standalone techniques well known in literature. In this study, a novel combination of the SOWIA method by employing the Standard deviation (as the objective part) and Rank Sum method (as the subjective part). Both components were never combined before in previous studies.

The SOWIA Method procedure consists of the following steps:

**Step 1:** The decision matrix $D = [x_{ij}]$ is prepared

**Step 2:** The values associated with attributes ($x_{ij}$) may be in different units. To avoid the influence of various dimensions of elements of ($x_{ij}$), the matrix is normalized using the following equation [12]:

$$x_{ij}^* = \frac{\sum_{i=1}^{m} x_{ij}}{\sum_{i=1}^{m} x_{ij}}$$  \hspace{1cm} (8)

Where $x_{ij}^*$ is the normalized value of $x_{ij}$ and $\sum_{i=1}^{m} x_{ij}$ is the total of the values of jth attribute for ‘m’ number of alternatives.

**Step 3:** This step deals with determination of weights of importance of the attributes. The same can be determined by three ways, namely:

a. **Objective weight ($O_j$) of importance of attributes [13]:**

Standard deviation (SD) method is considered to determine the objective weight ($O_j$) of the attributes. This is determined in the following way

$$\sigma_j = \sqrt{\frac{\sum_{i=1}^{m} (x_{ij} - \overline{x}_j)^2}{m}}$$  \hspace{1cm} j = 1, \ldots, n  \hspace{1cm} (9)

The following equation is used to calculate $O_j$.

$$\frac{\sigma_j}{\sum_{j=1}^{n} \sigma_j} \hspace{1cm} O_j = \frac{\sigma_j}{\sum_{j=1}^{n} \sigma_j}$$  \hspace{1cm} j = 1, \ldots, n  \hspace{1cm} (10)

$\sigma_j$ = standard deviation

$O_j$ = Objective weight of importance of criteria

b. **Subjective weight ($S_j$) of importance of attributes [12]:**

Using Rank Sum weight method (RS) to determine the Subjective weight. In the rank sum (RS) procedure the weights, are the individual ranks normalized by dividing by the sum of the ranks. The formula producing the weights is the following:

$$w_j^{(RS)} = \frac{n-r_j+1}{\sum_{i=2}^{n-r_j+1} (n+1-r_j)}$$  \hspace{1cm} (11)

Where $w_j^{(RS)}$ is the normalized weight for dimension j, N is the number of dimensions, and $r_j$ is the rank of the j-th criterion, $j = 1, 2, \ldots, n$.

c. **Integrated weight ($W_j^\text{int}$) of importance of attributes [12]:**
If the decision maker wants to utilize the combined effect of objective and subjective weight as described in earlier steps he/she may use the integrated weight as defined in the following equation:

\[ W_{j}^{\text{int}} = \alpha \cdot O_j + (1 - \alpha) \cdot S_j \]  

(12)

Where \( \alpha \) is known as objective factor decision weightage. The value of \( \alpha \) lies in the interval \((0, 1)\). \( O_j \) and \( S_j \) are objective and subjective weight respectively. As \( \alpha \) can be assigned any value in the interval \((0, 1)\).

B. **The multi-objective optimization on the basis of simple ratio analysis (MOOSRA) method**

First MOOSRA method has been developed by Das et al.\[15\]. Generally, the MOOSRA methodology starts with the formulation of decision matrix which has in general four parameters, namely: alternatives, criteria or attributes, individual weights or significance coefficients of each criteria and measure of performance of alternatives with respect to the criteria. Considers both beneficial and non-beneficial objectives (criteria) for ranking or selecting one or more alternatives from a set of available options.

C. **Operational Competitiveness Rating Analysis (OCRA) Method**

In OCRA method, in the first step, the preference ratings with respect to nonbeneficial or input criteria are determined; in the second step, the preference ratings of the output criteria are determined and in the last step, the overall preference ratings of the available alternatives are evaluated where both the cardinal and ordinal data are used. OCRA uses an intuitive method for incorporating the decision maker’s preferences about the relative importance of the criteria \[16\].

### III. PROPOSED TECHNIQUES

All the proposed methods are using SOWIA method. The two methods proposed are GMOOSRA, and GOCRA for performance evaluation of alternatives.

D. **Grey multi-objective optimization on the basis of simple ratio analysis (GMOOSRA) method**

The aims of this study extend the MOOSRA method \[15\] for solving decision making problems with grey data. By extending the MOOSRA method, an algorithm to determine the most preferable alternative among all possible alternatives, when performance ratings are given as grey numbers, is presented.

The procedure of applying the MOOSRA-G method consists of the following steps:

**Step 1**: Selecting the set of the most important attributes, describing the alternatives.

**Step 2**: Constructing the decision-making matrix \( \otimes X \). Grey number matrix \( \otimes X \) can be defined as \[17\]:

\[ \otimes X = \begin{bmatrix} \otimes x_{11} & \otimes x_{12} & \ldots & \otimes x_{1m} \\ \otimes x_{21} & \otimes x_{22} & \ldots & \otimes x_{2m} \\ \vdots & \vdots & \ddots & \vdots \\ \otimes x_{n1} & \otimes x_{n2} & \ldots & \otimes x_{nm} \end{bmatrix} \]

\[ W = [w_1, w_2, \ldots, w_n] \]

Where \( \otimes x_{ij} \) denotes the grey evaluations of the i-th alternative with respect to the j-th attribute; \( [\otimes x_{i1}, \otimes x_{i2}, \ldots, \otimes x_{im}] \) is the grey number evaluation series of the i-th alternative, \( i=1, n \), \( j=1, m \).

**Step 3**: Constructing the normalized grey decision matrices.

For the normalization of responses of alternatives expressed in the form of interval grey numbers, Jahanshahloo et al. \[18\] suggested the use of the following formula:

\[ \otimes X^e_{ij} = \frac{1}{\sqrt{\sum_{j=1}^{m} x_{ij}^2 + x_{ij}^2}} \]

(14)

To calculate the lower and the upper bounds of an interval grey number can be determined using the following formulae \[18\]:

\[ \overline{X}_{ij} = \sqrt{\frac{1}{2} \sum_{j=1}^{m} x_{ij}^2 + \overline{x}_{ij}^2} \]

and

\[ \underline{X}_{ij} = \sqrt{\frac{1}{2} \sum_{j=1}^{m} x_{ij}^2 + \underline{x}_{ij}^2} \]

(15)

(16)
Step 4: Weighted normalized grey decision matrix $\otimes \hat{X}$ is formed by using $W^{int}$ criteria significance calculated in SOWIA method. The weighted normalized values $\otimes \hat{x}_{ij}$ are calculated as follows:

$$\otimes \hat{x}_{ij} = \otimes x^*_{ij} \times w_j, \quad i = 0, m,$$  \hspace{1cm} (17)

Where $w_j$ is the weight (importance) of the j criterion and $\otimes x^*_{ij}$ is the normalized rating of the j criterion.

Step 5: Determination of performance of the Alternatives

For optimization based on the MOOSRA method, the performance score $\otimes y^*_1$ of all the alternatives are computed as:

$$\otimes y^*_1 = \sum_{i=1}^g \otimes \hat{x}_{ij},$$  \hspace{1cm} (18)

Here;

$\sum_{j=1}^g \otimes \hat{x}_{ij}$, benefit criteria for 1, …, $g$
$\sum_{j=g+1}^n \otimes \hat{x}_{ij}$, cost criteria for $g+1, \ldots, n$

$g$, maximum number of criteria to be done. $(n-g)$, minimum number of criteria to be done.

Step 6: the crisp values of the overall performance of the Alternatives

Performance values are also grey numbers, these values should be transformed into performance crisp values.

Step 7: Determining the Whitened Value

Convert the interval grey number to Whitened Value can be determined as the follows:

$$X(\lambda) = \lambda \bar{x} + (1 - \lambda) \bar{x}$$  \hspace{1cm} (19)

For $\lambda = 0.5$, formula gets the following form:

Here as whitening coefficient and $\lambda \in [0, 1]$,

$$\text{as } \otimes y^*_i = \left( \frac{y_i^* + y_i^*}{2} \right) \hspace{2cm} (20)$$

$$y_i^* = \frac{1}{2} (y_i^* + y_i^*) \hspace{2cm} (21)$$

Calculated $y_i$ values are ranked from the biggest to the smallest and an evaluation is done among the alternatives.

Step 8: Ranking of the Alternatives

The alternative with the highest overall performance index is the most favorable choice.

E. Grey Operational Competitiveness Rating Analysis Method (GOCRA)

This study extends the OCRA method [16] for dealing with grey data, and an algorithm for determining the best choice among all possible choices when the data are grey number is also presented.

The approach for extending the OCRA method grey environment is as follows:

Step 1: construct the grey decision matrix. In the grey decision matrix $\otimes X$ [17],

$$\otimes X = \begin{bmatrix}
\otimes x_{11} & \otimes x_{12} & \ldots & \otimes x_{1m} \\
\otimes x_{21} & \otimes x_{22} & \ldots & \otimes x_{2m} \\
\vdots & \vdots & \ddots & \vdots \\
\otimes x_{n1} & \otimes x_{n2} & \ldots & \otimes x_{nm}
\end{bmatrix},$$  \hspace{1cm} (22)

$W = [w_1, w_2, \ldots, w_n]$  

Where $\otimes x_{ij}$ is determined by $\otimes x_{ij}$ (the smallest value, the lower limit) and $\otimes x_{ij}$ (the biggest value, the upper limit). $\otimes x_{ij}$ — grey value representing the performance value of the i alternative in terms of the j criterion and $w_j$ is the weight of criterion $C_j$.

In this method, the jth criterion of the ith alternative is represented by grey number:

$$\otimes x_{ij} = [x_{ij}, \tilde{x}_{ij}].$$

Step 2: Compute the preference ratings with respect to the non-beneficial attribute

The arrogant performance of ith alternative with respect to all the input attribute is calculated using the following equation:

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\( \otimes I_i = \sum_{j=1}^{n} W_j \frac{\min(\otimes X^m_j) - \otimes X^i_j}{\min(\otimes X^m_j)} \)  

(i=1,2,…,m; j=1,2,…n; i≠m)  

(23)

Where \( \otimes I_i \) is the measure of the relative performance of \( i^{th} \) alternative and \( \otimes X^i_j \) is the performance score of \( i^{th} \) alternative with respect to \( j^{th} \) input criterion. The calibration constant \( W_j \) (relative importance of \( j^{th} \) criterion) is used to increase or reduce the impact of this difference on the rating \( \otimes I_i \) with respect to \( j^{th} \) criterion.

**Step 3:** Calculate the linear preference rating for the input criteria.

\( \otimes I_i = \otimes I_i - \min (\otimes I_i) \)  

(24)

**Step 4:** Compute the preference ratings with respect to the beneficial criterion.

The aggregate performance for \( i^{th} \) alternative on all the beneficial or output criteria is measure using the following expression:

\( \otimes O_i = \sum_{h=1}^{H} W_h \frac{\otimes x^i_h - \min(\otimes x^m_h)}{\min(\otimes x^m_h)} \)  

(25)

Where \( h=1,2,…,H \) indicates the number of beneficial attributes or output attribute and \( W_h \) is calibration constant or weight importance of \( h^{th} \) output criteria. The higher an alternative’s score for an output criterion, the higher is the preference for that alternative. It can be mentioned that \( \sum_{j=1}^{n} W_j + \sum_{h=1}^{H} W_h = 1 \)  

(26)

**Step 5:** Calculate the linear preference rating for the output criteria:

\( \otimes O_i = \otimes O_i - \min (\otimes O_i) \)  

(27)

**Step 6:** Compute the overall preference ratings.

For each alternative \( (\otimes P_i) \) is calculated by scaling the sum \( (\otimes I_i + \otimes O_i) \) so that the least preferable alternative receives a rating of zero.

\( \otimes P_i = (\otimes I_i, \otimes O_i) - \min(\otimes I_i + \otimes O_i) \)  

(28)

**Step 7:** The crisp values of the overall performance of the Alternatives

The result of grey decision making for each alternative is grey number \( \otimes P_i \). The center-of-area is the most practically and simple to apply:

\( \otimes P_i = \left[ \frac{\otimes I_i}{2}, \frac{\otimes O_i}{2} \right] \)  

(29)

\( P_i = \frac{1}{2} \left( \otimes I_i + \otimes O_i \right) \)  

(30)

**Step 8:** The alternative with the highest overall performance index is the most favorable choice.

II. A numerical example with Grey data

We consider a numerical example in order to explain the proposed approaches. By using the set of four criteria: \( x_1, x_2, \) and \( x_3 \) are the beneficial type and \( x_4 \) is the cost or non-beneficial type criteria, and the set of five alternatives: \( A_1, A_2, A_3, A_4, A_5 \). The data are tabulated in Table 1.

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Grey decision making matrix</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Criteria</strong></td>
<td><strong>Optimization</strong></td>
</tr>
<tr>
<td></td>
<td>( \otimes x_1 )</td>
</tr>
<tr>
<td>Alternatives</td>
<td>( \bar{x} )</td>
</tr>
<tr>
<td>( A_1 )</td>
<td>64 ( \bar{x} )</td>
</tr>
<tr>
<td>( A_2 )</td>
<td>57 ( \bar{x} )</td>
</tr>
<tr>
<td><strong><a href="http://www.ijsrp.org">www.ijsrp.org</a></strong></td>
<td></td>
</tr>
</tbody>
</table>
A. SOWIA Method Computations

First, applying the SOWIA method to determine the weights of criteria.

The steps of the SOWIA method:
1. To begin with this method, we prepare the normalized decision matrix from the original decision matrix.
2. Determine the objective weights ($O_j$) of the attributes by the Standard deviation (SD) method, finally the objective weight is computed by dividing the $j$th deviation with the sum of all ‘n’ number of Standard deviation.

Table 2

<table>
<thead>
<tr>
<th>Criteria</th>
<th>$x_1$</th>
<th>$x_2$</th>
<th>$x_3$</th>
<th>$x_4$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\bar{x}_j$</td>
<td>0.20</td>
<td>0.20</td>
<td>0.20</td>
<td>0.20</td>
</tr>
<tr>
<td>$\sigma_j$</td>
<td>0.00954</td>
<td>0.016306976</td>
<td>0.018584</td>
<td>0.015146</td>
</tr>
<tr>
<td>$\sum \sigma_j$</td>
<td>0.059577</td>
<td>0.059576923</td>
<td>0.059577</td>
<td>0.059577</td>
</tr>
<tr>
<td>$O_j$</td>
<td>0.160129</td>
<td>0.273712964</td>
<td>0.311934</td>
<td>0.254224</td>
</tr>
</tbody>
</table>

3. Determine the Subjective weights ($S_j$) of importance of attributes by Rank Sum weight method (RS):
   a. The importance ranking of the criteria.

Table 3

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Importance ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>$x_2$</td>
<td>1</td>
</tr>
<tr>
<td>$x_4$</td>
<td>2</td>
</tr>
<tr>
<td>$x_3$</td>
<td>3</td>
</tr>
<tr>
<td>$x_1$</td>
<td>4</td>
</tr>
</tbody>
</table>

b. Calculate the RS weight value for each criterion.

Table 4

<table>
<thead>
<tr>
<th>Criteria</th>
<th>$x_2$</th>
<th>$x_4$</th>
<th>$x_3$</th>
<th>$x_1$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$S_j$</td>
<td>0.4</td>
<td>0.3</td>
<td>0.2</td>
<td>0.1</td>
</tr>
</tbody>
</table>

4. Combined the objective and subjective weights $W_{j}^{int}$:

$W_{j}^{int} = \alpha \cdot O_j + (1 - \alpha) \cdot S_j$

($\alpha = 0.5$) As $\alpha$ can be assigned value 0.5

Table 5

<table>
<thead>
<tr>
<th>Criteria</th>
<th>$x_1$</th>
<th>$x_2$</th>
<th>$x_3$</th>
<th>$x_4$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$O_j$</td>
<td>0.160129</td>
<td>0.273712964</td>
<td>0.311934</td>
<td>0.254224</td>
</tr>
<tr>
<td>$S_j$</td>
<td>0.1</td>
<td>0.4</td>
<td>0.2</td>
<td>0.3</td>
</tr>
<tr>
<td>$W_{j}^{int}(\alpha=0.5)$</td>
<td>0.130064</td>
<td>0.336856482</td>
<td>0.255967</td>
<td>0.277112</td>
</tr>
</tbody>
</table>

B. GOCRA computations
Applying the further steps of the GOCRA method. Grey the overall preference \( P_i \) for each of the alternative is calculated. The computation details of this method are shown in Table 6.

### Table 6
**Computational details and ranking using (GOCRA) method**

<table>
<thead>
<tr>
<th>Alternatives</th>
<th>( P_i )</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>( A_1 )</td>
<td>(-0.54249, 0.547092)</td>
<td>0.002301</td>
</tr>
<tr>
<td>( A_2 )</td>
<td>(-0.51505, 0.611607)</td>
<td>0.048281</td>
</tr>
<tr>
<td>( A_3 )</td>
<td>(-0.54624, 0.546241 )</td>
<td>0</td>
</tr>
<tr>
<td>( A_4 )</td>
<td>(-0.58426, 0.615665 )</td>
<td>0.015704</td>
</tr>
<tr>
<td>( A_5 )</td>
<td>(-0.48349, 0.668042)</td>
<td>0.092277</td>
</tr>
</tbody>
</table>

Then the final ranking of alternatives is obtained with GOCRA method as \( A_5 > A_2 > A_4 > A_1 > A_3 \), the best alternative is \( A_5 \) and the worst alternative is \( A_3 \).

### C. GMOOSRA computations

By applying the procedure of GMOOSRA. In Table 7, the beneficial, non-beneficial, and composite scores are listed for all alternatives. The five alternative should be selected because it has the maximum composite score.

### Table 7
**Ranking using GMOOSRA method**

<table>
<thead>
<tr>
<th>Materials</th>
<th>( \oplus y_i )</th>
<th>( y_i )</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>( A_1 )</td>
<td>(2.220476, 2.904206)</td>
<td>2.562341</td>
<td>3</td>
</tr>
<tr>
<td>( A_2 )</td>
<td>(2.395828, 3.04446 )</td>
<td>2.720144</td>
<td>2</td>
</tr>
<tr>
<td>( A_3 )</td>
<td>(2.207465, 2.834855 )</td>
<td>2.52116</td>
<td>4</td>
</tr>
<tr>
<td>( A_4 )</td>
<td>(1.957866, 2.802825)</td>
<td>2.380345</td>
<td>5</td>
</tr>
<tr>
<td>( A_5 )</td>
<td>(2.511563,3.417314 )</td>
<td>2.964439</td>
<td>1</td>
</tr>
</tbody>
</table>

According to the result of GMOOSRA method , the final ranking of alternatives is obtained as \( A_5 > A_2 > A_3 > A_4 \), the best alternative is \( A_5 \) and the worst alternative is \( A_4 \).

### IV. RESULTS AND DISCUSSIONS

### Table 8
**The final results of the proposed methods**

<table>
<thead>
<tr>
<th>Materials</th>
<th>GOCRA</th>
<th>GMOOSRA</th>
</tr>
</thead>
<tbody>
<tr>
<td>( A_1 )</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>( A_2 )</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>( A_3 )</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>( A_4 )</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>( A_5 )</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

According to the GMOOSRA and GOCRA the order of alternative ranks is the different. The results obtained using proposed two methods suggest \( A_5 \) is the best alternative. The discrepancy that appears between the rankings obtained by different two methods is only due to the difference in their mathematical modeling while solving a decision problem. Compared with the different MCDM methods the proposed methods are very simple to understand and easy to implement.

### Table 9. Comparison of the proposed methods
The decision maker can easily apply GMOOSRA method because of its several advantages such as highly stable, simple and easy to implement decision making approach with less mathematical calculations over the other GOCRA method. Direct and causes no complication in calculation despite the large-scale data [20].

V. CONCLUSIONS

This paper proposed two different methods based on grey numbers technique to determine the most preferable choice among all possible choices. The proposed methods are based on the SOWIA technique with modification for each proposed method. An illustrative example is given to show the results and to compare the performance of the two methods.

Hence the GMOOSRA and GOCRA methods are more practical, realistic, comprehensive and applicable for any grey numbers multi-criteria decision making problems and very simple to understand and easy to implement in comparison to other methods.

The decision maker can easily apply GMOOSRA method because of its several advantages such as highly stable, simple and easy to implement decision making approach with less mathematical calculations over the other GOCRA method.

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Wergner’s Granulomatosis: A Case Study

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Abstract- Wergner’s Granulomatosis(WG) is a condition of systemic vasculitis in which the presence of circulating Anti-Neutrophil Cytoplasmatic Antibody which attacks small and medium sized blood vessels. A female of age 39 was admitted with ear itching and drainage was diagnosed as WG with the help of laboratory and radiologic findings.

Index Terms- Granulomatosis, Vasculitis, Polyangitis, Vasculopathies.

I. INTRODUCTION

Granulomatosis with polyangiitis (GPA), formerly known as Wegener’s granulomatosis (WG) larger group of vasculitic syndromes that involves both granulomatosis and polyangiitis.[2] The condition is also known as systemic vasculitis or necrotizing vasculopathies, of which feature an autoimmune attack by an abnormal type of circulating antibody termed ANCA (antineutrophil cytoplasmatic antibodies) against small and medium-size blood vessels.[1]

Therefore, the signs and symptoms of GPA are highly varied and reflect which organs are supplied by the affected blood vessels. Typical signs and symptoms include nosebleeds, stuffy nose and crustiness of nasal secretions, and inflammation of the uveal layer of the eye. Damage to the heart, lungs and kidneys can be fatal.[2]

II. CASE REPORT

A female patient of age 39years was admitted with the complaints of left ear itching followed by drainage along with left sided facial palsy, headache and sinusitis. Her physical findings such as BP 100/60mmHg, PR 110/min, temp-101F were found abnormal. On clinical examination it was asssed that she had attic bulging along with pus on left ear and the right shows temporal perforation. From asking to the patient it was found that she had an itching sensation 1 month back followed by applied oil on the ear followed by pain and clear discharge from left ear. And CT PNS shows sphenoid sinusitis. And she had an itching sensation 2week back. She had no history of altered of altered sensorium, T2DM, trauma, ear surgery. Before admission patient was treated with antibiotics cefexime for 5 days and cefuroxime for 2days however no pain relief was obtained.

Blood examination shows that Hb-9.2g/dl(11.5-16.5), packed cell volume 32(37-47), WBC-16,940(4000-11000), platelet count -5.36lakh(1.5-4.5) and elevated ESR-114(0-20). Liver function test shows total bilirubin 0.3mg/dl, total protein 6.3g/dl, albumin-3.1g/dl, SGPT 37U/L and GGTP 64U/L.

Vasculitis package shows that ANCA(Anti-Neutrophil Cytoplasmatic Antibody) shows positive value of 1:20DIL substrate ethanol fixed human neutrophil and ANCA IgG quantitation ANTI PR3 IgG 0f 93.61. Ear swab culture shows the presence of pencillin sensitive Enterococcus faecalis.

Radiologic examination chest X-ray shows necrotic mass lesion with left upper lobe with areas of necrosis and cavitations, CT image shows that thick walled fluid filled cavitary lesion in the lung cavity, lesion abducts meditational and chest wall pleura, wall appear hypo dense with peripheral rime of attachment, calcify nodules in right upper nodules, fibrotic strands in right middle lobe, few subcentimetric meditational and left hilar nodes seen. CT temporal bone shows opacification left mastoid ear cells with soft tissue in middle ear cavity along with erosive changes in F.N canal and soft tissue thickening in right middle cavity. Perforation of the left tympanic membrane. Erosive changes are seen involving few of the air cells posteriorly around descending portion of the facial nerve canal. Minimal soft tissue thickening seen in right middle ear cavity lateral to the malleolus refraction of tympanic membrane on right side. Bronchoscopy reveals that inflamed LUL bronchi. From these data the patient was diagnosed as Wergner’s Granulomatosis with lung, ear and sinus involvement. The patient was treated with inj.cyclophosphamide 500mg and inj.methylprednisolone 500mg iv twice daily as pulse therapy, T.Co-trimoxazole 400/80mg, esomeprazole 20mg twice daily and ciplox ear drops every 6hours.

III. DISCUSSION

Granulomatosis with polyangiitis (GPA), formerly known as Wegener granulomatosis, is a rare multisystem autoimmune disease of unknown etiology. Its hallmark features include necrotizing granulomatous inflammation and pauci-immune vasculitis in small- and medium-sized blood vessels.[5]

The annual incidence of GPA is estimated to be 2.1-14.4 new cases per million people in Europe. GPA is rare in Japanese and African-American populations but occurs more often in people of Northern European descent. The prevalence of
GPA in the United States is estimated to be 3 cases per 100,000 people and equally affects men and women.\(^2\)

The cause of GPA is unknown. Genetics have been found to play a role in GPA though the risk of inheritance appears to be low. Characteristically, granulomas form with histiocytic epithelioid cells and often with giant cells. Plasma cells, lymphocytes, neutrophils, and eosinophils are present. Inflammation affects tissues as well as vessels; vasculitis may be a small or large component of the disease. Micronecrosis, usually with neutrophils (microabscesses), occurs early. Micronecrosis progresses to macronecrosis. A central area of necrosis (called geographic necrosis) is rimmed by lymphocytes, plasma cells, macrophages, and giant cells. A zone of fibroblastic proliferation with palisading histiocytes may surround the area.\(^7\)

Nonspecific chronic inflammation and tissue necrosis occur in the nose. The lungs are most likely to display the full spectrum of histopathologic abnormalities, but diagnostic features are not typically identified on the small tissue samples obtained by transbronchial biopsy. In the kidneys, the most common finding is a pauci-immune crescentic focal glomerulonephritis with necrosis and thrombosis of individual loops or larger segments of the glomerulus. Vasculitic lesions and disseminated granulomas occurs only occasionally.\(^4\)

Before the institution of effective therapy, the mean survival of adults with untreated GPA was only 5 months, with 82% of patients dying within the first year and 90% of patients dying within the second year.\(^3\) Despite improvement with the use of corticosteroids, the mean survival time was increased only to 12.5 months. GPA treatment depends on the severity of the disease. Severe disease is typically treated with a combination of immunosuppressive medications such as rituximab or cyclophosphamide and high-dose corticosteroids to induce remission and azathioprine, methotrexate, or rituximab to keep the disease in remission. Plasma exchange is also used in severe cases with damage to the lungs, kidneys, or intestines.\(^3\)

IV. CONCLUSION

Wegener granulomatosis (WG), also known as Granulomatosis with Polyangiitis abbreviated to GPA, typically involves the upper respiratory tract, lower respiratory tract (bronchi and lung), and kidney, with varying degrees of disseminated vasculitis. A female patient of age 39 admitted with complaints of ear drainage with pain finally diagnosed as wegener’s granulomatosis with ear, sinus and lung involvement. And she was treated with cyclophosphamide and prednisolone pulse therapy. Eventhough it is a rare disease but it will help to know about this condition and act as an initiator for further coming studies.

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Study of fingertip pattern in Carcinoma Cervix patients

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Abstract- Dermatoglyphic study to correlate a particular dermatoglyphic pattern with occurrence of cervical carcinoma in the Northern Bengal population was done for a period of one year (July 2015 to June 2016). Fingertip patterns of 72 cases of cervical carcinoma were tested against 72 controls. The results showed a statistically significant decrease in the frequency of ulnar loop pattern in cervical cancer patients(52.78%) compared to control group(60.83%) in both the hands. There is decrease in the percentage of Radial loops in cervical cancer patients (3.19%) compared to control group (7.36%) in both hands and the difference is statistically significant. The percentage of whorls decreased in control group (27.50%) compared to cervical cancer patients (38.89%) and the difference is statistically significant in both hands.

Index Terms- dermatoglyphics, cervical cancer, finger print, fingertip pattern.

I. INTRODUCTION

Dermatoglyphics is the scientific study of epidermal ridges and their configurations on the palmar region of hand and fingers and plantar region of foot and toes. The term dermatoglyphics was coined by Cummins H and Midlo C in 1926 and was derived from Greek words ‘derma’ means skin and ‘glyphics’ means carvings (Penrose LS, 1963)[1,2]. Development of dermatoglyphic pattern is under genetic control. This is evident from the clear resemblance of dermatoglyphics among related person (Schaumann B and Alter M, 1976)[3]. There are many diseases known to be caused by abnormal genes. Whenever there is any abnormality in the genetic make up of parents it is inherited to the children and is reflected in dermatoglyphic pattern. (Walkar JFA, 1941)[4]. Dermatoglyphics as a diagnostic aid is now well established in a number of diseases, which have a strong hereditary basis, and is employed as a method of screening abnormal anomalies (Holt SB, 1961)[5]; (Holt SB and Lindsten J, 1964)[6].

Dermatoglyphic analysis as a diagnostic tool has many advantages:

- There is no trauma to individual during recording.
- Ridge patterns can quickly be analyzed.
- Ridge patterns can be inspected for abnormalities immediately after birth.

The cervical cancer is one of the most extensively studied cancers & its genetic basis was well established[8]. High mortality & morbidity rate poses a heavy economic burden on families[9] as well the country[10]. Additionally high medical costs that are incurred by families due to cervical cancer further impoverish individuals and communities[11]. The screening procedures (i.e. Pap smear test etc.) have been effectively reducing the incidence rate by 80% and mortality by 70%[12]. But they are invasive procedures & expensive also and an equipped set up is required.

The etiology of cervical carcinoma is multi-factorial with genetics playing an important role. Taking into consideration of genetic predisposition of dermatoglyphics and cervical carcinoma, the study was undertaken to find out correlation between them. Being inexpensive and noninvasive procedure (in a country like India) like dermatoglyphics may be useful investigatory or screening procedures for the population at risk in cervical carcinoma.

II. AIMS & OBJECTIVES

- To determine various fingertip patterns in women suffering from cervical carcinoma and compare them with normal subjects in North Bengal.
- To find out fingertip patterns in women having cervical carcinoma in North Bengal.
- To compare the specific fingertip patterns in normal women and women having cervical cancer.

III. MATERIALS & METHODS

3.1 STUDY TYPE AND DESIGN: This was an Analytical and Cross-sectional study.
3.2 STUDY AREA: In collaboration with the departments of Radiotherapy (OPD), Gynecology (OPD & IPD) of North Bengal Medical College & Hospital.
3.3 STUDY PERIOD: The tenure of the study was one year from July 2014-June 2015.
3.4 STUDY POPULATION: Women having Cervical carcinoma who were attending Radiotherapy OPD and
Gynecology OPD & IPD in North Bengal Medical College and Hospital.

3.5 INCLUSION CRITERIA:
- Histopathologically confirmed cases of cervical carcinoma of above 15 years of age[13].
- The first degree relatives were selected for normal group who are above 15 years of age.

3.6 EXCLUSION CRITERIA:
- Very seriously ill patients.
- Women having any obvious genetic disorder and having any other carcinoma in body and diseases causing dermatoglyphic changes[7].
- History of any type of skin hypersensitivity.
- Women not willing to give consent.
- Cervical cancer patient with no first degree relatives.

3.7 SAMPLE SIZE:
- 72 patients with cervical cancer.
- 72 women with no cervical cancer.
- Total 144 subjects.

3.8 SAMPLING DESIGN: Sampling design by complete enumeration method. After taking proper history of 108 histopathologically confirmed cervical cancer patients, 36 patients were excluded. So remaining 72 patients’ dermatoglyphics were taken. The 72 control women were also found from the first degree relatives of cervical cancer patients.

3.9 STUDY TOOLS: Black duplicating gel, ‘T’ shaped rubber roller, Inking slab, Reducer, One side glazed mop lithography paper(A-3), Doctors’ spirit, Soap, Drawing board and board clips, Cotton, Protractor, magnifying lens, scale, calculator, pencil and pen, Needle with a sharp point, for ridge counting, Format for Consent and History taking.

3.10 STUDY TECHNIQUES: Among the various number of methods used for recording dermatoglyphics, the most routinely used one (that having no harm onto human body) is the INK METHOD (described by Cummins H in 1936[14] and Cummins H and Midlo C, 1961[15]) was used for this study.

3.11 STEPS IN THE PRINTING METHOD:

1. After taking proper consent and brief history, the subjects were asked to clean their hands with soaps and water to remove any oil or dirt and dry their hands but to leave some moisture.
2. The requisite amount of Black Duplicating Ink was placed on the glass slab. It was uniformly spread by the ‘T’ shaped rubber roller to get a thin even ink film on the glass slab.
3. The thin film of ink was applied on the palm by passing the inked rubber roller uniformly over the palm and digits.
4. Left hand of the subject was then placed on the sheet of paper (kept over the pressure pad) from proximal to distal end. The palm was then lifted from the paper in reverse order, from the distal to proximal end. The fingers were also printed below the palmar print by rolled finger print method. (Figure 1, 2).
5. The same procedure was repeated for right hand.
6. The prints were then subjected for detail dermatoglyphic statistical analysis (Figure 3).

![Figure 1: Print of Finger taken by rolled finger print method](image1.jpg)

![Figure 2: Print of Palm taken by rolled finger print method](image2.jpg)
3.12 PARAMETERS/VARIABLES STUDIED: Fingertip patterns i.e. loops (radial and ulnar), Whorls, arches.

3.13 FINGERTIP PATTERN CONFIGURATION: Galton F (1892)[16], divided fingertip patterns into 3 groups - Loops, Arches and Whorls. Henry ER (1900)[17], added 4th group ‘Composites’ to demarcate more complex patterns.

3.14 Fingertip Pattern:
1. Arch (A): An arch is the simplest pattern. It consists of more or less parallel ridges. This pattern is present in 6-7% cases.
2. Loop (L): It is the most frequent pattern on fingertip. This pattern is present in 65-67% cases. It is subdivided into two types: Ulnar Loop (Lu), Radial Loop (Lr)
3. Whorl (W): According to Galton’s classification, whorl is any ridge configuration with two or more triradii. According to Henry’s classification whorl is a ridge configuration in which ridges actually encircle core and more complex patterns are called as ‘Composites’[7].

3.15 STATISTICAL ANALYSIS:
Chi Squared test was used for analysis the qualitative values. Statistical analyses were done using a computer-based on-line Programmer[18] and Microsoft Office Excel 2007. Differences were considered significant if P values were less than 0.05.

IV. RESULTS & ANALYSIS
In the present study after taking fingerprints of all 144 (72 patients suffering from cancer cervix were considered as cases and 72 normal females were considered as controls) females, following observations were made. Differences are considered significant if P values are less than 0.05.
Table 1: Distribution of study population and statistical analysis according to fingertip pattern of both hands (72x10=720) among patients (n_1=72) & controls (n_2=72).

<table>
<thead>
<tr>
<th>Groups</th>
<th>Fingertip patterns</th>
<th>Ulnar loops</th>
<th>Radial loops</th>
<th>Arches</th>
<th>Whorls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients</td>
<td>Percentage</td>
<td>380</td>
<td>23</td>
<td>37</td>
<td>280</td>
</tr>
<tr>
<td></td>
<td>Frequency</td>
<td>52.78</td>
<td>3.19</td>
<td>5.14</td>
<td>38.89</td>
</tr>
<tr>
<td>Controls</td>
<td>Percentage</td>
<td>438</td>
<td>53</td>
<td>31</td>
<td>198</td>
</tr>
<tr>
<td></td>
<td>Frequency</td>
<td>60.83</td>
<td>7.36</td>
<td>4.31</td>
<td>27.50</td>
</tr>
<tr>
<td>Chi square value</td>
<td></td>
<td>4.112</td>
<td>11.842</td>
<td>0.530</td>
<td>14.067</td>
</tr>
<tr>
<td>P value</td>
<td></td>
<td>&lt;0.05</td>
<td>&lt;0.001</td>
<td>&gt;0.05</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Remarks</td>
<td></td>
<td>S</td>
<td>ES</td>
<td>NS</td>
<td>ES</td>
</tr>
</tbody>
</table>

Legend Table 1: The above table 1 shows that the frequencies of ulnar loop and radial loop are more in control groups than cervical cancer patients. The differences are statistically significant for ulnar loop and radial loop. The frequency of whorl pattern is more in patients than controls, and this difference is statistically significant. The frequencies of arch pattern are statistically non-significant.

Table 2: Distribution of study population and statistical analysis according to fingertip pattern of right hand (72 x 5=360) among patients (n_1=72) & controls (n_2=72).

<table>
<thead>
<tr>
<th>Groups</th>
<th>Fingertip patterns</th>
<th>Ulnar loops</th>
<th>Radial loops</th>
<th>Arches</th>
<th>Whorls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients</td>
<td>Percentage</td>
<td>175</td>
<td>15</td>
<td>22</td>
<td>148</td>
</tr>
<tr>
<td></td>
<td>Frequency</td>
<td>48.61</td>
<td>4.17</td>
<td>6.11</td>
<td>41.11</td>
</tr>
<tr>
<td>Controls</td>
<td>Percentage</td>
<td>196</td>
<td>34</td>
<td>20</td>
<td>110</td>
</tr>
<tr>
<td></td>
<td>Frequency</td>
<td>54.44</td>
<td>9.44</td>
<td>5.56</td>
<td>30.56</td>
</tr>
<tr>
<td>Chi square value</td>
<td></td>
<td>1.188</td>
<td>7.368</td>
<td>0.096</td>
<td>5.596</td>
</tr>
<tr>
<td>P value</td>
<td></td>
<td>&gt;0.05</td>
<td>&lt;0.01</td>
<td>&gt;0.05</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Remarks</td>
<td></td>
<td>NS</td>
<td>HS</td>
<td>NS</td>
<td>S</td>
</tr>
</tbody>
</table>

Legend Table 2: The above table 2 shows the differences of frequencies of whorls and radial loops between patients and control groups statistically significant for right hands. But the frequencies of other two patterns are not statistically non-significant between two groups.

Table 3: Distribution of study population and statistical analysis according to fingertip pattern of left hand (72 x 5=360) among patients (n_1=72) & controls (n_2=72).

<table>
<thead>
<tr>
<th>Groups</th>
<th>Fingertip patterns</th>
<th>Ulnar loops</th>
<th>Radial loops</th>
<th>Arches</th>
<th>Whorls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients</td>
<td>Percentage</td>
<td>205</td>
<td>8</td>
<td>15</td>
<td>132</td>
</tr>
<tr>
<td></td>
<td>Frequency</td>
<td>56.94</td>
<td>2.22</td>
<td>4.17</td>
<td>36.67</td>
</tr>
<tr>
<td>Controls</td>
<td>Percentage</td>
<td>242</td>
<td>19</td>
<td>11</td>
<td>88</td>
</tr>
<tr>
<td></td>
<td>Frequency</td>
<td>67.22</td>
<td>5.28</td>
<td>3.06</td>
<td>24.44</td>
</tr>
<tr>
<td>Chi square value</td>
<td></td>
<td>3.063</td>
<td>4.482</td>
<td>0.616</td>
<td>8.800</td>
</tr>
<tr>
<td>P value</td>
<td></td>
<td>&gt;0.05</td>
<td>&lt;0.05</td>
<td>&gt;0.05</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Remarks</td>
<td></td>
<td>NS</td>
<td>S</td>
<td>NS</td>
<td>HS</td>
</tr>
</tbody>
</table>

Legend Table 3: The above table 3 shows the differences of frequencies of radial loops and whorls are statistically significant between cervical cancer patients and controls in left hands. The differences of frequencies of ulnar loops and arches are statistically non-significant between two groups.

V. DISCUSSION

The study consisted of 72 histopathologically confirmed cervical carcinoma patients (above 15 years of age) and equal numbers of normal healthy females were selected from the first degree relatives who were above 15 years of age, were included...
as controls for comparison. The prints were obtained by “Ink method” on the one side glazed mop lithography paper (A-3) and analyzed to find out variations in dermatoglyphic features among cervical cancer females and control group. The dermatoglyphic patterns were analyzed under following heading:

5.1 Ulnar loops:

In the present study there is decrease in the frequency of ulnar loop pattern in cervical cancer patients(52.78%) compared to control group(60.83%) in both hands. The difference is statistically significant($x^2$ value=4.112, $P<0.05$).

The percentage of ulnar loops in right hand is decreased in cervical carcinoma patients(56.94%) than control group(67.22%), but the difference is not statistically significant. The difference of percentage of ulnar loop pattern in left hand of cervical cancer patients(48.61%) and control group(54.44%) is statistically not significant.

Pal GP et al. (1985)[19] observed significant decrease frequency of ulnar loop on fingertips of carcinoma of cervix patients.

Inamdar VV et al. (2006)[20] noticed decrease frequency of ulnar loops in both hands of cancer cervix patients.

Kashinathappa BS. Et al.(2013)[21] reported significant decrease in frequency of ulnar loops in both hands of carcinoma cervix patients as compared to controls.

However Umana U. et al(2012)[22] found that the cervical cancer group presented with 74.9% of loop pattern on the right compared to the 64.0% in the normal, while the left hands had 68.5% in the case compared to the 61.2% ($P<0.001$).

5.2 Radial loops:

There is decrease in the percentage of Radial loops in cervical cancer patients (3.19%) compared to control group(7.36%) in both hands and the difference is extremely statistically significant($x^2$ value=11.842, $P<0.001$).

There is decrease in the percentage of radial loops of right hand in cervical cancer patients(2.22%) compared to control group(5.28%) and the difference is statistically significant($x^2$ value=4.482, $P<0.05$).

There is decrease in the percentage of radial loops in left hands in cervical cancer patients(4.17%) compared to control group(9.44%) and the difference is highly statistically significant($x^2$ value=7.368, $P<0.01$).

The increased and decreased percentages of cancer cervix patients and control groups radial loop could not be compared as no workers found any statistical significance for radial loop pattern.

5.3 Arches:

In the present study the percentage of arches decreased in control groups compared to cervical cancer patients in both hands, right hand, left hand, But the differences are not statistically significant.

Pal GP et al. (1985)[19] observed significant increase in arches on fingertips of carcinoma of cervix patients.

Inamdar VV et al. (2006)[20] studied dermatoglyphic features in carcinoma cervix and observed significant increase in the frequency of arches in left hand.

5.4 Whorls:

The percentage of whorls decreased in control group(27.50%) compared to cervical cancer patients (38.89%) and the difference is extremely statistically significant($x^2$ value=14.067, $P<0.001$) in both hands.

There is decrease percentage of whorls in control group(24.44%) compared to cervical cancer patients(36.67%), this difference is highly statistical significant($x^2$ value=8.800, $P<0.01$) in right hand.

There is decrease percentage of whorls in control group(30.56%) compared to cervical cancer patients(41.11%) and the difference is statistically significant($x^2$ value=5.596, $P<0.05$) in left hand.

Floris G. et al. (1990)[23] explains the increase in whorls in cervical cancer patients compared to normal.

Inamdar VV et al. (2006)[20] studied dermatoglyphic features in carcinoma cervix and observed significant increase in the frequency of whorls in both hands of cervical cancer patients.

Kashinathappa BS. et al.(2013)[21] showed significant increase in frequency of whorls in both hands of carcinoma cervix patients as compared to controls.

VI. CONCLUSION

The present work on dermatoglyphics in cervical cancer patients has determined few significant parameters applicable to the cervical cancer patients.

Significant findings in qualitative analysis of cervical cancer patients include:

1. Decrease in frequency of ulnar loop in both hands.
2. Decrease in frequency of radial loop in both hands(especially significant).
3. Decrease in frequency of radial loop in right hand.
4. Decrease in frequency of radial loop in left hand(highly significant).
5. Increase in frequency of whorl in both hands(especially significant).
6. Increase in frequency of whorl in right hand(highly significant).
7. Increase in frequency of whorl in left hand.

Thus from the present study, it appears that there do exists a variation in the fingertip patterns in cervical cancer patients and it is possible to a certain extent to predict the individual’s tendency for acquiring cervical cancer with an advantage of being very simple and economical ‘Ink method’. Moreover the materials required for the dermatoglyphic procedure are easily available and portable. As the specific features of fingertip patterns are present in the cervical cancer patients, it can be use for mass screening program for prevention of cervical cancer.

REFERENCES


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Environmental Impact Assessment of Kota Super Thermal Power Station

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Abstract- Environmental Impact Assessment (EIA) is an important management tool for ensuring optimal use of natural resources for sustainable development. A beginning in this direction was made in our country with the impact assessment of river valley projects in 1978-79 and the scope has subsequently been enhanced to cover other developmental sectors such as industries, thermal power projects, mining schemes etc. To facilitate collection of environmental data and preparation of management plans, guidelines have been evolved and circulated to the concerned Central and State Government Departments. EIA has now been made mandatory under the Environmental (Protection Act, 1986 for 29 categories of developmental activities involving investments of Rs. 50 crores and above. In present study we have studied environmental aspects of kota super thermal power on Kota city. The KSTPS in Rajasthan was commissioned in 1983 and presently operating at 1045MW capacity, The Kota Super Thermal Power Station came in five stages and a total of 7 units have been commissioned. KSTPS is situated at the left bank of “Chambal River” in Rajastan principal industrial city Kota. The present total area covered under KSTPS is 688 ha. The power generation system comprises mainly boiler, turbine, generator and transformers with accessories all arranged to operate as complementary parts of a common monolithic set. The allowable limits for discharge of water as specified in Schedule 4 of Environmental Protection Act And Amendment 1983 is Ammonical Nitrogen - 50, Arsenic-0.2, Biochemical oxygen demand -30, Cadmium -2, Chemical oxygen demand -250, Chromium hexavalent -0.1, Chromium total -2, Copper-3, Cyanide-0.1, Fluoride-2, PH-5.5-9.0, Phenols-1, Dissolve Phosphate -5, Residual Chloride 1, Sulphide 2, Total Suspended Solid 100, Zinc 5.0. Various effluent samples are analysed to assess the effluent quality from KSTPS. Any major industrial activity have tendency to degrade the environment viz. air environment, water, noise, land and biological also. It is duty of every industry it should have its own environmental unit that allow to minimum quantity of pollutants emit into environmental and keep this pollutant range with in permissible limit described according to central and state pollution control board and MOEF. So we should think in the terms of sustainable development means development without destruction.

Index Terms- KSTPS, MOEF, EIA, pollutants

I. INTRODUCTION

Environmental Impact Assessment (EIA)

The planned development in the power sector of Rajasthan was initiated to meet the growing demand and with a view to create the status own power generating capacity under the implementation programme initiated by RAJASTHAN RAJYA VIDYUT UTPADAN NIGAM LIMITED. The KSTPS in Rajasthan was commissioned in 1983 and presently operating at 1045MW capacity.

Table-1 Per unit power generation capacity

<table>
<thead>
<tr>
<th>STAGES</th>
<th>UNITS</th>
<th>CAPACITY (Mw)</th>
<th>COMMISIONING DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Unit – 1</td>
<td>110</td>
<td>17 Jan 1983</td>
</tr>
<tr>
<td></td>
<td>Unit - 2</td>
<td>110</td>
<td>13 July 1983</td>
</tr>
<tr>
<td>II</td>
<td>Unit – 3</td>
<td>210</td>
<td>25 Sept 1988</td>
</tr>
<tr>
<td></td>
<td>Unit – 4</td>
<td>210</td>
<td>01 May 1989</td>
</tr>
<tr>
<td>III</td>
<td>Unit – 5</td>
<td>210</td>
<td>26 March 1994</td>
</tr>
<tr>
<td>IV</td>
<td>Unit – 6</td>
<td>195</td>
<td>13 July 2003</td>
</tr>
<tr>
<td>V</td>
<td>Unit – 7</td>
<td>195</td>
<td>30 May 2005</td>
</tr>
</tbody>
</table>

II. PROCESS DESCRIPTION:-

Raw material - coal and water. Coal requirement for Existing plant is 17000 tonnes per day and for the proposed expansion will be 2800 tonnes per day. The power generation system comprises mainly boiler, turbine, generator and transformers with accessories all arranged to operate as complementary parts of a common monolithic set. The super saturated steam from the boiler of designed...
pressure and temperature devices the turbine which in turn devices the generator where mechanical energy is converted into electrical energy.

III. ENVIRONMENTAL CONSULTANT:-

KSTPS gives contract to provide environmental labs on yearly tender basis for conducting environmental studies and environmental monitoring in KSTPS contract duration start from 1 May of every year. In year 1999-2000 the contract was given to M.S. AQUARIA LABS PRIVATE LIMITED. For the year 2000-2001 contract was given CTRL (Chemical Testing And Research Laboratory) and for the year 2001-2002 the contract was given to AQUARIA LABS again. And 2002-2003 the contract was given to POORVA ENVIROTECH SERVICES. Report on environmental management and performance evaluation of pollution control equipment at KSTPS is done regularly by BHEL Pollution Control Research Institute, Ranipur, Haridwar.

IV. AIM OF STUDY –

Study of KTPS is aimed at assessment of environmental status, leading to identification evaluation of environmental impacts. This study would also provide data on present status of :

(i) Stack emission monitoring  
(ii) Fugitive emission  
(iii) Water usage – recycling and resources  
(iv) Soil quality  
(v) Noise environment

V. ENVIRONMENTAL STATUS AND QUALITY IN AND AROUND KSTPS:-

The intensity of environmental impacts from a specific project depends on several factors such as types of process (physical, chemical fuel combustion process) involve in the developmental project, processing capacity (scale or size of the project) level of pollution control measures, project location, surrounding geomorphology etc. to assess environmental quality prevailing in the surrounding area prior to implementation of the proposed project. Environmental quality of KSTPS is assessed in various area through quantitative and qualitative assessment viz-

-Air Quality
-Water Quality
-Noise Environment
-Coal, Ash and Soil quality
AIR QUALITY -
(1) Determination of moisture contents in stack gases
(2) Determination of stack gas velocity and volumetric flow rate.
(3) Determination of particulate matter in stack gases
(4) Determination of gaseous pollutants such as SO2, SO3, NOx etc.

Table-2 Air quality parameters for emit in the environment

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Environmental Component</th>
<th>Sampling Locations</th>
<th>Sampling Parameters</th>
<th>Total Sampling Period</th>
<th>Sampling Frequency</th>
<th>Methodology</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Meteorology</td>
<td>One central location</td>
<td>Temperature, Wind Speed, Wind Direction</td>
<td>3 months</td>
<td>Hourly</td>
<td>The meteorology parameters were recorded using automatic micro-meteorological equipment consisting of anemometer, wind vane and thermometer. Review of secondary data collected from IMD station at Rameswaram. Rainfall was recorded every morning at 0830 hours.</td>
</tr>
<tr>
<td>2</td>
<td>Ambient Air Quality</td>
<td>4 locations</td>
<td>As per NAAQS 2009</td>
<td>Two days per week for 13 weeks</td>
<td>24 hourly</td>
<td>Gravimetric method for PM10 and PM2.5 Modified West &amp; Greece method for SO2 (IS-5182 part-II 1969) using Tetrachloro mercuric 0.01 N absorbing solution. Jacob-Hochheiser method (IS-5182 part-IV 1975) for NOX using Sodium Arsenaic absorbing solution of 0.01 N absorbing solution. CO was measured by GC method.</td>
</tr>
<tr>
<td>3</td>
<td>Water Quality</td>
<td>6 locations (3-Surface water 3-Ground water)</td>
<td>As per IS:10500-2012</td>
<td>Grab sampling</td>
<td>Monthly once in study period</td>
<td>As per APHA methods. The conductivity, temperature were analyzed at site laboratory and rest of the parameters were analyzed at VIMTA’s Central Laboratory at Hyderabad.</td>
</tr>
<tr>
<td>4</td>
<td>Noise</td>
<td>10 locations</td>
<td>Last readings for 24 hours</td>
<td>Once during study period</td>
<td>Integrated on hourly basis</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Soil</td>
<td>10 locations</td>
<td>Soil profile, Chemical constituents, Suitability for agricultural growth</td>
<td>Composite sample up to 50-cm depth</td>
<td>Once during study period</td>
<td>Analysis was carried out as per Soil Chemical analysis by ML Jackson</td>
</tr>
<tr>
<td>6</td>
<td>Terrestrial Ecology</td>
<td>Total study area</td>
<td>Flora and fauna</td>
<td>Field observations</td>
<td>Once during study period</td>
<td>Through field visits and collected secondary data. Count and quadrat method</td>
</tr>
</tbody>
</table>

Techniques For Ambient Air Quality Monitoring -

http://dx.doi.org/10.29322/IJSRP.8.5.2018.p7724
Total water requirement of KSTPS is around 3155750 m³/day. This includes water requirement for condenser cooling, boiler makeup and other large single use of water is for condensing low pressure of steam leaving the turbine. There are no changes in physicochemical characteristic of this water by the process except for an increase in its temperature. Fraction of water consumed as condenser cooling water, Auxiliary cooling water, D. M. plant, Water back wash and regeneration water, service water and potable water is 86.88%, 11.54%, 0.34%, 0.33%, 0.62% and 0.29% respectively.

To assess the water quality of KSTPS a number of samples are regularly collected from within and around the plant. These samples are then analyzed in laboratory for various parameters and compared with applicable standards.
<table>
<thead>
<tr>
<th>Sr. N.</th>
<th>Site</th>
<th>pH</th>
<th>TDS</th>
<th>Total Alkalinity</th>
<th>Chloride</th>
<th>BOD</th>
<th>Phosphate</th>
<th>Nitrate</th>
<th>Fe</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ash pond outlet</td>
<td>7.8±0.62</td>
<td>1.143±0.13</td>
<td>420±102</td>
<td>312.4±54.1</td>
<td>40.204±5.6</td>
<td>6.543±0.514</td>
<td>10.289±1.361</td>
<td>1.21±0.411</td>
</tr>
<tr>
<td>2</td>
<td>Ash pond inlet</td>
<td>9.4±0.21</td>
<td>17.540±1.5</td>
<td>680±58</td>
<td>410.6±64.3</td>
<td>36.036±2.3</td>
<td>10.27±0.763</td>
<td>15.474±3.209</td>
<td>1.58±0.313</td>
</tr>
<tr>
<td>3</td>
<td>Common plant drain</td>
<td>8.7±0.10</td>
<td>18.90±5.85</td>
<td>380±62.3</td>
<td>430.2±29.5</td>
<td>25.610±3.1</td>
<td>17.02±1.74</td>
<td>20.173±0.421</td>
<td>2.01±0.014</td>
</tr>
<tr>
<td>4</td>
<td>Oil handling area</td>
<td>8.1±0.40</td>
<td>7.101±2.11</td>
<td>400±24.4</td>
<td>200.5±40.1</td>
<td>21.384±2.1</td>
<td>7.21±0.43</td>
<td>10.211±0.312</td>
<td>1.41±0.121</td>
</tr>
<tr>
<td>5</td>
<td>Coal handling area</td>
<td>9.1±0.32</td>
<td>19.103±2.4</td>
<td>230±54.2</td>
<td>230.1±34.1</td>
<td>17.209±1.3</td>
<td>11.14±2.13</td>
<td>18.015±0.189</td>
<td>2.78±0.155</td>
</tr>
<tr>
<td>6</td>
<td>D. M. plant effluents</td>
<td>7.9±0.7</td>
<td>3.184±1.07</td>
<td>330±44.2</td>
<td>190.7±26.1</td>
<td>15.131±2.4</td>
<td>13.481±1.512</td>
<td>14.154±0.216</td>
<td>1.40±0.183</td>
</tr>
<tr>
<td>7</td>
<td>Water treatment plant</td>
<td>7.1±0.5</td>
<td>2.001±0.12</td>
<td>74±12.164</td>
<td>102±12.34</td>
<td>0.0</td>
<td>1.002±0.004</td>
<td>5.284±0.641</td>
<td>1.05±0.259</td>
</tr>
<tr>
<td>8</td>
<td>Township STP</td>
<td>7.2±0.4</td>
<td>2.211±0.13</td>
<td>86±10.032</td>
<td>120±18.27</td>
<td>0.128±0.004</td>
<td>3.104±0.014</td>
<td>4.437±0.426</td>
<td>1.12±0.314</td>
</tr>
<tr>
<td>9</td>
<td>Condenser cooling water</td>
<td>7.4±0.3</td>
<td>6.201±1.15</td>
<td>180±32.743</td>
<td>241.5±54.0</td>
<td>4.238±1.03</td>
<td>5.259±0.476</td>
<td>15.024±1.354</td>
<td>1.24±0.385</td>
</tr>
</tbody>
</table>

**Table- 5 Water quality assessment from different location**

**NOISE ENVIRONMENT**-
The noise from KSTPS is very complex in nature as it is generated from multiple sources. The generated noise is distributed over the entire frequency spectrum. The important source of noise in KSTPS complex are-

*Boiler  
*Turbine  
*ESP  
*Pumps  
*Compressor  
*Air Cooling Tank  
*Coal Mills  
*P.A. Fans, F.D. And I.D. Fans
To measure the noise in KSTPS the sound level meter is calibrated with the help of an acoustic calibration period. Except during day time when stream releases the noise from KSTPS is audible from distance of 1km. The noise measure at location in KSTPS premises ranges between 56 and 120db. KSTPS has provided earplugs/muffs for the operators working in high noise.

VI. CONCLUSION

Any major industrial activity have tendency to degrade the environment viz. air environment, water, noise, land and biological also. It is duty of every industry it should have its own environmental unit that allow to minimum quantity of pollutants emit into environmental and keep this pollutant range with in permissible limit described according to central and state pollution control board and MOEF. Thousands of people residing within 2KMs from KSTPS suffer from asthma attacks, cardiac problem and upper and lower respiratory problems associated with fine particles from power plant, and coal dust powder. People Living in Shakti Nagar, Waqf Nagar, Dadabari, Khishorpura, Complaining of Black shoot, coal dust coming from the the KSTPS, blacken their Terries, walls and cloths. In this study it has been found that most of the people are unaware of particulate matters and its impacts on their health. Even due to ignorance people thought that respiratory problems are seasonable that comes with winter and vanished with time when summer arrives. However KSTPS have its own environmental unit which monitor environmental data time to time, but some parameters are more than permissible limit specially particulate matter. So KSTPS need to lead towards more eco-friendly technologies. So the common there is a recognition of the linkage between environment and development and the need to deal with both in an integrated manner in order to address pressing global regional issues, So we should think in the terms of sustainable development means development without destruction.

REFERENCES


AUTHORS

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User Delinquency in Law College Library, Sri Lanka: perception of the Students

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Abstract- User malpractices of Library materials by highlighting, underlining, removing papers/parts of the page, binding barcode labels, call numbers labels and damaging or defacing library materials is a threat to the library collection. Such practices can be describe as abusing of the library materials. According to the stock count carried out in 2017, 78 books (out of 4320) were highly abused and removed from the lending collection in the library. There for this survey was conducted with following objectives; to identify the various forms of abuse, to identify reasons for the abuse and to identify the possible solutions to protect the library collection. The survey was conducted by using questionnaires with close and open ended questions. Students (75) were selected for the study and 69 responded and the rate was 92% from years of first year, second year and final year. The respondents gave their answers to the forms of abusing library materials mainly tearing away pages, writing notes inside text books, highlighting/underlining the pages, mutilation, hiding, of books. According to the reasons for the abuse of the library materials, 65% of students mentioned that rare materials not allowed to be photocopied, 68% claimed the inadequate numbers of copies and 59% indicated high cost of photocopying charges. The respondents proposed a variety of strategies to protect the collection too. The study recommended proper orientation to users. The number of copies of demanded text books should be increased. Improving of photocopying services of the library. Introduce and electronic system as RFID machines. Regularly reviewed set of library instruction should be drawn.

Index Terms- User delinquency, Abuse of library materials, Mutilation, Malpractices of readers, Law collection.

I. INTRODUCTION

The abuse of Library materials can be defined in terms of theft, mutilation, unauthorized borrowing, drawing and vandalism. Mutilating library materials by marking, underlining, removing pages or portion of pages, removing binding, removing barcodes, removing call number labels, labeling color tags, damaging or defacing library materials seriously affect the library. Abuse of library materials or mutilation and theft in libraries is a serious and harmful issue in any library.

The Sri Lanka Law College functions under the council of Legal Education to administer legal education to person who desire to be enrolled in the Bar of Sri Lanka. The Law College is the only institution which offers a complete course of study leading to examination for those desiring to quality for admission to the profession.

As at today, while other institutions (eg : University of Colombo, University of Peradeniya, University of Jaffna, Open University of Sri Lank and Private Institutions) offer academic courses leading to a degree or other academic qualification relating to law, person become eligible to practice the law, only after admission to the profession as provided for in rules of the council of legal education. Thus, The Law College is the only gateway to the legal profession in Sri Lanka. Members of the profession are called Attorneys-at-Law.

Law College Library-Stock Count – 2017

<table>
<thead>
<tr>
<th>Subject</th>
<th>Class Number</th>
<th>Amount of Books</th>
</tr>
</thead>
<tbody>
<tr>
<td>Law</td>
<td>340</td>
<td>911</td>
</tr>
<tr>
<td>Legal System</td>
<td>340.5</td>
<td>314</td>
</tr>
<tr>
<td>Conflict of Laws</td>
<td>340.9</td>
<td>77</td>
</tr>
<tr>
<td>International Law</td>
<td>341</td>
<td>89</td>
</tr>
<tr>
<td>Constitutional and Administrative Law</td>
<td>342</td>
<td>317</td>
</tr>
<tr>
<td>Military, Tax, Trade, Industrial Law</td>
<td>343</td>
<td>226</td>
</tr>
<tr>
<td>Social, Labor, Welfare, Healthy, Safety, Cultural Law</td>
<td>344</td>
<td>191</td>
</tr>
<tr>
<td>Criminal Law</td>
<td>345</td>
<td>77</td>
</tr>
<tr>
<td>Private Law</td>
<td>346</td>
<td>80</td>
</tr>
<tr>
<td>Civil Procedure and Courts</td>
<td>347</td>
<td>36</td>
</tr>
<tr>
<td>Laws(statutes), regulations, Cases</td>
<td>348</td>
<td>26</td>
</tr>
<tr>
<td>Law of Specific</td>
<td>349</td>
<td>31</td>
</tr>
</tbody>
</table>

Total amount of books 2375
II. OBJECTIVES OF THE STUDY
The objective of the survey were:
- To identify various form of abuse in library materials.
- To identify the physical damages on library materials.
- To identify the lack of appropriate information resources.
- To identify the reasons for the abuse of library materials.
- To identify the most common methods/opportune time for stealing and mutilation.
- To identify the possible solutions to protect the library collection.
- The various measures in place to detect stealing and mutilation in the library.

III. RESEARCH METHODOLOGY:
The survey was conducted by using questionnaires with close and open ended questions. Observation of the abused library materials was also used for this study. The total sample for the study was 75 students drawn through systematic random sampling technique questionnaire was major tool for the data collection.

IV. POPULATION OF THE STUDY:
Students of the Sri Lank Law College which are on the first year, second year and final year students were selected for the study as they use the Lending collection especially in preparation of their notes and project activities. From first year 25 students were selected and 24 (96%) responded, from second year 25 were selected and 23 (92%) responded and also final year 25 students were selected and 22 (88%) responded. The total number of respondents was 69 students and total response rate was 92%.

Table 02: Selected Students.

<table>
<thead>
<tr>
<th>Year</th>
<th>Selected Students</th>
<th>Responded Rate</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Year</td>
<td>25</td>
<td>24</td>
<td>96%</td>
</tr>
<tr>
<td>Second Year</td>
<td>25</td>
<td>23</td>
<td>92%</td>
</tr>
<tr>
<td>Final Year</td>
<td>25</td>
<td>22</td>
<td>88%</td>
</tr>
<tr>
<td>Total</td>
<td>75</td>
<td>69</td>
<td>92%</td>
</tr>
</tbody>
</table>

V. RESULTS AND DISCUSSIONS.

Table 03: Forms of Abusing Library Materials.

<table>
<thead>
<tr>
<th>Forms of Abusing Library Materials</th>
<th>SA</th>
<th>A</th>
<th>D</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tearing away pages</td>
<td>31</td>
<td>25</td>
<td>03</td>
<td>04</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>32</td>
<td>03</td>
<td>12</td>
</tr>
</tbody>
</table>

From the above table 03, over 70% respondents mentioned that the forms of abusing library materials mainly were tearing away pages and hiding of books, over 65% respondents mentioned the forms of abusing library materials were writing notes inside text books and highlighting/underlining the pages. There are law rate of responses for stealing books, mutilation, withholding and rough handling. It is indicated that tearing pages, writing notes inside text books and highlighting/underlining the pages are the main forms of abusing the Library materials.

Table 04: Physical Damages on Library Materials.

<table>
<thead>
<tr>
<th>Physical Damages on Library Materials</th>
<th>SA</th>
<th>A</th>
<th>D</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underlined words or scribbles</td>
<td>26</td>
<td>14</td>
<td>12</td>
<td>17</td>
</tr>
<tr>
<td>Marks in documents, stain in document</td>
<td>28</td>
<td>23</td>
<td>11</td>
<td>07</td>
</tr>
<tr>
<td>Books with torn or removed covers, figures</td>
<td>24</td>
<td>17</td>
<td>18</td>
<td>04</td>
</tr>
<tr>
<td>Creased books, use of correction fluid</td>
<td>12</td>
<td>17</td>
<td>21</td>
<td>19</td>
</tr>
<tr>
<td>Structural Damages</td>
<td>11</td>
<td>17</td>
<td>13</td>
<td>28</td>
</tr>
</tbody>
</table>

From the above table 04, under the question on the physical damages on the library materials 65% agreed that marks in document, stain in document, 50% agreed that underlined words or scribbles and books with torn or removed covers, figures. 35% said that creased books use of correction fluid and...
According to these figures most of the physical damages of the books are marks in document, stain in document, underline words or scribbles and books with torn or removed cover, figures. Actually there were major facts of the damages in the collection.

Table 05: Lack of appropriate information resources are to contribute to the abuse of library materials.

<table>
<thead>
<tr>
<th>Lack of appropriate information resources are to contribute to the abuse of library materials</th>
<th>SA</th>
<th>A</th>
<th>D</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of photocopy services in the library.</td>
<td>18</td>
<td>20</td>
<td>18</td>
<td>13</td>
</tr>
<tr>
<td>Strict library rules.</td>
<td>14</td>
<td>12</td>
<td>16</td>
<td>27</td>
</tr>
<tr>
<td>Lack of support from the library staff.</td>
<td>14</td>
<td>14</td>
<td>23</td>
<td>18</td>
</tr>
<tr>
<td>Lack of proper shelving and shelf reading of library materials.</td>
<td>07</td>
<td>13</td>
<td>25</td>
<td>24</td>
</tr>
<tr>
<td>Lack of adequate library orientation programmes for new library users.</td>
<td>20</td>
<td>18</td>
<td>20</td>
<td>11</td>
</tr>
<tr>
<td>Inadequate copies of popular library materials.</td>
<td>28</td>
<td>19</td>
<td>13</td>
<td>09</td>
</tr>
<tr>
<td>Inadequate copies of recommended text in the library.</td>
<td>30</td>
<td>16</td>
<td>13</td>
<td>10</td>
</tr>
<tr>
<td>Library staff is not competent enough sometimes.</td>
<td>20</td>
<td>19</td>
<td>22</td>
<td>08</td>
</tr>
</tbody>
</table>

**KEY**

<table>
<thead>
<tr>
<th>SA</th>
<th>A</th>
<th>D</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Disagree</td>
<td>Strongly Disagree</td>
</tr>
</tbody>
</table>

According to the table 05, the students are indicating that more than 60% agreed that inadequate copies of popular library materials and inadequate copies of recommended text in the library is a serious issue for the readers. On the other hand lack of photocopy services in the library, lack of adequate library orientation programmes for new library users and library staff is not enough sometimes also is to be a seriously considering factor. The students have neutral responses to the statements of strict library rules, lack of support from the library staff, lack of proper shelving and shelf reading of library materials. It shows that the library staff are very supportive of the students.

Table 06: Reasons for abusing library materials.

<table>
<thead>
<tr>
<th>Reasons for abusing library materials</th>
<th>SA</th>
<th>A</th>
<th>D</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rare materials not being allowed to photocopy</td>
<td>37</td>
<td>07</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>Inadequate number of library materials</td>
<td>23</td>
<td>20</td>
<td>18</td>
<td>08</td>
</tr>
<tr>
<td>High cost of photocopying</td>
<td>12</td>
<td>14</td>
<td>26</td>
<td>17</td>
</tr>
<tr>
<td>Rare materials-Unavailability</td>
<td>38</td>
<td>13</td>
<td>06</td>
<td>12</td>
</tr>
</tbody>
</table>

According to the table 06 there are various reasons for abuse of the library materials. 50% said that rare materials not being allowed to photocopy, inadequate number of library materials-unavailability of copies. Inadequate supervision is also another main reason for abuse of the library materials.

Table 07: Maintaining of disciplinary measures.

<table>
<thead>
<tr>
<th>Maintaining of disciplinary measures</th>
<th>SA</th>
<th>A</th>
<th>D</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charging for full cost of the abused materials</td>
<td>46</td>
<td>17</td>
<td>06</td>
<td>00</td>
</tr>
<tr>
<td>Cancellation of membership</td>
<td>17</td>
<td>31</td>
<td>16</td>
<td>09</td>
</tr>
<tr>
<td>Exhibiting their photos with names</td>
<td>24</td>
<td>17</td>
<td>11</td>
<td>19</td>
</tr>
<tr>
<td>Suspending the membership for a new weeks</td>
<td>10</td>
<td>09</td>
<td>22</td>
<td>28</td>
</tr>
</tbody>
</table>

According to the table 07, 46 students were indicated charging for full cost of the abused is the best option for maintaining of disciplinary measures. Today, disciplinary measures are essential for any institute for effective management. Library as an institute disseminating of information. 50% students have responded to being students have responded to being cancellation of membership and exhibiting their photos with names. Other measure has been indicated like suspending the membership for a few weeks.

Table 08: Most common method/opportune time for stealing and mutilation.

<table>
<thead>
<tr>
<th>Most common method/opportune time for stealing and mutilation</th>
<th>SA</th>
<th>A</th>
<th>D</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Escaping with materials at library closure hour when there is a rush</td>
<td>27</td>
<td>19</td>
<td>17</td>
<td>06</td>
</tr>
<tr>
<td>Hiding stolen/mutilated materials in folders</td>
<td>28</td>
<td>17</td>
<td>19</td>
<td>05</td>
</tr>
<tr>
<td>Hiding materials inside / under dresses</td>
<td>11</td>
<td>08</td>
<td>29</td>
<td>21</td>
</tr>
<tr>
<td>Connivance / collaboration with staff</td>
<td>14</td>
<td>11</td>
<td>28</td>
<td>16</td>
</tr>
<tr>
<td>Erasing library identification</td>
<td>17</td>
<td>36</td>
<td>11</td>
<td>05</td>
</tr>
</tbody>
</table>
stamps and removing slip and back covers
Interchanging book slip of previously loaned book with stolen book

<table>
<thead>
<tr>
<th></th>
<th>SA</th>
<th>A</th>
<th>D</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>17</td>
<td>21</td>
<td>24</td>
<td>05</td>
</tr>
</tbody>
</table>

From table 08 respondents mentioned escaping with materials at library closure hour when there is a rush, hiding stolen/ mutilated materials in folders and erasing library identification stamps and removing slip and back covers as the most common method of stealing and mutilation. 50% than students were mentioned above methods for stealing and mutilation.

Table :-09 Collection protection strategies.

<table>
<thead>
<tr>
<th>Collection protection strategies</th>
<th>SA</th>
<th>A</th>
<th>D</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>User education or awareness seminars</td>
<td>50</td>
<td>13</td>
<td>05</td>
<td>01</td>
</tr>
<tr>
<td>Library must constantly display mutilated books with names of the readers</td>
<td>37</td>
<td>21</td>
<td>05</td>
<td>06</td>
</tr>
</tbody>
</table>

According to the table 09 more than 75% have agreed to the statements given in the table. 63 (84%) students indicated the necessity of user education awareness seminars, encourage users to protect the collection and provide electronic resources. 60 (80%) students agreed to develop the collection ownership attitudes and also 58 (77%) students mentioned and agreed to establish Library must constantly display mutilated books with names of the readers.

Table :-10 Suggestions to protect the library materials.

<table>
<thead>
<tr>
<th>Suggestions to protect the library materials</th>
<th>SA</th>
<th>A</th>
<th>D</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improve supervision</td>
<td>47</td>
<td>18</td>
<td>02</td>
<td>02</td>
</tr>
<tr>
<td>Conduct regular library programmes</td>
<td>39</td>
<td>23</td>
<td>03</td>
<td>04</td>
</tr>
<tr>
<td>Provide enough library materials</td>
<td>48</td>
<td>15</td>
<td>05</td>
<td>01</td>
</tr>
<tr>
<td>Digitalization on rare materials</td>
<td>39</td>
<td>23</td>
<td>05</td>
<td>02</td>
</tr>
<tr>
<td>Regular supervision of users</td>
<td>40</td>
<td>22</td>
<td>05</td>
<td>02</td>
</tr>
<tr>
<td>Improve competence in security officers</td>
<td>29</td>
<td>18</td>
<td>18</td>
<td>04</td>
</tr>
<tr>
<td>Books should be examined after return or used by the reader</td>
<td>35</td>
<td>16</td>
<td>07</td>
<td>11</td>
</tr>
<tr>
<td>Introduce huge fine system for abusers</td>
<td>32</td>
<td>21</td>
<td>07</td>
<td>09</td>
</tr>
<tr>
<td>Ban bringing blades, correction fluid, water bottles, file covers etc. for the library</td>
<td>33</td>
<td>20</td>
<td>07</td>
<td>09</td>
</tr>
<tr>
<td>Introduce electronic checking system</td>
<td>42</td>
<td>14</td>
<td>07</td>
<td>06</td>
</tr>
<tr>
<td>Provide cheaper and efficient photocopy services</td>
<td>48</td>
<td>20</td>
<td>01</td>
<td>00</td>
</tr>
<tr>
<td>Through search at exits</td>
<td>26</td>
<td>19</td>
<td>14</td>
<td>10</td>
</tr>
</tbody>
</table>

According to the table 10, 68 (90%) students agreed to provide cheaper and efficient photocopy service. 82% said that improve supervision, conduct regular library programmes, digitalization on rare materials and regular supervision of users. 60% said that provide enough library materials. Books should be examined after return or used by the reader, introduce huge fine system for abusers, introduce electronic checking system. 50% agreed to improve competence in security officers and through search at exits.

VI. RECOMMENDATION:-

In the light of finding from the study conducted. It was glaring that Law College library has to solve some problems in order to reduce and hopefully eliminate the problem of user delinquency. The following recommendations are here by given based on these identified problems.
• Proper orientation should be given to users. First year orientation should be well planned with video documentary with demonstration to the students.

• Multiple copies of books in the circulation section and those displayed in the open stack should be provided since it is discovered that textbooks are the most affected by theft and mutilation.

• User registration number should be mentioned on the date label below the return date, when issuing a book. It will given an idea about the list of users who borrowed the particular library materials.

• Affected libraries should launch campaign against user delinquency, there should be posters containing warning against theft and mutilation being conspicuously pasted on the notice boards within and outside the library.

• Libraries should be in possession of a standby and efficient power generating set to provide electricity to the library services during power shortage. The period of temporary electricity blackout usually encourages library delinquency among users.

• Libraries should engage more trained security personnel.

• Strict implementation of reasonable circulation policies must be adhered to by all libraries to control and avoid library theft and mutilation.

• The photocopy services of the library should be subsidized. This will reduce the tendency of stealing or mutilating library materials.

• In service training should be encouraged by libraries, particularly for the junior staff on what library profession is all about. This will enhance the efficiency of the workers.

VII. CONCLUSION

The study was mainly concerned with examination of the abuse of library materials in the Sri Lank Law College library, Sri Lanka: perception of the first year, second year and final year students. There is no doubt that for as library materials are physically handled and intellectually explored, there is bound to be some forms of abuse or the other. The results of the study have clearly indicated that the documents of the Sri Lanka Law College library network are considerably abused by the users. Tearing away pages, writing notes inside text books, highlighting/underlining the pages, hiding books are common. Abuse of library materials are higher or print materials than the non print materials, because print materials are used more often than the non print materials. The library awareness programme is a very important factor to the users. Students who undergo frequent library instruction and orientation understand better the value of borrowing and returning library materials, and avoid abusing them. Introducing CCTV camera system is another alteration to reduce the abuse of library materials. Library should invest in more electronic resources which will reduce to a large extent the incidence of users physically handling documentary materials. The students have proposed that the library staff also should be carefully involved with the protection of the collection. The library staffs who work in the shelf area and the reading rooms should frequently visit and observe these areas. Books should be examined by the counter staff when they are returned by the user. Library staff should be made aware of the value, importance, rareness of library materials, should introduce motivational and punishable guidelines for library staff requiring the responsibility of the collection, not issuing already damaged books, getting the assistance of security staff, employees placed in the stack areas, counter for supervision of the readers. Staff should be carefully examined when books are returned. Conducting awareness programmes to make the students understand the importance of protecting library materials. Inculcating proper attitudes will help them to refrain from abusing library materials.

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AUTHORS

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Does Electronic Medical Records make cost benefits to non-profit seeking health care institutes?

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Abstract- Background: Sri Lanka provides a free public health care service to its permanent residents. Currently Sri Lankan health care system is in the process of using EMR systems both public and private sector healthcare institutions. There are few published data available regarding cost-benefits of EMR in profit seeking institutes in some countries and no published data on non-profit seeking institutes. Therefore, main objective of the study is to perform a cost benefit analysis (CBA) of EMRs in the public health care system in Sri Lanka and secondary objectives are to evaluate the perception of EMRs among patients, health care professionals and supporting staff.

Methodology: Two Sri Lankan government hospitals' OPDs; hospitals belong to Type A divisional category, were selected for the study. Those two hospitals were named as Hospital D and Hospital AR. Hospital D has an EMR system and hospital AR has traditional paper-based recording. A modified cost- benefit analysis was done using achievable costs and benefits. Meanwhile, three different questionnaires were distributed among health care professionals, supporting staff and patients to determine their perception on EMRs.

Results: This study found that Benefits-to-Costs ratio of OPD of the hospital D for the year 2015 was 0.269 and for hospital AR was 0.0589. From CBA four basic cost reductions were found as costs for stationeries, patient queue waiting time, supporting staff number and indirect costs such as drug balancing. Health care professionals, supporting staff and patients had a positive perception on EMR systems.

Conclusion: Implementing EMRs to Sri Lankan health care system leads to cost reductions. If Sri Lankan government implements an EMR system only in OPDs of government hospitals, it will lead to save millions of rupees. There are thirty-five, Type A divisional hospitals in Sri Lanka. If this EMR system is implemented only in OPDs, Sri Lankan public health care system would have saved Rs192 million ($ 1.3 million) in 2015. Finally, it can be concluded that implementing EMRs in non-profit seeking health care institutes lead to cost reductions and save money.

Index Terms- Electronic Medical Records, EMR, Cost Benefits Analysis, CBA
of Sri Lanka’s total income and expenditures. Though, there are several studies done in other countries[7], [10]which have profit seeking health care institutes on cost-benefits of implementing EMRs, but no study in countries like Sri Lanka which have free health care providing system. Therefore, this study attempts to fill that gap.

General objective for the study is to perform a cost benefit analysis of EMR system in the public health care system in Sri Lanka and specific objectives are to determine health care professionals’, patients’ and supporting staff members’ opinion on EMR system.

II. METHODOLOGY

All the previous CBA of EMR systems studies were done in private or profit seeking institutes in other countries and basically they were the ratios of costs and profits. But this is the first and a unique study which was done for non-profit seeking government (public) hospitals.

This study did not follow conventional CBA method which performs net present value calculations. A shadow pricing method was used due to the difficulties in obtaining financial records for past five years of the particular government institute with the EMR system. For the purpose of comparison another institute of similar capacity was taken based on government classifications. Since Sri Lankan government health care institutes are not profit making organizations, cost reductions generated through the EMR system is considered as benefits for the analysis.

The study was included a CBA of EMR system and an opinion study on EMR System.

Importance of the study

Currently Sri Lankan health care system is going to use EMR systems and some institutes are using some forms of EMR systems including both public and private sector. Main purpose of implementing EMR in Sri Lanka is to enhance efficiency of the health care system. Set up cost is relatively high for implementing an EMR. But Sri Lankan Ministry of Health has to introduce mechanisms to reduce health expenditure while maintaining a good service to the public. Though, there are several studies done in other countries on cost-benefits of implementing EMRs, but no study in Sri Lanka.

Objectives of the study

General objective
Perform a cost benefit analysis of EMR in the public health care system in Sri Lanka and to determine whether it is worth to implement EMR.

Specific objectives
1. Determine Health care professionals’ opinion on EMR system
2. Determine patients’ opinion on EMR system
3. Determine supporting staff members’ opinion on EMR system

2.1 Population and setting
All the Type A divisional government hospitals in Sri Lanka were taken as the population for the study.

2.2 Sample Selection
After 2005, EMR systems were introduced to a few government hospitals in Sri Lanka[3]–[6]. From the hospitals with EMR system, one hospital was selected randomly and named as hospital D. The selected hospital was a Type “A” divisional hospital (Sri Lankan Health Ministry has categorized hospitals based on the bed strength of the hospital and based on the governing institute; Health Ministry or Provincial Council. Type A Divisional hospitals have 100 to 200 bed strength and govern by a Provincial Council.). Therefore, for the purpose of comparison another Type “A” divisional hospital (“SL Hosp List Beds.pdf,” 2010) was selected which uses traditional paper based recording and named as hospital AR. Out-Patient Departments (OPDs) of both hospitals were selected as the study setting.

Only OPD of hospital D implements relatively a 100% EMR system and has relatively zero paper charts when the study conducted. This study analyzed economic effects of an EMR system using a Cost-Benefits Analysis (CBA)[12].

2.3 Quantitative study
This study analyzed economic effects of an EMR system using a Cost-Benefits Analysis(CBA), based on different costs. Any qualitative factor such as quality of therapy and safe use of medication were excluded. These are key factors in health care services, but are not easily converted into monetary values and they consume more time. At the same time costs for drugs, devices and laboratory chemicals were excluded because the flow of drug and other supplies are not equal for both hospitals due to difference in their governing provisional councils. Therefore, the study focused on tangible items’ cost and important key services’ costs which can easily measure. In conclusion, this study discussed cost shifting after adoption into the EMR system.
Study setting of CBA

OPDs of both hospitals were selected as the study setting. Because only in OPD of hospital D is relatively 100% implements EMR system and it has relatively zero paper charts. In wards and clinics, paper charts are used and paper documentation is done along with EMR system. Therefore this study only considered costs and benefits for the OPD.

CBA

Cost benefit analysis is a systemic approach for estimating the strengths and weaknesses of alternatives that satisfy activities or function of an organization. It is a technique to select the best approach with labor, time and cost benefits for the adoption and practice. Cost benefit analysis is used for two purposes. First purpose is to justification of an investment and the second one is to compare two or more projects.

This study was not a conservative CBA and the purpose of the CBA was to compare two OPDs; with an EMR system and without an EMR system. The financial costs were obtained through each hospital’s accounting reports, though questionnaire, observations and opinions of experts. Net Present Value (NPV) calculation for the studied costs for the two hospitals was not done because the CBA was done through comparison of costs of two OPDs. Decline balance depreciation method was used to calculate computer hardware costs for the relevant year for the OPD of the hospital D.

Costs

EMR system incurred initial cost that used to implement the system, to purchase computer hardware, to develop the software. This cost was calculated for the year 2015 by using decline balance depreciation method (Depreciation is a method of allocating the cost of a tangible asset over its useful life). Other regular costs were the costs that the hospital usually bare such as salaries and wages and cost for stationeries.

Benefits

Basically benefits were cost reductions originated from cost savings due to elimination of stationeries. There were basically four types of cost reductions: 1) Cost reduction of stationeries, 2) Cost reduction of patient queue waiting time, 3) Cost reduction in supporting staff number, 4) Cost reduction in indirect costs such as drug balancing, recording.

2.4 Qualitative/Opinion study

The opinion study was carried out in the same government hospitals to gather information regarding perception of EMR of health care professionals, patients and supporting staff. OPD, clinics and wards were randomly selected from each hospital.

Three separate questionnaires were given to collect information from following parties, because they are the people who interact with medical records in Sri Lankan health care system.

1. Health care professionals (Physicians, Pharmacists, Medical Laboratory Technicians, Nurses)
2. Patients
3. Supporting Staff

Data collection tool

Three self-administered questionnaires for the patients, health care professionals and supporting staff were used as the data collection tool for the opinion study. Questionnaires had both open ended questions and close ended question. Written consents were obtained after explaining the objectives of the study from the participants.

The questionnaire for patients consist of six main areas,

1. Demographic information
2. Residential information
3. Patient income
4. Health care need
5. Medical Record
6. Electronic Medical Record

The questionnaire for Health care professionals and supporting staff consist six main areas,

1. Medical Records
2. Responsibility of Medical Records
3. Difficulties with paper based records
4. Information Technology knowledge
5. EMR
6. Costs
Data collection

Inclusion criteria

No age limit
Patients and care givers who come to hospital to above units for medical purposes
All health care professional and helpers who work in above units
All specified costs in Table 1

Exclusion criteria

Any person who refused to participate

Statistical analysis

All the obtained data from the study was entered into the Statistical Package for Social Sciences (SPSS) version 16. Descriptive statistics were performed to evaluate the socio-demographic characteristics of the participants. Cross tables were used with some variables.

Frequencies and especially percentages were calculated for the opinion study. For continues variables (mostly for CBA) mean values and standard deviations were calculated using descriptive statistics.

2.5 Ethics

Qualitative study carried out in this study involved human subjects and hence informed written consent was obtained from each participant after explanation about the study and informing that there are no direct benefits to participants. This study involved minimal risks since it was a questionnaire based study. The ethical approval to conduct the study was obtained from ethical review committee, faculty of Allied Health Sciences, University of Peradeniya, Sri Lanka. All the data were kept anonymously; confidentiality of the data was maintained according to ethics standards.

CBA Analysis

Step 1 Interventions were clearly identified as direct costs and indirect costs.

Step 2 All the costs for OPD were identified.

<table>
<thead>
<tr>
<th>Table 1: Identified direct costs and indirect costs for the OPD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Direct Cost for one month</strong></td>
</tr>
<tr>
<td>Cost for waiting time in the hospitals for patients</td>
</tr>
<tr>
<td>Physicians salaries</td>
</tr>
<tr>
<td>Nurses Salaries</td>
</tr>
<tr>
<td>Pharmacists salaries</td>
</tr>
<tr>
<td>Supporting staff salaries</td>
</tr>
<tr>
<td>Cost for papers for patient registration</td>
</tr>
<tr>
<td><strong>Total cost for paper slips for patients</strong></td>
</tr>
<tr>
<td>* Paper slips are used to write prescription and to give numbers for patients</td>
</tr>
<tr>
<td><strong>Total cost for pens for staff members</strong></td>
</tr>
<tr>
<td><strong>Indirect costs for one month</strong></td>
</tr>
<tr>
<td><strong>Cost for patients to re-correct prescriptions</strong></td>
</tr>
<tr>
<td>*If prescribed drugs are not available at drug stores, patients themselves have to go back to the physician to have another prescription to purchase drugs from the outside pharmacies. But in EMR system drug availability at stores is shown.</td>
</tr>
<tr>
<td><strong>Cost of drug balancing</strong></td>
</tr>
<tr>
<td>*In Sri Lankan public health care practice drug stock balancing is done in daily basis and annually. Approximately it takes around 2 hours for manual balancing. But in EMR system drug balancing is done automatically.</td>
</tr>
</tbody>
</table>

http://dx.doi.org/10.29322/IJSRP.8.5.2018.p7726
Cost for papers for recording OPD drugs at Pharmacy department

Cost for patients to re-correct a laboratory investigation test order
*If requesting test cannot be done with available facilities or available chemicals, patient has to visit back to the physician to have another laboratory investigation test order to purchase it from the outside.

Cost for print laboratory investigation tests

Cost for papers for recording OPD laboratory tests at Medical Laboratory

Total cost for energy use for computers

Cost for the EMR system for the year 2015; according to decline balance depreciation.

Cost of maintenance of EMR system for a year

Step 3  Benefits were calculated by comparing costs values. Cost reductions were accounted as benefits.

Step 4  Summation of all the cost values was taken.
Summation of all the benefit values was taken.
Total costs were subtracted from total benefits to determine net benefits.
Net benefits=Total benefits - Total costs
Benefit-to-cost ratio was calculated.
Benefit-to-cost ratio=Total benefits/Total Costs

The financial costs for the year 2015 were obtained through each hospital’s accounting reports, questionnaires, observations and opinions of experts. Net Present Value (NPV) calculation for the costs for the two hospitals was not done because the CBA was done through comparison of costs of two OPDs (Any cost reduction with respect to the other hospital was taken as a benefit for the considering hospital.). Decline balance depreciation method was used to calculate computer hardware costs for the relevant year for the OPD of the hospital D.[13] There were basically four types of cost reductions:

1) Cost reduction of stationeries
2) Cost reduction of patient queue waiting time
3) Cost reduction in supporting staff number
4) Cost reduction in indirect costs such as drug balancing and recording

The opinion study was carried out in the same government hospitals to gather information regarding perception of EMR. OPD, clinics and wards were randomly selected from each hospital. Three separate questionnaires were given to randomly select stake holders- health care professionals, supporting staff and patients of the two government hospitals. One hundred patients, fifty health care professionals and fifty supporting staff members were selected.

III. RESULTS

Benefits-to-costs ratio of OPD of the hospital D for the year 2015 was 0.269 and for hospital AR was 0.0589. Average Benefits for the hospital D relative to the hospital AR for a month for the year 2015 were shown in Table No 2.

Table 2: CBA Calculation Summary

<table>
<thead>
<tr>
<th>Item</th>
<th>Hospital D Costs/Rs</th>
<th>Hospital AR Costs/Rs</th>
<th>Hospital D Benefit relative to Hospital AR(Rs)</th>
<th>Hospital AR Benefit relative to Hospital D(Rs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Cost for one month</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost for waiting time in the hospitals for patients</td>
<td>888250.52</td>
<td>192553.83</td>
<td>1080804.34</td>
<td>0</td>
</tr>
<tr>
<td>Physicians salaries</td>
<td>435462.52</td>
<td>0</td>
<td>435462.52</td>
<td>0</td>
</tr>
<tr>
<td>Nurses salaries</td>
<td>253561.72</td>
<td>0</td>
<td>126780.86</td>
<td>126780.86</td>
</tr>
</tbody>
</table>
Table 3: Benefits of hospital D relative to hospital AR for a month

<table>
<thead>
<tr>
<th>Cost Reduction</th>
<th>Rs/Month</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Stationeries</td>
<td>61201.36</td>
</tr>
<tr>
<td>2) Patient queue waiting time</td>
<td>192553.82</td>
</tr>
<tr>
<td>3) Supporting staff number</td>
<td>183779.75</td>
</tr>
<tr>
<td>4) Indirect costs (for an example drug balancing and recording)</td>
<td>19851.45</td>
</tr>
<tr>
<td>Total</td>
<td>457386.38</td>
</tr>
</tbody>
</table>

Only the OPD of the hospital D was able to save Rs 5488636.58 for the year 2015 because of the EMR system. According to the study results, 54% of the patients visit more than one physician in government and private sector to fulfill their health care needs in last three months, October to December in 2015. 90% of the patients do not have a thorough knowledge on their previous disease conditions and given drug regimens. 89% of the patients think MRs are important in their current and future health care plans. 55% of the patients did not have any kind of a medical record at the time when the survey was conducted. 71% of the above 55% of the patients did not have any idea about their past MR. 59% of the sample was aware about EMR systems and 86% of them had experienced EMR inside the country, while 4% had seen through internet and 10% just heard EMR. 73% of the patients think that EMR systems can increase the efficiency of Sri Lankan health care system and it can save their time by reducing waiting time at health care institute. Study found that average time spent in hospital D was 50.30±24.57 minutes and in hospital AR was 63.54±27.42 minutes.

95% of the health care professionals stated that Medical Records are very important in caring patients. 41% of the health care professionals think the responsibility regarding MRs should go to all health care professionals and at the same time, another 41% of
health care professionals think it is the responsibility of all parties including patients and supporting staff. The other 18% of health care professionals feel that it is the responsibility of the supporting staff. 98% of the health care professionals think it is good to have a policy for Medical Records in Sri Lanka to ensure proper maintain. 82% of health care professionals stated that poor legibility and misplacing of the paper based Medical Records as two major issues. When consider the Information Technology (IT) knowledge, 41% of health care professionals did not have a proper IT education, but they can work with computers with experience. 86% of the health care professionals are aware about EMR systems and 73% of them had working experience with EMRs. 95% of the health care professionals think that health IT system can increase the efficiency of health care system in Sri Lanka. 98% thinks EMR make their service more easy and convenient. 91% thinks EMR is the best solution for the previously mentioned difficulties with paper based MRs. 50% thinks that implementing EMR systems in Sri Lanka is difficult and 64% of the total sample has accounted maintaining as a major problem.

59% of sample thinks that EMR systems can reduce health care expenditures in Sri Lankan health care system. 83% of SS thinks MRs are very important in treating patients. 50% of the SS stated that physicians are responsible for MRs and 42% stated that as a responsibility of all parties. 100% of the SS stated that it is good to have a policy for MRs in Sri Lanka. Poor legibility (67%) and inability to use in emergency situations (75%) are two major issues with paper based MRs for the SS. 58% of the SS did not have a proper IT knowledge. 67% of SS was aware of EMR systems and 94% of that had EMR working experience. 96% of the sample believes that health IT can increase the efficiency of the health care service. 100% of SS sample thinks that EMR make their service easier and the best solution for difficulties with paper based MRs is the EMR. 88% of the SS stated maintaining as a major problem with EMR systems. Only 21% of SS thinks that EMR system can reduce the health care cost in Sri Lankan health care system.

IV. DISCUSSION

The study found that Benefits-to-Costs ratio of OPD in hospital D was 0.269 and for hospital A 0.0589 for the year 2015. Theoretically, it is not a socially beneficial project. However Sri Lankan government provides a free health care service and it does not make any profit. Therefore, when comparing Benefits-to-Costs ratio of two hospitals it can be concluded that hospital D has a higher Benefits-to-Costs ratio relative to hospital A. This means that the hospital D obtains more benefits when compared to its costs than hospital A because of its EMR system. All benefits were the cost reduction due to elimination of papers.

Opinion study showed that, patients do not have a thorough knowledge on their previous disease conditions and the given drug regimens. Patients think Medical Records are very important in their current and future health care management. Majority of patients stated that, EMR systems can increase the efficiency of Sri Lankan health care system and it can save their time by reducing waiting time at health care institutions in both private and public sector.

Health care professionals and supporting staff stated that medical records crucial in caring patients. Health care professional and Supporting Staff agreed to have a policy for MRs for Sri Lanka to ensure proper maintaining of Medical Records. Opinion study showed that health care professional and supporting staffs do not have a clear idea regarding the responsibility of Medical Records. Poor legibility and misplacing of Medical Records were identified as major problems with traditional paper base MRs for health care professionals and poor legibility and poor access in emergencies for Supporting Staff. Health care professionals and Supporting Staff believe that EMR systems can increase the efficiency of Sri Lankan health care service. They suggested EMR as the best solution for the difficulties with paper based recording. They mentioned EMR system maintenance as a major issue with implementation EMRs in Sri Lanka.

As guided by the World Health Organization- Medical Records Manual- A guide for developing countries (2006), the EMR system that the hospital D has, is able to

1. Collect clinical, administrative data at the point of care
2. Exchange data more easily between health professionals to facilitate continuing care within the hospital D
3. Provide valuable statistical data in a timely and efficient manner to public health and health ministry
4. Support management in administrative and financial reporting and other processes

However, the collected data is not directly used for measuring clinical improvement and health outcomes, comparing the outcomes against benchmarks and facilitating research and clinical trials.

Limitation for the study

The study has several limitations. Opinion study was done only in two government hospitals due to issues in time duration. Number of staff members at the selected hospitals was not large enough. Some data used for CBA was not available at hospitals and not easily obtainable from authorities such as prices. Therefore usual market prices had to use. Qualitative factors such as quality of therapy and safe use of medication were omitted because they are time consuming steps. Cost for drugs and laboratory tests had to omit due to different in hospital supply and prescribing patterns.

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V. CONCLUSION

Implementation EMRs to Sri Lankan health care system leads to remarkable cost reductions. These cost reductions are originated due to elimination of paper base recordings. If Sri Lankan government implements an EMR system only in OPDs of government hospitals, it leads to save millions of rupees. There are thirty five Type A divisional hospitals in Sri Lanka. If this EMR system is implemented only in OPDs of them, Sri Lankan public health care system would have been able to save Rs192102280.30 in 2015. If the EMR system is expanded to all units of hospitals with an interconnection, it may lead to save billions of rupees annually and Sri Lankan public can have an efficient health care service due to reduction in hospital waiting time. Health care professionals, patients and supporting staff have a positive view on EMRs. But for implementation of the EMR systems, MR policy needs to be introduced to the health care system to ensure proper maintenance.

Finally it can be concluded that implementation of EMR in non profit seeking healthcare institutes, leads to cost reductions.

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Spatial Disparities in Access and Use of Rehabilitation Services in Northern Greece: a GIS-based Study

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Abstract - Access to health care is considered to be of great importance for a person’s right to health. This paper attempts to highlight the spatial disparities in access to and use of rehabilitation services across Imathia’s area in Northern Greece. Our study is being focused on one defined geographical area, Imathia, in Macedonia in northern Greece. We defined a public general hospital as a local National Health System institution providing health services for the purpose of rehabilitation concerning patients with musculoskeletal disorders. The implementation of data included descriptive and concluding statistical processing. The spatial data was visualized in points and polygons. Most patients (60.5%) are from areas near to the hospital which means that there is more concentration. The research focuses on spatial disparities and does not deal with their causes. As a consequence these findings raise important research questions for future investigation.

Index Terms - health care access, rehabilitation services, spatial accessibility, rural, geographical information system

I. INTRODUCTION

Musculoskeletal disorders (MSDs) are often the cause of dysfunction and disability, with a significant impact on economic and social resources (Carmona et al. 2001). Thousands of people worldwide suffer from dozens of MSDs, while some of them are presented as a result of injuries and degrade the level of health and the quality of peoples’ lives. The management of musculoskeletal conditions is multidisciplinary and requires a wide range of therapeutic interventions, from simple guidance or recommendations to specialized surgical treatments. Despite the fact that in some regions excellent care is provided, some others are characterized by low availability of healthcare resources and barriers to health care access (UKDH, 2006).

Definition of access

According to the FRA (2008) “access to health care is a basic human right and one of the fundamental principles of European health systems, together with safety, quality, and equity”. Inequitable access to rehabilitation services is a critical gap in health care in many regions. Even though health is a public good, health care, like many public services, is not equally accessible to all individuals (Powell, 2016). The distribution of people is uneven in the different geographical areas as well as their individual characteristics (demographic characteristics, income etc). All these affect their health status and their ability to overcome the obstacles to health care access (Aday and Andersen, 1974; Mc Lafferty, 2003).

According to Penchansky and Thomas (1981) access consists of five aspects: Adequate, Accessible, Affordable, Appropriate, and Available. Accessibility represents the geographic dimension of access and it was classified (Abdullah, 1992; Shah et al., 2016) into spatial component. Accessibility is spatial in nature as the location of healthcare units and health professionals plays a principal role in providing healthcare services (Shah et al., 2016).

Over the last years (Sasaki et al., 2010; Russell et al., 2013; McGrail and Humphreys, 2015; Ward et al., 2015; Dohyeong et al., 2016; Gao et al., 2016) researchers and health policy planners have been addressing the access’ spatial feature. In any case, the conclusion is that the involvement of spatial planning in the development and application of health policies is nowadays an incontestable necessity.

The WHO (1998) defines accessibility as “a measure of the proportion of the population that reaches appropriate health services”. The inadequacy of the position of a healthcare organization is often responsible for limiting the access of the population.

However, literature indicates that access to health services is not the same thing as the adequacy of health resources in a geographical area (Gulliford et al., 2000). Since the beginning of ’70s (Elesh and Schollaert, 1972; Wennberg and Gittelsohn, 1973; Shannon and Dever, 1974) has been an interest in measuring spatial access to identify the social barriers that restrict the delivery of health care in both urban and rural areas of the USA. The issue of social inequality (in health and health determinants) is related to changes in health of the population. It is a fact that has been pointed out with the publication of the Black Report (Gray, 1982).
Nevertheless, even though the EU is aiming at reducing social inequalities in health, there is little evidence concerning the impact of intersectional grounds on limiting of the access to health care (FRA, 2012).

Access to health services is directly related to the issue of responding health systems to the needs of the population. In particular, the issue of spatial access to healthcare facilities is related to equality of health and health-related quality of life (Delamater et al., 2012). Geographical Information Systems (GIS) emphasize the spatial dimensions of access, giving information on available health facilities, the network of healthcare providers and underserved geographical areas (Mc Lafferty, 2003).

**Use of GIS in health care**

GIS are computer-based tools for mapping and examining the changes on earth. These are spatial data management systems and associated data properties. They are designed to gather, organize and classify data in order to specify the spatial properties of a phenomenon or object. Thus, it is easier to monitor not only the phenomena but also the space they are evolving. GIS are also used in public health, as a decision supporting tool to deal with health problems in different geographical areas (Kostantinidis, 2002).

GIS have a wide range of tools for the spatial structure of healthcare facilities and the monitoring of access to health services (Mc Lafferty, 2003; Fradelos et al., 2014). The use of GIS is useful for understanding health problems in diverse geographical areas (dos Anjos and Cabral, 2016). GIS technologies can contribute to the research and development of health policies through rational decision making, since they allow for the spatial linking of different types of entities such as physical objects, regional units, demographic information, geographical distribution of economic resources, population, and other relevant factors (Bellander et al., 2001; Mennecke and Lawrence, 2001; Tanser and le Sueur, 2002).

This paper attempts to highlight the spatial disparities in access to and use of rehabilitation services across Imathia’s area. This study hypothesizes that geographic accessibility to rehabilitation services will vary considerably across the specific geographical area. The research focuses on spatial disparities, namely whether the access differs from municipality to municipality and the extent to which it differs. It focuses on identifying disparities and it does not address their causes.

### II. METHODOLOGY

Our study focused on one defined geographical area, Imathia, in Macedonia in northern Greece (Figure 1).

![Figure 1. Location of Imathia / Greece. Source: Gogos et al., 2018.](image)

We defined a public general hospital as a local National Health System institution providing health services for the purpose of rehabilitation for patients with MSDs. We studied retrospectively all patients' folders (N = 1005) in which rehabilitation services rendered during the two-year period 2014 - 2015.

Initially, the Administrative division of the country was decided to be followed for obvious reasons, which were related to the possibility of using existing data. With this approach, the adaptation and the data's analysis was facilitated, as well as their
cartographic depiction, as the homogenization of information was complete, while there were direct references to the same geographical level. The regional unit Imathia is divided into three municipalities. These are Alexandreia, Naousa and Veroia respectively. The municipalities were reorganized, according to the table 1.

<table>
<thead>
<tr>
<th>Municipal Units</th>
<th>Municipalities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alexandreia</td>
<td>Antigonides</td>
</tr>
<tr>
<td></td>
<td>Meliki</td>
</tr>
<tr>
<td></td>
<td>Platy</td>
</tr>
<tr>
<td>Naousa</td>
<td>Eirinoupoli</td>
</tr>
<tr>
<td>Veroia</td>
<td>Apostolos Pavlos</td>
</tr>
<tr>
<td></td>
<td>Vergina</td>
</tr>
<tr>
<td></td>
<td>Dovras</td>
</tr>
<tr>
<td></td>
<td>Makedonidos</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Kallikratis reform law text, 2010

Data

The collected data can be divided into primary and secondary, as well as into geographical and descriptive. The descriptive, primary elements concerned data related to sex, age, place of residence, occupation, income and ailing physical area.

The secondary elements come from the procession of primary descriptive elements, so as their use to be compatible on the one hand during their statistical process and on the other hand their depiction to be understood.

The grouping of occupations happened according to the International Standard Classification of Occupations – 08 (ILO, 2010). The classification of the income happened in accordance with the HSA (2011).

The coding of diseases happened initially, analytically to each one of the sample, according to the full list of the International Statistical Classification of Diseases and Related Health Problems 10th Revision, (ICD-10) (WHO, 2011). The current project didn’t have as its main purpose the clinical study of MSDs, so in retrospect a generalization as to the main category of the disease was chosen to take place, which guaranteed – in always permissible limits – the same diagnosis of the diseases and allowed the frequencies of each specific type to be calculated (Table 2). The implementation of this data included descriptive and concluding statistical processing.

<table>
<thead>
<tr>
<th>code</th>
<th>Diseases of the musculoskeletal system</th>
</tr>
</thead>
<tbody>
<tr>
<td>M16</td>
<td>Coxarthrosis [arthrosis of hip]</td>
</tr>
<tr>
<td>M17</td>
<td>Gonarthrosis [arthrosis of knee]</td>
</tr>
<tr>
<td>M22</td>
<td>Disorders of patella</td>
</tr>
<tr>
<td>M23</td>
<td>Internal derangement of knee</td>
</tr>
<tr>
<td>M24</td>
<td>Other specific joint derangements</td>
</tr>
<tr>
<td>S42</td>
<td>Fracture of shoulder and upper arm</td>
</tr>
<tr>
<td>S43</td>
<td>Dislocation, sprain and strain of joints and ligaments of shoulder girdle</td>
</tr>
<tr>
<td>M50</td>
<td>Cervical disc disorders</td>
</tr>
<tr>
<td>S52</td>
<td>Fracture of forearm</td>
</tr>
<tr>
<td>S53</td>
<td>Dislocation, sprain and strain of joints and ligaments of elbow</td>
</tr>
<tr>
<td>M54</td>
<td>Dorsalgia</td>
</tr>
<tr>
<td>M59</td>
<td>Dislocation, sprain and strain of joints and ligaments at wrist and hand level</td>
</tr>
<tr>
<td>S72</td>
<td>Fracture of femur</td>
</tr>
<tr>
<td>S82</td>
<td>Fracture of lower leg, including ankle</td>
</tr>
<tr>
<td>S83</td>
<td>Dislocation, sprain and strain of joints and ligaments of knee</td>
</tr>
<tr>
<td>S92</td>
<td>Fracture of foot, except ankle</td>
</tr>
<tr>
<td>S93</td>
<td>Dislocation, sprain and strain of joints and ligaments at ankle and foot level</td>
</tr>
<tr>
<td>M99</td>
<td>Biomechanical lesions</td>
</tr>
</tbody>
</table>
Transformation of spatial data was held in the system GGRS87 and based on creation of the Digital Elevation Models of Greece (DEM), specifically for the county of Imathia. The creation of the DEM was deemed necessary, as it helps in gaining a global view of the distinction of the information’s levels of the space. The spatial data was visualized into points and polygons. Subjects were integrated in a GIS. Geocoding was done with the declaration of residential place. For the subjects’ geocoding, we used cartographic data provided by the GIS. The addresses geocoding techniques were provided by ArcMap 9.3.

III. RESULTS AND DISCUSSION

Regarding the gender of the statistical population it has been observed uneven distribution in view of the fact that the percentage of women (69.3%) was higher of the percentage of men (30.7%). In the map of figure 2, red dots represent women with MSDs and blue dots represent men with MSDs.

The map clearly shows areas with high and low rates of access. The maps in figure 3 and 4 are accessibility maps according to gender (men and women with MSDs who received healthcare services). This visually confirms spatial inequalities in accessibility, even among people in neighbouring locations.

As for the age, the statistics show that the sample mainly comprises a middle-aged or older while the smallest percentage belonged to those from 18 to 40 years of age (n=128).
Of the total sample of the population (N=1005), the majority involved farmers (48.7%), while the smallest proportion was unemployed (3.3%). As for the educational level of the population, the highest rate (68.5%) was elementary graduates and few (15%) are presented as university graduates. The declared income showed larger variations among the population of the study with the majority to present a monthly income 301 – 630 €, while few (17.5%) declared a monthly income >801 €. The features of this sample are imprinted on table 3.
Table 3: Features of sample (N=1005)

<table>
<thead>
<tr>
<th>Features</th>
<th>Frequency N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>men</td>
<td>308</td>
<td>30.7</td>
</tr>
<tr>
<td>women</td>
<td>697</td>
<td>69.3</td>
</tr>
<tr>
<td><strong>Age group</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-40</td>
<td>128</td>
<td>12.7</td>
</tr>
<tr>
<td>41-60</td>
<td>350</td>
<td>34.8</td>
</tr>
<tr>
<td>60+</td>
<td>527</td>
<td>52.4</td>
</tr>
<tr>
<td><strong>Occupation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skilled Agricultural</td>
<td>489</td>
<td>48.7</td>
</tr>
<tr>
<td>Clerical Support Workers</td>
<td>176</td>
<td>17.5</td>
</tr>
<tr>
<td>Services and Sales Workers</td>
<td>144</td>
<td>14.3</td>
</tr>
<tr>
<td>Professionals</td>
<td>84</td>
<td>8.3</td>
</tr>
<tr>
<td>Other</td>
<td>79</td>
<td>7.9</td>
</tr>
<tr>
<td>Unemployed</td>
<td>33</td>
<td>3.3</td>
</tr>
<tr>
<td><strong>Educational level</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>14</td>
<td>1.4</td>
</tr>
<tr>
<td>elementary graduates</td>
<td>689</td>
<td>68.5</td>
</tr>
<tr>
<td>Graduates of Secondary-High School</td>
<td>148</td>
<td>14.7</td>
</tr>
<tr>
<td>University graduates</td>
<td>143</td>
<td>14.0</td>
</tr>
<tr>
<td>MSc/PhD</td>
<td>11</td>
<td>1.0</td>
</tr>
<tr>
<td><strong>Monthly income</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;300</td>
<td>41</td>
<td>4.0</td>
</tr>
<tr>
<td>301-630</td>
<td>493</td>
<td>49.0</td>
</tr>
<tr>
<td>631-800</td>
<td>294</td>
<td>29.5</td>
</tr>
<tr>
<td>801-1,100</td>
<td>101</td>
<td>10.0</td>
</tr>
<tr>
<td>1,101-1,220</td>
<td>58</td>
<td>5.7</td>
</tr>
<tr>
<td>1,221-1,500</td>
<td>18</td>
<td>1.8</td>
</tr>
</tbody>
</table>

*Source: Gogos et al., 2018*

A “body map” was used in order to identify nine (9) body areas suffering by musculoskeletal problems: neck, shoulders, elbows, hands, back, waist, hips, knees and ankles/joints (Gogos and Papadopoulou, 2015). Based on the statistical analysis of the data, MSDs occurs mainly in women (N=697). The most frequently reported MSDs of study population were located in knee joint (22.78%) (Table 4).

Table 4: Allocation of MSDs per physical area

<table>
<thead>
<tr>
<th>Physical area</th>
<th>N</th>
<th>Men (N)</th>
<th>%</th>
<th>Women (N)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neck</td>
<td>148</td>
<td>39</td>
<td>26.35</td>
<td>109</td>
<td>73.64</td>
</tr>
<tr>
<td>Shoulder</td>
<td>180</td>
<td>66</td>
<td>36.66</td>
<td>114</td>
<td>63.33</td>
</tr>
<tr>
<td>Elbow</td>
<td>40</td>
<td>34</td>
<td>85</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td>Wrist/Hand</td>
<td>118</td>
<td>85</td>
<td>72.03</td>
<td>33</td>
<td>27.96</td>
</tr>
<tr>
<td>Upper back</td>
<td>60</td>
<td>6</td>
<td>10</td>
<td>54</td>
<td>90</td>
</tr>
<tr>
<td>Low back</td>
<td>190</td>
<td>22</td>
<td>11.57</td>
<td>168</td>
<td>88.42</td>
</tr>
<tr>
<td>Hips</td>
<td>22</td>
<td>8</td>
<td>36.36</td>
<td>14</td>
<td>63.63</td>
</tr>
<tr>
<td>Knees</td>
<td>229</td>
<td>40</td>
<td>17.46</td>
<td>189</td>
<td>82.53</td>
</tr>
<tr>
<td>Ankle/Feet</td>
<td>18</td>
<td>8</td>
<td>44.44</td>
<td>10</td>
<td>55.55</td>
</tr>
<tr>
<td><strong>total</strong></td>
<td>1,005</td>
<td>308</td>
<td>697</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Source: Gogos et al., 2018*

In map of figure 5, the entire population of the study that received health services during the aforementioned period from the General Hospital that is based on the capital of the county is showed. The areas close to the hospital from where most of the patients come from, like for example the municipal units of Veria’s Municipality, where a greater assembly is observed (60.5%), are obvious. In contrast, the smaller rate of patients who visited the hospital (3.6%) comes from Naousa’s municipality.
Moreover there are substantial variations in geographical accessibility to health's rehabilitation services not only among but also within Imathia’s areas. There was a fluctuation in access among the municipal units of Veria’s municipality with the most limited access to be cartographically imprinted in the Municipal Unit of Makedonidos (0.8%). The study on the health access of a random population sample of people residing in Imathia has shown spatial inequalities in accessibility to health's rehabilitation services.

Municipal units of Veria’s municipality show higher rates of accessibility to the specific health services in connection with the municipal sections of Naousa’s Municipality.

Veria is the capital city and the commercial center of Imathia region. The secondary level general hospital of Imathia is situated in the center of Veria’s city. Obviously, the proximity of Veria’s city and municipal units of Veria’s municipality in general to the base of the general hospital has a positive impact on the access of the population to the services it offers. One the other hand, Naousa is a rural area with population density below 150 inhabitants/ Km² (ENRD, 2011). It has an average altitude 330m and average distance 20km from the hospital. As a consequence the rural dwellers are forced to travel farther to contact health facilities than their urban center counterparts. Moreover rural residents without private vehicle depend on a poor public transportation. Consequently their accessibility to health facilities is minimized even more.

In urban areas people with health problems more easily seek medical attention. There is evidence that people living far away from healthcare facilities and those living in rural areas are less likely to see a health professional than those living closer or in urban areas (Lankila et al., 2016).

At the same time, the cartography of the spatial distribution of the access within the Municipality of Veria presents fluctuations with imprinted the limited access of the population from the municipal unit of Makedonidos (0.8 %), in the southern part of the county with middle altitude 500m and middle distance 40km from the hospital.

In recent years, the region’s road network has improved significantly but still cannot be considered satisfactory. The transport isolation of the specific disadvantaged area has not yet been lifted. In comparison with the population of the urban center, those residing in the particular underprivileged, rural area encounter dual problems of the poor organizational structures, on one hand the low quality of roads and on the other the lack of public transportation options. In addition, the large number of rural roads creates a maximum traffic safety problem. The required low speed of the vehicles increases the travel time to healthcare services.

Municipal unit of Makedonidos is a rural and remote area, which leads to isolation as that transportation network is less available. Remoteness creates difficulties for rural people resulting in obstruction to the use of secondary healthcare services. This condition is a challenge in terms of health care access for its remote communities and it should give cause for concern.

People tend to use health services close to their home and work (Mizen et al., 2015; Aggarwal et al., 2017) because the distance is often a barrier to health care use, reducing health facilities’ utilization. Distance-related inequity in health service use is potentially a major public health issue, as it may increase actual health differences. In the Behavioral Model of Health Services Use, distance is regarded as an enabling characteristic which makes health service resources available to the individual (Andersen and Newman, 2005).
This has, however, never been examined in Greece. The dimension of accessibility could be more reliable in the case of Greece due to the mountainous and insular relief of the country. Maybe the dimension of accessibility has to be re-examined by introducing time as a crucial ingredient, given that distance is a relative factor.

The results of the study show that areas in Imathia are outside of a 30 minute travel time from hospital and thus have limited geographic accessibility. For some types of health organizations, distance or travel time for the patients is a significant burden as they have no easy access to them - evidence for experiencing low opportunities and great difficulties to use them (Comber et al., 2011).

Spatial accessibility as the distance or travel time to the healthcare facilities is one of the most important dimensions of quality care. Spatial accessibility reflects to the equilibrium between the characteristics and the expectations of both the providers and clients, as the distance or travel time for the patients is of utmost importance for appropriate health care (Levesque et al., 2013).

In general, the current study established a high prevalence of musculoskeletal conditions in farmers. People consider the work on the farm as a healthy and idyllic occupation (Walker-Bone and Palmer, 2002). Nevertheless, farming has a wide range of threats to health with a significant impact on farmer’s health status and health related quality of life (Xiao et al., 2013). Farmers and farm workers are at risk of the prevalence of musculoskeletal disease due to their work, such as lift and carry heavy loads, are exposed to whole-body vibration from powerful motor vehicle, walk on slippery and uneven walkways (Osborne et al., 2010). The prevalence of musculoskeletal problem was observed higher in women and chronic pain is often observed in females (Nidhi and Vandana, 2001; Myers et al, 2003; Arendt-Nielsen et al., 2004).

**Limitations**

Some specific limitations to this study need to be pointed out. It is well known that researchers need high-quality data, which can contribute to more accurate results. However, in reality, the collected data is never perfect. Under this scope, we are considering this earlier step of our research as a “kick off research”, which is looking forward to a larger volume (and better quality) of data.

Additionally, other factors that affect accessibility to healthcare services, such as the perceived quality of services provided (dos Anjos and Cabral, 2016) are not addressed in this paper. The presented results come from an exploratory spatial analysis of the accessibility level in the population sample and they cannot be generalized to the whole population of specific geographical area because the sample is not necessarily representative.

Nonetheless, we try to highlight the importance of studying the spatial aspect of the phenomenon, so that accessibility to healthcare services can be linked to socio-economic factors that may influence their unequal spatial distribution in the future.

**IV. CONCLUSIONS**

The results of this study show substantial variations in geographical accessibility to health's rehabilitation services both within and among Imathia’s areas. Access to health care varies among the regions of Imathia, because access is influenced by both the uneven distribution of population and the spatial structure of health facilities.

This involves, on the one hand, an evidence-based planning of rural settings and on the other hand the establishment of new cooperation models and their instrumental implementation in political decision making and administrative acting within the context of transformation processes.

The adoption of GIS by researchers and health policy planners depends on the use of spatial data in health services. Therefore, we need to realise the behavior of health service users and how spatial entities influence their relationship with health services.

The cartography of morbidity and spatial deviations in the provision of health care can be seen as a modern viewpoint for the handling of the information that links the area with human health. One parameter that was taken into serious consideration for the construction of the maps was that the receivers of these cartographic diagrams wouldn’t be necessarily aware of the principles of the thematic cartography. Therefore, the possible creation of difficulty for the comprehension of the produced effect, which, anyway, is a necessary requirement in order for a thematic map to perform its communicative role, is examined (Katsios, 2005).

Although MSDs are prevalent in communities across the globe and their impact is pervasive (Woolf and Pfleger, 2003) the effect of space on their prevalence and the spatial distribution of populations at high risk for these diseases had not been previously studied. The present study attempted to highlight the spatial inequalities in accessibility to rehabilitation services because of MSDs. These findings raise important research questions for future investigation. One of these is the effect of environmental or occupational factors in the prevalence of MSDs. Moreover, future research could aim to investigate the influence of socio-demographic parameters on accessibility to health rehabilitation services in urban areas.

**Ethical approval**

For the collection of data and the conduct of the survey, the required permission was obtained from the Hellenic Data Protection Authority (reference number: 1595) and the hospital's Scientific Council.

**Competing interests:** None declared.
ACKNOWLEDGMENT

This research uses data from the Physical Therapy Department at General Hospital of Imathia. We would like to acknowledge hospital administration consent and permission to conduct this study at the specific institution. We are grateful for providing access to use information from patients’ records.

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Efficacy of Anti-Melanogenic and Anti-Ageing Properties of Glutathione with Additional UV Protection and Skin Whitening Benefits Led by the Combination of Oral Polypodium as Whitevit Plus

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Abstract- Widespread concerns regarding the rise in prevalence of skin cancer and the adverse effects of both acute and chronic photo-damage due to exposure to UV rays, has led to various modes of treatment. The latest development in this regard is the findings about Glutathione and Polypodium dry extract as potential treatment components for skin conditions. Glutathione plays pivotal role in protecting cells against oxidative stress-induced cellular damage and in detoxifying Xenobiotics and drug metabolism. The added photo-protective effects of oral Polypodium with its antioxidant, immunoregulatory and anti-inflammatory properties aid also in prevention of chronic skin damage, photoaging, and skin cancer led by UV exposure. Its decreased levels are associated with the common features of aging as well as of a wide range of pathological conditions, including neurodegenerative disorders.

Index Terms- skin whitening, anti-melanogenic, tyrosinase enzyme inhibitor, anti-aging, melanogenesis, oxidized glutathione, topical glutathione, Polypodium, alpha lenoic acid, psoriasis,

I. GLUTATHIONE FUNCTION AND CELL DEATH

Notably, Glutathione depletion and/or alterations in its metabolism appear to be crucial in the onset of Parkinson's disease. Despite the fact that it is required for cell survival, the molecular mechanism that links Glutathione depletion to cell death remains poorly understood. Recently, considerable attention has been focused on a newly defined type of cell death: iron-dependent cell death, also referred to as "ferroptosis". The iron chelator deferoxamine nearly abolishes ferroptosis induced by inhibiting Glutathione synthesis or Cystine uptake by the xCT transporter. Deferoxamine preferentially abrogates the intralysosomal accumulation of iron and inhibits oxidative stress-induced lysosomal membrane permeabilization and cell death. The use of Glutathione and a prodrug derived from it can be useful, since the dysfunction of the Glutathione redox system appears to cause a variety of diseases including neurodegenerative disorders. We also review trials that have been designed to cope with this difficulty; e.g. the use of precursors such as N-acetyl cysteine and chemical modification such as methylation.

II. GLUTATHIONE INHIBITS TYROSINASE ENZYME FUNCTION

Glutathione is present intracellularly in its reduced form and plays an important role in various physiological functions. Its skin-lightening effects result from direct as well as indirect inhibition of the tyrosinase enzyme and switching from eumelanin to phaeomelanin production. It is available in oral, parenteral and topical forms.

The tyrosinase enzyme is involved in the oxidation and reduction process in the epidermis. These chemical reactions that the enzyme catalyzes are of principal importance in the melanogenesis process. The overproduction of melanin, come up by the action of the tyrosinase, can cause different disorders in the skin related to the hyperpigmentation.

III. EFFICACY OF ORAL POLYPODIUM IN COMBINATION WITH ALPHA LIPOIC ACID

Taken orally, Alpha Lipoic Acid (ALA), an antioxidant is capable of regenerating other antioxidants, such as vitamin C and E. It’s clear from the research that ALA is a potent antioxidant, but it isn’t the only one; there are lots of great antioxidants for skin like Polypodium. The extract of Polypodium is an oral photo-protectant with strong anti-oxidative properties. Recent studies to determine its chemical composition have shown 4-hydroxyphenylacetic acid (p-coumaric), 3 methoxy-4-hydroxyphenylacetic acid (ferulic), 3, 4-dihydroxyphenylacetic acid (cafeic), 3-methoxy-4-hydroxybenzoic acid (vanillic) and 3-cafeoilquinic acid (chlorogenic) to be among its major phenolic components, of which ferulic and caffeic are the most powerful antioxidants. These phenolic compounds contribute to the health benefits afforded by this oral photo-protectant.

Thus, the combination of Oral Polypodium and Alpha Lipoic Acid with its anti-oxidative properties can be very protective for the skin against UV impact and thereby the issues arising from it.
IV. Efficacy of Glutathione with Vitamin C

Glutathione helps maintain the C vitamin and lower the required intake by recycling it. The recycling occurs after the C vitamin has neutralized a free radical by giving up an electron to the free radical. GSH in turn gives up an electron to the C molecule, returning it to work as an antioxidant.

One human trial led by C.S. Johnston at the Arizona State University and published in the American Journal of Clinical Nutrition in 1993 showed that vitamin C was able to elevate glutathione levels in red blood cells by nearly 50% compared to baseline after daily supplementation with 500 mg for 2 weeks. Individual results among the participants of this study ranged from modest 8% to significant 84%. It is important to note that a high dose group that took 2,000 mg of vitamin C a day did not exhibit better results than a 500 mg group.

V. Polypodium on Psoriasis

The fern Polypodium, has a clinically documented use in the treatment of psoriasis. One of the inflammatory mediators isolated in abnormally high quantities in the psoriatic skin is leukotriene B4 (LTB4). It was tested in an in vitro model using human leukocytes for its ability to inhibit the LTB4 formation. The inhibition was found to be caused by the polyunsaturated fatty acids (PUFAs) linoleic, linolenic and arachidonic acid. IC50 values were determined for the isolated acids and compared to a group of closely related acids also commonly found in nature. The IC50 values for most acids tested were of the same magnitude (20-60 microM) except for arachidonic acid which showed stimulatory activity and 8(R) hydroxylinoleic acid which gave 30% inhibition with the highest dose tested (120 microM). The amounts of PUFAs in different Polypodium extracts were quantitatively analysed and it is concluded that the fatty acid constituents of Polypodium may contribute to the clinical effects of the extract.

VI. Topical Glutathione for Skin Whitening

Glutathione is a tripeptide consisting of cysteine, glycine, and glutamate and functions as a major antioxidant. It is synthesized endogenously in humans. Glutathione protects thiol protein groups from oxidation and is involved in cellular detoxification for maintenance of the cell environment. Reduced glutathione (GSH) has a skin-whitening effect in humans through its tyrosinase inhibitory activity and topical oxidized glutathione GSSG is safe and effectively whitens the skin and improves skin condition in healthy women.

An experiment was carried to determine skin-whitening and skin-condition effects of topical GSSG in healthy women. It was found that the skin melanin index was significantly lower with GSSG treatment than with placebo from the early weeks after the start of the trial through to the end of the study period (at 10 weeks, P<0.001). In addition, in the latter half of the study period GSSG-treated sites had significant increases in moisture content of the stratum corneum, suppression of wrinkle formation, and improvement in skin smoothness. There were no marked adverse effects from GSSG application.

VII. Polypodium on Polymorphic Light Eruption

Oral Polypodium treatment is beneficial for the prevention of Polymorphic light eruption (PLE). A total of 35 patients with long-standing PLE were included in an open, uncontrolled bicenter study. PLE was induced by photo-provocation with artificial UVB and UVA light, thereafter oral treatment with PL was initiated. Two weeks later a second photo-provocation was performed while the patients were still taking PL. Thirty patients developed PLE lesions after repeated irradiation with UVA. Of these, 18 patients also responded to UVB. After PL treatment, 9 (30%) and 5 (28%) patients, respectively, were unresponsive to repeated UVA and UVB exposure. In the remaining patients, the mean number of UVA and UVB irradiations required to elicit PLE increased significantly.

VIII. Dosage:

Orally administered Polypodium extract decreases UV-mediated oxidative damage to DNA by enhancing the activity of endogenous antioxidant systems responsible for blocking the formation of reactive oxygen species. Its beneficial effects have been attributed to the phenolic components of Polypodium extract including chlorogenic acid, coumaric acid, vanillic acid, and especially the potent oxidation inhibitors caffeic and ferulic. Our group reported that oral GSH administration (500 mg/d) resulted in lightening of skin color, when given for 4 weeks.

IX. Conclusion

We demonstrated that GSSG application to the face whitened the skin and improved skin condition in healthy women. Further studies are needed in future to clarify the mechanisms by which topical GSSG produces these skin benefits and Polypodium dry extract 240mg with alpha lipoic acid 50 mg taken twice daily for 60 days is safe and effective means for reducing the damaging effects of ultraviolet radiation. These agents which can be taken orally and has not been noted to have serious adverse reactions, offers unique advantages in that they can be given orally, thus avoiding patient resistance to topically applied sunscreens.

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Development of a Novel Robust Differential Maximum Power Point Tracking (MPPT) Method

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Abstract- The use of photovoltaic (PV) systems is increasingly growing in importance since they involve an exploitation of solar radiation constituting an energy source which is renewable, available in most places, and pollution-free. Despite their numerous advantages, PV systems have two major drawbacks: low energy conversion efficiency and loss of energy due to variations in meteorological conditions; for this reason, Maximum Power Point Tracking (MPPT) control techniques play a key role in exploiting the maximum energy caught by PV modules. The output characteristic of a photovoltaic array is non-linear and changes with solar irradiation and the cell’s temperature. Therefore, a Maximum Power Point Tracking (MPPT) technique is needed to draw peak power from the solar array to maximize the produced energy. In this study we have analyzed the Maximum Power Point Tracking (MPPT) method and finding out a new and easier way to track maximum power point (MPP) and also our study is focused to overcome the drawbacks of MPPT. This research paper presents a novel MPP tracking method for tracking exact Maximum Power Point (MPP) if the irradiation or load changes.

I. INTRODUCTION

Maximum Power Point Tracking (MPPT) is a technique which is used commonly with photovoltaic (PV) solar systems to maximize power extraction under all conditions [1]. MPPT is not a mechanical tracking system that “physically moves” the modules to make them point more directly at the sun. MPPT is a fully electronic system that varies the electrical operating point of the modules so that the modules are able to deliver maximum available power. As PV solar panel efficiency is low, so it is very important that load works in maximum power. Otherwise power losses occur. In PV solar system, it is not necessary that the load works in the maximum power. That is why it’s necessary to track the maximum power point so that load can work at that point for reducing power losses. In this study we have considered the challenge to minimize the power losses of existing solar systems and another challenge to track the maximum power.

Due to changes in irradiation the load characteristics also changes as a result the efficiency of the whole system is also variable. Our main focus of this study is as follow:

- To investigate and track the maximum power point in present solar system and find the suitable and stable way for tracking MPP.
- To learn and study about algorithms for tracking maximum power point.

II. METHODOLOGY

A. MPP Tracking Methods

Over the past decades many methods to find the MPP have been developed and published. These techniques differ in many aspects such as required sensors, complexity, cost, range of effectiveness, convergence speed, correct tracking when irradiation and/or temperature change, hardware needed for the implementation. Some popular MPPT algorithms are Perturb and Observation, Incremental Conductance, Fractional Open Circuit Voltage, Fractional Short Circuit Current etc.

Perturb and Observation MPPT Algorithm: This algorithm is an iterative technique and very simple one. It measures the panel operating voltage and current periodically and calculates the instantaneous power p(n). This instantaneous power compares with the previous output power P(n)-P(n-1), then the operating voltage X(n+1) is determined and changed by changing the duty ratio of the converter X(n+c) or X(n-c). The sign of change of output power is also observed to track the MPP. This method has some drawbacks as well: The operating point continues to oscillate around the MPP, resulting in PV power losses, The P&O fails to work properly under a sudden increase in insolation level, exhibiting erratic behavior, It lacks accuracy in finding whether the MPP is reached.

Incremental Conductance Algorithm (INC): This is a most popular MPPT algorithm and widely used. The disadvantages of the P&O MPPT algorithm is overcome and eliminated by this INC technique but it is more complex and very difficult to implement. The theory of the incremental conductance is to determine the variation direction of the output terminal voltage of the PV modules by measuring and comparing the incremental conductance and instantaneous conductance of PV modules.
III. PROPOSED METHOD

A. Proposed MPP Tracking Technique:

Analyzing all popular algorithms and technique we have proposed a robust optimization 1st order close loop differential MPP tracking method which is controlled by PI controller. We have developed this method to track MPP whether the radiation or load changes. Here is the block diagram of our proposed method

![Figure 1: Model of MPPT using block diagram](image)

The Figure 1 shows PV system block diagram with MPPT Technique. It consists of PV array, Buck converter, MPPT block, and finally load. Combination of Series and parallel solar cells constitute PV array. Series connection of solar cells boost up the array voltage and parallel connection increases the current. In order to change the input resistance of the panel to match the load resistance (by varying the duty cycle), a DC to DC converter is required. Buck converter is used to obtain more practical uses from solar panel. The input of buck converter is connected to PV array and output is connected to load [12]. MPPT block receives VPV and IPV signals from PV array. The output of MPPT block is going to the PI controller. Then from PI controller these pulses are given to buck converter. Converter works based on these pulses to make the PV system operate at Maximum power point (MPP) [3]. The heart of the model is MPPT block which is working through the PI controller helps in finding the maximum operating point of the solar panel. This can be done by using a robust 1st order close loop differential MPPT method

B. Modeling of MPPT

The proposed circuit needs independent dc source which is supplied from photovoltaic cell. The inputs are fed by voltage and current of the PV terminals, while the output provides duty cycle for the buck converter. Buck converter controls the output voltage by varying the duty cycle k, of the switch. This is calculated using the formula

$$V_0 = KV_S.$$  

If we vary the pulse width of the pulse generator various voltage ranges at the output can be obtained. Once the buck converter injected the power from the PV panel and the PI controller starts function, it varies the value of duty cycle which will change the input value that is sensed by the PI controller. By using the PI controller the error has been minimized in the system and the efficiency is improved [12].

C. MPPT implementation

MPPT implementation is a close loop system. Here \( \frac{dp}{dv} = 0 \) goes to dc/dc buck converter. From PV array Icell and Pcell is goes through the differentiator and PI controller forcefully maintain that \( \frac{dp}{dv} \) is equal to zero (0). The controlling block diagram is given bellow:

![Figure 2: MPPT block diagram using buck converter and PI controller](image)

IV. ANALYSIS AND SIMULATION

A. Simulation Circuit diagram of MPPT tracking in PSIM

In this paper, the simulation model is developed with PSIM. The proposed circuit needs independent dc source which is supplied from photovoltaic cell. The inputs are fed by voltage and current of the PV terminals, while the output provides duty cycle for the buck converter. Buck converter controls the output voltage by varying the duty cycle k, of the switch. Which is calculated using the formula\( V_0 = KV_S \). If we vary the pulse width of the pulse generator various voltage ranges at the output can be obtained. Once the buck converter injected the power from the PV panel and the PI controller starts function, it varies the value of duty cycle which will change the input value that is sensed by the PI controller. By using the PI controller the error has been minimized in the system and the efficiency is improved [12].
Figure 3: Simulation circuit of solar panel with MPPT block

The model shown in figure 3 represents a PV solar panel connected to resistive load through a DC/DC Buck converter. The DC-Buck boost system specifications are given as follows:
- Load Resistance, $R_{Load} = 1.5\, \Omega$
- Buck inductance, $L = 500\, \mu\text{H}$; Resistance, $R_L = 10\, \text{m}\Omega$
- Buck capacitor, $C_c = 47\, \mu\text{F}$; Resistance, $R_c = 1\, \text{m}\Omega$

Here in the block there are two differentiators. One is connected to the PCell and another is connected to the VCell. Now the specifications are given:
- Power diff. resistor, $R_{1P} = 20\, \Omega$; $R_{2P} = 100\, \Omega$
- Power diff. capacitor, $C_P = 10\, \text{n}\mu\text{F}$
- Voltage diff. resistor, $R_{1V} = 20\, \Omega$; $R_{2V} = 100\, \Omega$
- Voltage diff. capacitor, $C_V = 10\, \text{n}\mu\text{F}$
- PI controller gain ($K$) = 10000 and $a = 0.1$

Now here is the panel parameter below:

<table>
<thead>
<tr>
<th>Sr. no</th>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Number of cell</td>
<td>$N_s = 36$</td>
</tr>
<tr>
<td>2</td>
<td>Standard radiation</td>
<td>$1000, \text{w/m2}$</td>
</tr>
<tr>
<td>3</td>
<td>Series resistance</td>
<td>$R_s = 0.008, \Omega$</td>
</tr>
<tr>
<td>4</td>
<td>Shunt resistance</td>
<td>$R_{sh} = 1000, \Omega$</td>
</tr>
<tr>
<td>5</td>
<td>Short circuit current</td>
<td>$I_{sc} = 3.8, \text{A}$</td>
</tr>
<tr>
<td>6</td>
<td>Open circuit voltage</td>
<td>$V_{oc} = 21.1, \text{V}$</td>
</tr>
</tbody>
</table>

**B. Irradiance Effect**

**Effect of Decreasing Irradiance:**
In solar panel irradiance is not constant, it is changeable. If it is cloudy day then irradiance effect is decreasing. Then it is very important to track that MPP. On that condition $\frac{dP}{dV} = 0$ is required. The output power of the solar panel varies with the irradiance. Solar power is high at high value of solar irradiance & it starts decreasing as the solar irradiance value decreases.

After simulation using the circuit diagram 3

Here in the figure, when irradiance is low then on the upper portion PCell track the $P_{max}$ and in lower portion $\frac{dP}{dV}$ track the zero(0) point. If $\frac{dP}{dV} = 0$ then power will be maximum. That mean PCell track the $P_{max}$. It is clear from waveform that even though solar irradiance varies output remains constant. This is because of PI controller and novel robust differential MPPT method. It is also necessary that Load can work at that maximum power. This is shown in below simulation figure.

**Increasing Irradiance Effect:** When it is sunny day then irradiance effect is high. Then it is also necessary to track MPP for minimize power loss. On that condition $\frac{dP}{dV} = 0$ is require.
Here in the figure, when irradiance is high then on the upper portion PCell track the Pmax and in lower portion $\frac{dP}{dV}$ track the zero(0) point. If $\frac{dP}{dV} = 0$ then power will be maximum. That mean PCell track the Pmax. Load must have to work at that maximum power when the irradiance is high. This is shown in below simulation figure.

Figure 7: Load is working in maximum power point

C. Load Changing Effect

It is very difficult to track MPP when load is changed. Because when load is changed power consumption fluctuate at instant. That is why is too difficult to track MPP. But using PI controller and 1st order close loop differential MPPT method can easily track maximum power point.

Here is the changing load is $R_{load} = 1\Omega$

Now load changing effect is shown in the below figure.

Figure 8: MPP is tracked when the load is changing

Here in this figure…..though load is changed on the upper portion Pcell easily track the Pmax and also $\frac{dP}{dV}$ is equal to zero (0) is shown in the lower portion.

V. RESULT ANALYSIS

We have found a new MPP tracking method which is controlled by PI controller. This new method name is “Novel Robust Differential MPP Tracking Method”. Using this method through the PI controller we can easily track the maximum power point.

A. Irradiance Effect

The output power of solar panel with MPPT block with respect to solar irradiance level is as shown in the figure 4 and 6. It is clear from the figure that the output power of the solar panel varies with the irradiance. Solar power is high at high value of solar irradiance & it starts decreasing as the solar irradiance value decreases.

Now here is the result justifying table.

Table 2: Result justification on irradiance varies

<table>
<thead>
<tr>
<th>Sr.No</th>
<th>X-axis (Time in second)</th>
<th>Y-axis (Power in watt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>2</td>
<td>0.0066</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>0.0133</td>
<td>38</td>
</tr>
<tr>
<td>4</td>
<td>0.02</td>
<td>60</td>
</tr>
<tr>
<td>5</td>
<td>0.10</td>
<td>60</td>
</tr>
<tr>
<td>6</td>
<td>0.15</td>
<td>58</td>
</tr>
<tr>
<td>7</td>
<td>0.20</td>
<td>48</td>
</tr>
<tr>
<td>8</td>
<td>0.30</td>
<td>38</td>
</tr>
<tr>
<td>9</td>
<td>0.35</td>
<td>31</td>
</tr>
<tr>
<td>10</td>
<td>0.40</td>
<td>30</td>
</tr>
</tbody>
</table>
From the table 2 it is shown that at X-axis when time is between 0(zero) s to 0.2 s Pcell couldn’t track the Pmax. This is the error of this method. But on the other side 0.02 s is very small time. So this small time couldn’t create any effect on the output result. After that small time maximum power point is tracked exactly by Pcell. That mean it takes time 20ms to track maximum power point.

B. Load Changing Effect

Output power of solar panel of with MPPT block varies with respect to the changing of load. By using PI controller to track maximum power Pmax in MPPT method while the load is changing, as shown in figure 8. PI controller forcefully create \( \frac{dP}{dV} \) is equal to 0(zero) and that is why load can track the maximum power point. This is shown in figure 8.

Now here is the result justifying table

<table>
<thead>
<tr>
<th>Sr.No</th>
<th>Time in s(X-axis)</th>
<th>Pcell(Y-axis)W</th>
<th>I1(Y-axis)A</th>
<th>∆PV(Y-axis)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6.66ms</td>
<td>10</td>
<td>0</td>
<td>3.5</td>
</tr>
<tr>
<td>2</td>
<td>13.33ms</td>
<td>40</td>
<td>0</td>
<td>3.4</td>
</tr>
<tr>
<td>3</td>
<td>20.00ms</td>
<td>60</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>26.66ms</td>
<td>60</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>33.33ms</td>
<td>60</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>200ms</td>
<td>60</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>300ms</td>
<td>60</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>400ms</td>
<td>60</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>500ms</td>
<td>60</td>
<td>11</td>
<td>0</td>
</tr>
</tbody>
</table>

From the table 3 it is clear that from time 0 (zero) to time 0.02 there is some error. On that time Pcell, I1 and ∆PV is not expected value. But after that point all three Pcell, I1 and ∆PV is expected value. That mean system takes 20ms to track maximum power point. After that small time load can easily track the maximum power point and PI controller forcefully create \( \frac{dP}{dV} \) is equal to 0(zero).

VI. CONCLUSION

Power generation method using solar photovoltaic module is a foremost effective technique of using the solar energy. In this method solar panel directly convert sunlight irradiation into electricity by the photoelectric effect. It is clean and pollution-free. MPPT algorithms used in PV systems are one of the most important factors affecting the electrical efficiency of system. As a result of cost optimization, after decided to use an MPPT system, it is important to decide which technique or method will be used in application [10]. After studying MPPT techniques, it is clear that it can be very difficult to choose the best; each MPPT method has its own advantages and disadvantages and the choice is highly application dependent. That’s why MPPT algorithms are not suitable for tracking MPP [11]. Analyzing these methods we find out an easier new method which is controlled by PI controller. The name of this method is “Novel robust differential maximum power point tracking method”.

The output power of the solar panel varies with the irradiance. Solar power can be high when irradiance is high or power can be low when irradiance is low. So it is difficult to track MPP. One the other hand when load is varying the output is varying at instant. That is why it is more difficult to track maximum power point than irradiance varying. So it is important to use a robust and cost effective method. Using this Novel robust differential maximum power point tracking method through PI controller, we can track maximum power point perfectly whether it is irradiance effect or load change effect or temperature effect on PV panel.

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Finally, I must express my very profound gratefulness to my parents and to my wife for providing me with constant support and encouragement during my years of study and through the process of researching and writing this paper. This accomplishment would not have been possible without them. Thank you.

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Teacher Educators’ and Student Teachers’ Attitude towards Teacher Education Programmes in Universities: A Case of Selected Private and Public Universities in Kenya

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Abstract- Attitudes vary at different times of one’s life and are usually determined by several factors such as work environment, job satisfaction and status of the profession. Both student-teachers’ and teacher-educators’ attitudes may affect the quality of teacher preparation program and finally quality of the teacher either positively or negatively. This paper is a focus on the attitude of teacher educators and student teachers towards teacher education programmes in universities. The study adopted a descriptive survey design. The study sample consisted of Bachelor of Education fourth year students drawn from three Public universities and three Private universities, Teacher Educators and Heads of Departments from the faculty of Education. Stratified random sampling was used to select the universities, student-teachers and Teacher Educators. Data was collected using questionnaires, interview schedules, observation checklists and documents analysis. Data was analyzed using descriptive statistics. The study found that a large percentage of the respondents portrayed a negative attitude of teacher education programmes. This may be to the fact that most student teachers and teacher educators enrolled in these programmes, do not have teaching as their professional interest thus join by circumstance. The study recommends the need to conduct screening of individuals before admission in teacher education programmes so as to ensure that only those who are interested and committed to teaching as a profession are enrolled. Keywords: Attitude, Teacher Education Programmes, Enrollment, Teacher Educators, Student Teachers, Public University, Private University.

Index Terms- Educators, Attitudes, Programmes

I. INTRODUCTION

Studies have shown that attitudes to some extent influence work performance and commitment to tasks. Hacieminoglu, (2016) for instance observed that students who hold favorable attitudes towards science instruction had better achievement. Smith (1971) further emphasizes the importance of positive teacher attitude and its implication on student outcome. He observes that teacher attitude influences his behavior in the classroom.

Student-teachers’ commitment to the teaching profession play an important role in determining their learning. Some of the entrants into Teacher Education institution are students who chose teaching as a second, third and fourth choice occupation or did not choose at all. Sitima (1995) observed that some students ended up pursuing Bachelor of education Degree program as a last resort having missed admission to their preferred courses. JAB 1993/94, (report) indicate that 34.4% students admitted to education program had not selected the program as their first choice. This is corroborated by Ayosen in Leavit (1992) whose findings indicates that for most students of education, education program was their last resort, this research was done at Lagos University. Kafu (2011) revealed that 50% from a sample of one thousand students in Kenya of education sought admission into the faculty because they had been rejected by their preferred faculties, while 36% did not want to go into teaching after the completion of their program. Further, Task Force report (2012) findings indicate that most teacher trainees do not have teaching as a first career choice at all levels of teacher training and that teacher training institutions admit students with low grades as opposed to other disciplines.

It is evident that there are students in Teacher Education whose interest is elsewhere. Kafu (1996) in his study confirms this when only one out of the 748 students had wanted to be teachers. This is consistent with Okumbe (1998) and Okioma (2010) who observe that a good proportion of teachers enter the teaching profession with low morale. Therefore, this group of students requires special attention and encouragement by teacher educators to boost their confidence. This can be achieved through provision of adequate
learning resources and appropriate infrastructure, a variety of instructional teaching methods and a good curriculum. Motivating and sustaining student teacher interest is however, constrained by limited teacher educator/student interaction.

Since inception teacher education has not enjoyed parity of esteem with other programs being considered more professional, prestigious and lucrative such as law, medicine, engineering and increasingly accountancy. According to Stones (1989), it is conventional wisdom in academic that education as a discipline ranks pretty low and teaching probably ranks lower. Labaree in Cochran (2008) sums up this perception that, Teacher Education has suffered from low status and that,

Every one picks on it, professors; reformers; policy makers and teachers; right wing think tanks; and left wing think tanks; even the professors, students and graduates of teacher education programmes themselves (p. 90).

The above statement provides partial explanation for the low regard in which Teacher Education is held. Teaching is characterized by low remuneration, poor working conditions, low allowances as compared to allowances and benefits offered in other professions. More dilapidating is the widely held belief that a teacher does not require much time to master their professional expertise and that anybody with subject knowledge can teach. Consequently teacher education remains an unattractive option for most bright young people (Coutinho in Leavit, 1992). Teaching has become employment of last resort. Task Force Report (2012) and Kafu (2006) observe that young people tend to look for better pay and higher status alternatives. Low economic reward has adversely affected the career appeal of teaching to the young generation in Kenya. Request for Interfaculty transfers from the School of Education to other Schools illustrate this. Many students who qualify for other courses and who are admitted to the faculty of education request to be transferred to faculties perceived to produce better professionals, while those not admitted to other faculties of their preference seek to be transferred to education as a last resort.

The image of the teacher has deteriorated over time according to Kafu (2010) teachers no longer enjoy the prestige that was in the past associated with the teaching profession. Information explosion and the new technologies have enabled educated persons to access information that had been exclusive for teachers. This has undermined the traditional belief that teacher education programme is unique and reserved for only a few people (Republic of Kenya, 2005). In the past the roles of teachers were limited to the modest demands of the day, however, at the present time these roles have dramatically expanded the societies’ expectations of teachers. In contrast to the situation hitherto contemporary, technological advances, the current demand of inclusivity has witnessed far more diverse learners whose teaching requires a more expansive set of skills. It follows therefore, that a failure to deliver on these demands will be attended by vigorous criticism. Teachers are now held responsible for everything that goes on in school, as illustrated by Parker (1981) who asserts that teacher bashing has become a popular sport as they are an easy target and that they are so powerless to strike back. He further states that, teachers are blamed for being unable to cure social ills that no one knows how to treat and in the process they are demoralized.

The concept of teaching profession has always been controversial, this controversy stems from two intriguing questions, who is a teacher? and are teachers born or made? Kafu (2007, p. 14) the answer to these questions give a clear perception people have about teacher education. To some, teachers can be substituted with teaching machines (MohidininKafu,2005). This group does not hold teacher education in high regard while others think that anybody with subject knowledge can teach as effectively as a trained teacher.

Unlike other professions, teaching has not been accepted as a full profession and is sometimes seen as a semi profession. In this light, it is not possessed of the full characteristics expectable of a profession such as strong knowledge base, autonomy to professional decisions and accountability to superiors rather than to the profession (Leavit, 1992). This is exacerbated by the absence of professional ethics within teacher education which has been traditionally associated with ethical codes of conduct and standards as formulated by and within different professional communities e.g. law and medicine (Hussein & Postlethwatee, 1994).

Teacher Education programmes in Kenya do not offer ethics as course because ethics has never been formally incorporated in teacher training curriculum. Ethics is just casually mentioned in passing as aspects of principles and practices of teaching (Wilkins in Kafu, 2011). Consequently the teachers produced fail to understand the teaching profession itself and its demands. They do not understand their role in the profession other than the instructional responsibilities in the teaching profession Kafu (2011). This has compromised the status, integrity and image of the teacher, not only in the profession but also in the society.

The nature of work that teachers engage in is different from what other professionals do. Teachers need students for teaching and learning to take place, and must motivate them while other professionals carry out their work independently and make judgment on behalf of clients as they see them. They do not act as agents of someone else for instance, the government. They act as principals making their own judgment (Furlong et al., 2000). For instance the surgeons operate on the anaesthetized; the lawyers defend the mute e.t.c. Conversely, teachers’ clients are sometimes unwilling and they are in class under duress (Labaree in Cocheran et al., 2008). Yet teachers are expected to facilitate their learning.

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Lorte (1975) observes that teachers carry out their practice in isolation. This usually in a self-contained classroom and thus does not share a culture of observing, sharing and discussing their experience with others. Consequently they end up not developing a common shared culture among themselves as professionals.

Unlike other professions, teachers’ expertise is not strictly held by the teacher, thus teachers give away their expertise by showing children how to learn on their own. Other profession rent their expertise which requires their client to return for consultation every time they need help. Teachers’ skills are therefore seen as transparent and ordinary. Unlike other professionals that seem to base their practice on a body of technical specialist knowledge that is far beyond the reach of lay people (Bogonko, 1995; Furlong, 2000). Consequently there is no special esteem associated with the work of preparing teachers (Labartee in Cochran et al., 2008).

Teaching profession is a mass occupation that deals with very many clients at the same time. Sometimes, there is no clear identity of the client as they can be parents, stakeholders, students, and the community. Moreover, it is the only profession that employs untrained individuals in large numbers. All these tend to debase the status of the teaching profession (Kafu, 2010). Since admission of student teachers to teacher preparation institutions is not on the first choice basis, teachers lack a strong long-term commitment to teaching as a vocation in this regard compromising their performance as teacher (Falayim, 2009). There is need therefore to scrutinize individuals aspiring to be teachers to ensure that only those with the right attitude are enrolled to teacher education programme.

Job satisfactions play a very important role in performance. Robinson (1994) asserts that a person with high level of satisfaction has positive attitude towards his job and therefore, good performance, while another who does not feel satisfied has negative attitude towards his job. Job satisfaction among teacher educators seems to be very low. This is evidenced by low remuneration given to them which is not commensurate with the duties they are expected to perform. As a consequence, teacher educators have taken up part time jobs (moonlighting) in other institutions thus compromising their teaching quality. This is a common practice in most Universities in Kenya (Taskforce Report, 2012), yet no clear guidelines or policies have been put in place by the universities to regulate this practice. Moonlighting is attributed to poor pay which will only be ameliorated by better pay. Three major strikes that have been staged by Public University lecturers to demand better pay and conditions: The Higher Education (1995), Capital F (2011) & Nyataya (2014). The universities and government should consider devising incentives that will motivate and retain good staff. Most institutions of higher learning have witnessed brain-drain, whereby experienced personnel are leaving the country in search of better prospects abroad leaving local institutions to founder (Kwapong, 2000).

Teacher educators are not adequately motivated towards their primary role which is to ensure that students become competent teachers. This arises from the reward system practiced by the university which values research more highly than teaching. In this regard teaching is seen as a basic competence and therefore teaching excellence is not regarded as sufficient basis for promotions (Gilbert & Cameroon, 2008). Particular problem arising from this is that teacher educators tend to see themselves more as researchers and scholars than teacher –educators. 

Narvaez & Lapsley, (2008) asserts that time has come for educators to pay attention not merely on knowledge, development of skills, teaching and learning but also to the moral and ethical development of teachers.

II. RESEARCH METHODOLOGY

The study was carried out in Kenya involving three public and three private Universities. Descriptive survey research design was adopted. The study sample comprised Bachelor of Education fourth year students drawn from the six universities, Teacher Educators and Heads of Departments from the faculty of Education. Stratified random sampling was used to select the universities, student-teacher and Teacher Educators. Data was collected using questionnaires, interview schedules, observation checklists and documents analysis. Questionnaires included open and closed ended items. Collected data was analyzed using descriptive statistics and presented in Frequency tables and graphs.

III. FINDINGS

Teacher Educators and Teacher Trainees attitudes towards education programmes

This focused on the need to establish the feelings of the teacher educators and students towards the teaching profession based some aspects of teacher education programmes.

The findings were presented in themes as: working environment, perception towards teacher education programme/teaching profession, implementation of the teacher’s education curriculum, adequacy and duration of the training programme.
Working Environment

The working environment for any employee determines his/her performance. A conducive environment encourages full use of one’s competencies while a non-conducive environment inhibits use of one’s potential.

Teacher educators were asked to give opinion on how they rated the working environment. A representation of 50 (59.5%) and 7 (23.3%) from Public and Private Universities respectively felt it was unsatisfactory and 5 (6%) and 10 (33%) said it was satisfactory, 14 (16.6%) and 5 (16.6%) from Public and Private Institutions indicated that it was good and 15 (17.8%) and 7 (23.3%) were of the opinion that the working condition were very good. This shows that a majority of teacher educators are dissatisfied with the working environment. A workforce that is not satisfied tends not to give their best on performance and may contribute to low achievement of an organization goals (Dobre, 2013). Table 1 portrays this representation.

Table 1: Teacher Educators’ View on Working Environment

| Rating of working environment | Public | | | Private | | | Total | |
|---|---|---|---|---|---|---|---|
| | Freq. | % | Freq. | % | Freq. | % |
| Unsatisfactory | 50 | 59.5 | 7 | 23.3 | 57 | 50 |
| Satisfactory | 5 | 6 | 11 | 33 | 16 | 14 |
| Good | 14 | 16.6 | 5 | 16.6 | 19 | 16.6 |
| Very good | 15 | 17.8 | 7 | 23.3 | 22 | 19.4 |
| Total | 84 | 100 | 30 | 100 | 114 | 100 |

Generally the results show that in most of the universities surveyed the working conditions are not favorable which can be attributed to the large number of students, limited or lack of incentives to teacher educators, limited infrastructural resources and facilities coupled with underfunding especially in the Public universities. All these tend to contribute to de-motivated work force.

Giving reasons for dissatisfaction with the working environment at the university, 47 (56)% and 23 (77)% of the teacher educators from Public and Private universities respectively named lack of books/reference materials, as being the reason, 46 (55%) and 10 (33%) attributed to slow promotion, 11 (13%) and 3 (10%) of the teacher educators from Public universities indicated that there was inadequate research incentives, while, 8 (10%) related it to lack of adequate infrastructure and research incentives. This is attributed to the fact that due to the rapid expansion of university education and higher enrolment in the university, teacher educators find themselves overloaded and teaching large classes. As a result they have limited time to conduct meaningful research and publish materials that can be used for teaching and also for their promotion at the universities. Table 2 below highlights these results.

Table 2: Reasons for Dissatisfaction with the University Working Environment

| Reasons for dissatisfaction | Public | | | Private | | | |
|---|---|---|---|---|---|---|
| | Frequency | Percent | Frequency | Percent |
| Inadequate learning resources/facilities | 47 | 56 | 23 | 77 |
| Takes long to be promoted | 46 | 55 | 10 | 33 |
| Inadequate research incentives | 11 | 13 | 3 | 10 |
| inadequate infrastructure (e.g. Offices) | 8 | 10 | 2 | 7 |
| internet connectivity | | | | |
| Heavy teaching load | 45 | 54 | 10 | 33 |

On whether the teacher educators are satisfied with the incentives offered by the university, 38% and 47% of the teacher educators from Public and Private universities respectively agreed as a majority 62% and 53% from Public and Private universities expressed dissatisfaction. Figure 1 indicates the general perception of incentives offered in the universities in Kenya. These incentives include good salary, good welfare policy, recognition of work done and opportunity for further studies. The findings show that lecturers are not satisfied with incentives provided in the universities in Kenya. There is generally limited support for further studies, research...
activities and compensation for teaching large classes. This contributes to lecturers engaging in part time teaching in several colleges and Universities. This may also explain why not many of them could serve the University for more than Fifteen years.
Teaching at the University

On how they rate the teaching at the university, a majority 55 (65%) and 20 (70%) of the teacher educators from Public and Private universities indicated that the courses are repetitive. However as shown in table 3, the courses are perceived to be challenging by 19 (23%) and 7 (22%) of the teacher educators in Public and Private Universities respectively as some 10 (12%) and 3 (8%) of the teacher educators from Public and Private universities indicated that the teaching at the university is exciting. It is surprising to note that some teacher educators find teaching challenging when they are experts in their areas of specialization. This could be attributed to lack of teaching and learning resources. No matter how knowledgeable an expert is, his ability to deliver may be hampered by inadequate learning resources and un-conducive learning environment. It seems therefore, that teacher trainees are not being effectively prepared. This confirms the findings of Ndirangu & Udoto, (2011) and Okioma (2011) that inadequate learning facilities and resources lower the quality of teacher preparation at the university. Those who rated university teaching as repetitive and monotonous are likely to be those educators who teach several cohorts of students the same course. This tends to be repetitive and monotonous. This is also likely to be caused by the many programmes that are offered at the university and the splitting of large classes into smaller groups. Some of the courses in the programme have different course titles but with the same content making it repetitive. Lack of common planning and designing of courses across the teacher education programme contribute to duplication witnessed in some programmes. Additionally monotonous teaching may be attributed to limited use of instructional strategies resulting in teacher educators not being enthusiastic about their work thus affecting teacher preparation. This is presented in Table 3.

Table 3: Teacher educator rating on University teaching

<table>
<thead>
<tr>
<th>Ratings</th>
<th>Public</th>
<th></th>
<th>Private</th>
<th></th>
<th>Grand total</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Percent</td>
<td>Frequency</td>
<td>Percent</td>
<td>Frequency</td>
<td>Percent</td>
</tr>
<tr>
<td>Repetitive</td>
<td>55</td>
<td>65%</td>
<td>20</td>
<td>70%</td>
<td>75</td>
<td>66%</td>
</tr>
<tr>
<td>Monotonous/Challenging</td>
<td>19</td>
<td>23%</td>
<td>7</td>
<td>22%</td>
<td>26</td>
<td>23%</td>
</tr>
<tr>
<td>Exciting</td>
<td>10</td>
<td>12%</td>
<td>3</td>
<td>8%</td>
<td>13</td>
<td>11%</td>
</tr>
<tr>
<td>Total</td>
<td>84</td>
<td>100%</td>
<td>30</td>
<td>100%</td>
<td>114</td>
<td>100%</td>
</tr>
</tbody>
</table>

Student’s Attitude towards Education Courses

Three sets of questionnaires were group into themes as follows; students’ attitudes towards Teacher education programme, implementation of the teacher education curriculum and students’ opinions on the duration of the programmes. Results are presented in table 4,5and 6

Table 4: Position of Students’ choice of teaching as a profession

<table>
<thead>
<tr>
<th>Public</th>
<th>Private</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>Percent</td>
<td>Frequency</td>
</tr>
<tr>
<td>1 First</td>
<td>89</td>
<td>25%</td>
</tr>
<tr>
<td>2 Second</td>
<td>92</td>
<td>26%</td>
</tr>
<tr>
<td>3 Third</td>
<td>96</td>
<td>27%</td>
</tr>
<tr>
<td>4 Fourth</td>
<td>80</td>
<td>22%</td>
</tr>
<tr>
<td>Total</td>
<td>448</td>
<td>100%</td>
</tr>
</tbody>
</table>
Private Universities did not choose teaching profession as a first choice. Hence most students in the faculty of Education are there as result of missing out on their preferred career choice programmes. Consequently these types of students are likely to have negative attitude towards teaching profession and therefore require a lot of mentoring and encouragement by teacher educators. These findings agree with Mwaka (2008), Kafu (2006) and the Task Force Report (2012) findings. Given other choices most students would have settled for other courses which are perceived as prestigious and more lucrative. This is also echoed by the Heads of Departments that most of the students admitted through JAB to School of Education did not choose the programme as first choice, and that many apply for inter-faculty transfers which sometimes is not possible. This leaves them a disappointed lot. They were further asked to give reasons for choosing the teaching profession and the results are as indicated in Table 5.

Table 5: Reasons for choosing teaching profession

<table>
<thead>
<tr>
<th></th>
<th>Public</th>
<th></th>
<th>Private</th>
<th></th>
<th>Totals</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Freq.</td>
<td>%</td>
<td>Freq.</td>
<td>%</td>
<td>Freq.</td>
<td>%</td>
</tr>
<tr>
<td>1 I enjoy being a teacher</td>
<td>112</td>
<td>31%</td>
<td>40</td>
<td>44%</td>
<td>152</td>
<td>34%</td>
</tr>
<tr>
<td>2 It is a rewarding profession</td>
<td>51</td>
<td>14%</td>
<td>5</td>
<td>6%</td>
<td>56</td>
<td>12%</td>
</tr>
<tr>
<td>3 Had no alternative</td>
<td>81</td>
<td>23%</td>
<td>16</td>
<td>18%</td>
<td>97</td>
<td>22%</td>
</tr>
<tr>
<td>4 Springboard to other careers</td>
<td>113</td>
<td>32%</td>
<td>30</td>
<td>33%</td>
<td>143</td>
<td>32%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>448</strong></td>
<td><strong>100%</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Only 31% of students in Public and 44% in Private universities asserted they chose the teaching profession because they enjoy being teachers. Teaching was taken to be a rewarding profession and that is why 14% and 6% of the students chose the profession. However as indicated in the findings, some students, 23% in Public Universities and 18% in Private Universities chose the profession because they had no alternative. It is also shown that teaching profession was chosen as a springboard to other careers, this was indicated by 32% and 33% of the student teachers who participated in the study. The findings show that most students join the teaching profession as a second and third option and as result missing out on the cluster points to join other professions like law, medicine, and engineering among others. Given the societal expectation of teachers, these students teaching as first choice may not be committed to meet these expectations in their profession later. Teaching calls for commitment and right attitude so as to overcome the challenges that come with the job. Student teachers that have chosen teaching as a springboard to other careers will in future contribute to teacher high attrition which interferes with government planning on the provision of teachers to schools. This usually results in shortage of secondary school teachers to teach some specific subjects in schools.

There was need to establish students perception towards education programme. This was important because their perception greatly influenced their interest in the courses and the programme. The findings are presented in Table 6.

Table 6: Students’ Perception towards Education Programme

<table>
<thead>
<tr>
<th>Opinions of Students Public Universities</th>
<th>Agreement</th>
<th>Undecided</th>
<th>Disagreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>F %</td>
<td>F %</td>
<td>F %</td>
<td></td>
</tr>
<tr>
<td>I undertook education course as a last resort</td>
<td>159 45%</td>
<td>30  8%</td>
<td>169 47%</td>
</tr>
<tr>
<td>I intend to stay in teaching profession for at least 5 years</td>
<td>152 43%</td>
<td>83 23%</td>
<td>122 34%</td>
</tr>
<tr>
<td>Methods of teaching at the University motivates me</td>
<td>175 49%</td>
<td>32 9%</td>
<td>150 42%</td>
</tr>
<tr>
<td>Preparation for teaching in secondary school at the university is adequate</td>
<td>240 67%</td>
<td>28 8%</td>
<td>89 15%</td>
</tr>
<tr>
<td>Lessons are well prepared and organized</td>
<td>155 43%</td>
<td>30 8%</td>
<td>172 48%</td>
</tr>
<tr>
<td>I have learned the value of teaching at the University</td>
<td>269 75%</td>
<td>35 10%</td>
<td>53 15%</td>
</tr>
<tr>
<td>University lecturer motivate me to pursue teaching</td>
<td>205 57%</td>
<td>34 10%</td>
<td>118 33%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Opinions of Students in Private Universities</th>
<th>Agreement</th>
<th>Undecided</th>
<th>Disagreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>F %</td>
<td>F %</td>
<td>F %</td>
<td></td>
</tr>
<tr>
<td>I undertook education course as a last resort</td>
<td>36 40%</td>
<td>7 8%</td>
<td>48 52%</td>
</tr>
<tr>
<td>I intend to stay in teaching profession for at least 5 years</td>
<td>42 46%</td>
<td>21 23%</td>
<td>28 31%</td>
</tr>
<tr>
<td>Methods of teaching at the university motivates me</td>
<td>57 63%</td>
<td>7 8%</td>
<td>27 29%</td>
</tr>
<tr>
<td>Preparation for teaching in secondary school at the university is adequate</td>
<td>68 75%</td>
<td>6 7%</td>
<td>17 18%</td>
</tr>
<tr>
<td>Lessons are well prepared and organized</td>
<td>57 63%</td>
<td>30 8%</td>
<td>105 29%</td>
</tr>
<tr>
<td>I have learned the value of teaching at the university</td>
<td>76 84%</td>
<td>7 7%</td>
<td>9  9%</td>
</tr>
</tbody>
</table>
University lecturer motivate me to pursue teaching profession 67  73%  7  8%  17  19%

On whether the students undertook education course as a last resort, 159 (45%) and 48 (52%) of the students in Public and Private Universities respectively agreed, 30 (8%) and 7 (8%) in Public and Private Universities were undecided as only 30 (8%) and 36 (40%) in Public and Private Universities disagreed. It appears that most student teachers undertook education course not as a last resort but because other reasons like interest, job opportunities amongst other reasons. Most 152 (43%) and 42 (46%) of the students in Public and Private Universities indicated that they intend to stay in the teaching profession for at least 5 years, 83 (23%) and 21 (23%) in Public and Private Universities were undecided as 122 (34%) and 28 (31%) in Public and Private Universities disagreed. This shows that a majority of the teacher trainees intend to stay in teaching profession for at least five years which is attributed to the inherent interest in the course and the background experience for joining other professions. Five years is a short period for a professional to leave as it would put much burden on the schools to replace them. This implies that there will be few experienced teachers in the schools which may affect the quality of learning and teaching.

To find out if teaching motivate student teachers 175 (45%) and 57 (63%) in Public and Private Universities agreed, 32 (9%) and 7 (8%) in Public and Private Universities were undecided as 150 (42%) and 27 (29%) in Public and Private Universities disagreed. It appears those students are comfortable with the instructional methods used at the university. This is also attributed to the fact that these students did not choose teaching as a first career choice and may contemplate leaving the course.

University lecturers were noted to motivate students to pursue teaching profession by a majority 205 (57%) and 67 (73%) of the students in Public and Private Universities agreeing to the fact, 34 (10%) and 7 (8%) in Public and Private Universities were undecided while 118 (33%) and 17 (19%) in Public and Private Universities disagreed. This implies that the teacher educators influence the learning at the University.

_Student’s Attitudes towards Programme Duration_

Three items were administered to establish student’s views on the duration of programme. The findings are as presented in table 7.

**Table 7: Student’s Perception about Education Course in Public Universities**

<table>
<thead>
<tr>
<th>Opinion</th>
<th>Agreement</th>
<th>Undecided</th>
<th>Disagreement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>%</td>
<td>F</td>
</tr>
<tr>
<td>Teaching Practice has helped me to view teaching in a more positive way</td>
<td>287</td>
<td>80%</td>
<td>34</td>
</tr>
<tr>
<td>Four years is adequate to prepare a competent teacher</td>
<td>287</td>
<td>80%</td>
<td>13</td>
</tr>
<tr>
<td>Teaching practice duration was adequate</td>
<td>270</td>
<td>76%</td>
<td>33</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Opinion</th>
<th>Agreement</th>
<th>Undecided</th>
<th>Disagreement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>%</td>
<td>F</td>
</tr>
<tr>
<td>Teaching Practice has helped me to view teaching in a more positive way</td>
<td>82</td>
<td>90%</td>
<td>5</td>
</tr>
<tr>
<td>Four years is adequate to prepare a competent teacher</td>
<td>76</td>
<td>84%</td>
<td>4</td>
</tr>
<tr>
<td>Teaching practice duration was adequate</td>
<td>75</td>
<td>82%</td>
<td>3</td>
</tr>
</tbody>
</table>

Teaching practice gives the student teachers hands on experiences. This is enhanced by availability of instructional materials, interaction with teachers and students which motivates them, these implies that teaching practices enable students to connect theory and practice, student teachers put into practice what they have learned in the university thus enabling them to appreciate the complexity of the teaching profession.

According to students, the results on whether four years is adequate for preparation of a competent teacher in both content and pedagogyare inconsistent with Feiman-Nemser & Buchmann, (1987) view that teacher preparation duration is not adequate to efficiently prepare teachers.

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Student’s Attitudes towards Curriculum Implementation

This was considered very important as student teachers are the consumers of the curriculum. Curriculum implementation is the core business of teacher education institution as it determines the quality of teacher produced. Table 8 presents information about students’ perception on Education as a course.

Table 8: Student’s Perception about Education Course

<table>
<thead>
<tr>
<th>Course</th>
<th>Agreement</th>
<th>Undecided</th>
<th>Disagreement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F %</td>
<td>F %</td>
<td>F %</td>
</tr>
<tr>
<td>Public Universities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I get feedback from lecturers own</td>
<td>202 57%</td>
<td>45 13%</td>
<td>110 30%</td>
</tr>
<tr>
<td>I have enough time to interact</td>
<td>147 41%</td>
<td>320 9%</td>
<td>178 50%</td>
</tr>
<tr>
<td>Lecturers are available for</td>
<td>133 37%</td>
<td>33 9%</td>
<td>191 54%</td>
</tr>
<tr>
<td>consultation outside class</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lecturers are sensitive to</td>
<td>104 29%</td>
<td>35 10%</td>
<td>218 61%</td>
</tr>
<tr>
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<td>course material</td>
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<tr>
<td>Assignments are marked and</td>
<td>105 29%</td>
<td>34 10%</td>
<td>218 61%</td>
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<tr>
<td>returned in a reasonable time</td>
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<tr>
<td>Lessons are well prepared and</td>
<td>155 43%</td>
<td>30 8%</td>
<td>172 48%</td>
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<tr>
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<td>We are given sufficient</td>
<td>201 63%</td>
<td>39 11%</td>
<td>117 26%</td>
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<td>Private Universities</td>
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<tr>
<td>I get feedback from lecturers</td>
<td>55 63%</td>
<td>11 12%</td>
<td>25 25%</td>
</tr>
<tr>
<td>own assignments</td>
<td></td>
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<tr>
<td>I have enough time to interact</td>
<td>53 57%</td>
<td>5 6%</td>
<td>33 37%</td>
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<td>with the lecturer</td>
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<tr>
<td>Lecturers are available for</td>
<td>46 51%</td>
<td>12 13%</td>
<td>33 36%</td>
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<tr>
<td>consultation outside class</td>
<td></td>
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<tr>
<td>Lecturers are sensitive to</td>
<td>43 47%</td>
<td>14 16%</td>
<td>34 37%</td>
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<td>whether students understand</td>
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</table>

The findings on students’ feedback from lecturers on their assignments, may be attributed to the limited time lecturers have to mark students work and the extremely large classes to handle and different campuses to teach. This indicates a compromise of the quality of teachers’ preparedness. Teacher preparation is skill oriented and requires immediate feedback to students to enable them to improve on areas that are not understood (Kafu, 2010).

The large classes and tight schedule of the lecturers do not allow interaction between lecturers and students. On whether lecturers are available for consultation outside class, 133 (37%) in Public and 46 (56%) in Private agreed, 33 (9%) and 12 (13%) in Public and Private were undecided as a majority 191 (54%) in Public Universities and 33 (36%) in Private. It appears that the situation is different with more students indicating there is consultation outside class. This is attributed to practices in private universities where lecturers are not allowed to teach on part time in other institutions and therefore are available for students. However, as indicated in the findings, generally a majority of the students from both Public and Private indicated that there is minimal consultation with lecturers. This may be attributed to student lecturer ratio which is inadequate. Lack of consultations with lecturers affect effective teacher preparation as it denies students opportunity to address some challenges they may be experiencing in the course of their study, and which would have been easily handled by the lecturers.

The findings indicate that students in Public Universities find the courses taught not well prepared for. This may be attributed to the large classes that teacher educators handle thus some students may not be attended to.

Not all student teachers’ needs are met as 15% and 18% students in public and private universities indicated respectively, that they are not well prepared. These students form interrelated parts of teacher education system and therefore may contribute to the dysfunction of teacher education as a system.
Figure 2: Student’s Attitude towards Education Programmes

As indicated in figure 2, a majority of the students in the Universities portrayed a positive attitude towards education programme at Universities. However as noted, a majority 58% of the students from Private Universities agreed as compared 51% from the Public Universities. Students from Private Universities therefore were considered to have a more liking of the course than those in the Private Universities. It was also noted that among the students who were undecided included a majority 13% were from Public Universities as compared to 9% from Private Universities. 36% and 33% of the students from Public and Private Universities respectively disagreed though there were more from Public Universities than those from Private Universities.

IV. CONCLUSION

The attitude of lecturers and students is generally not encouraging. The case of lecturers for instance is contributed by poor working conditions, dissatisfaction with incentives from the university – large classes to handle, and inadequate supply of learning resources and heavy teaching load among others. Most students on the other hand never opted for Teacher education programme but were admitted having failed to secure places in their preferred choices. The new culture in Kenya which holds that teaching profession is meant for failures has contributed to this attitude among students. There are internal variations between students in public and private universities. Students in private universities are more positive towards teacher education programmes than those from public universities. This is because students in private universities are not admitted by JAB and therefore enrol in the programmes of their choice.

V. RECOMMENDATIONS

It is recommended that only those students who choose teaching as a first choice career should be admitted in teacher preparation programme. There is need to conduct screening of individuals to be admitted in teacher education programmes so as to ensure that only those who are interested and committed to teaching profession are enrolled.

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Review of Artificial Intelligence AI

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Abstract- The development of areas interested in Artificial Intelligence is just a small percentage of the computer revolution. So Artificial Intelligence is still a young science, but this doesn't prevent researchers to be confident that they are in the right direction. In this survey we'll introduce the Artificial Intelligence from different angles. First we provide the definitions for the term Artificial Intelligence, and then we provide a brief historical description for the interactive form of the Artificial Intelligence. Beside that we'll conclude an over view of some modern applications and related visions.

Index Terms- Artificial Intelligence, high tech, emotions and thinking.

I. INTRODUCTION

The computer revolution made a huge impact in many fields of ordinary lives. And lately it becomes very difficult to see a machine without a computer. With this revolution, the term Artificial Intelligence came to the surface. It is deeply believed that the term and its theories have existed long before recorded, and see the light after the invention of the electronic computer in the early 1941[1].

The attempt to give a complete picture isn't easy; a lot of definitions and questions surrounding the term, and make the environment a little foggy. The early task starts with the big questions of how the human mind works, how the stored information inside the brain cooperates to solve a wide range of problems, and how the conclusions get from this information. Solving these questions help the scientists and programmers to translate the brain into Artificial Intelligence programs that take the full benefit of the computer and allowed the programmers community to give various definitions to the term. The straightforward definition is to use computer programs using Artificial Intelligence to replace the complex human thought tasks and processes, and this is done by simulating the human logic on a machine. This will lead the machine one day to be an expert in many areas, allowing them to be as creative as human, and analyze complex data to get the benefit from every single detail.

The Artificial Intelligence will perform complex and hard tasks for us; its smartness may go beyond the human intelligence. The perfect use of the computer and its programs will enable the human to do things better and faster. [3] Not only this, it is deeply believed that the machine might perform behavior, and this behavior if carried out by a human would require some degree of intelligence.

The wondering questions continue and continue, and some people might think that the computer is a substitution of the mind. A claim might influence that if programmers and scientists programmed a computer with the smart complex programs, and if this computer have the suitable inputs and outputs, then it would have emotions and senses in exactly the same sense in which humans have feelings and emotions. Scientists said that this newly programmed computer would independently have its own mind. So if there were an Artificial Intelligence's Practical Applications, or AIPA, program that highly matched human cognition, then scientists would loudly say that they have created an actual smart mind.

To make the picture relatively obvious, a well known example always mentioned, the chess game. Chess always considered the ultimate "thinking" game. In a very famous match, the champion Gary Kasparov beat the Deep Blue, the IBM's supercomputer, 4 games to 2 in 1996. Taking into the account that the IBM's supercomputer was able to evaluate 200 million moves a second, this amazing capability, enables easily the computer won any match versus anybody, but despite of this, Kasparov was able to win. This competition made many philosophers and scientists ask many questions about the Artificial Intelligence starting from the wondering if there is any reason to doubt a computer's ability to understand and think? Another important question arises: should a computer be able to take decisions that directly depend on emotional beings? I.e. can the computer read its competitor eyes and predict what to do and what will the next step be.

Looking into people and computers as individual capacities, it may easily be seen that they are not very different, but the education and organization that structure both may be very different. So this lead to another important question: should our decisions be made by computers for us? The answer to this question may yes, but taking into consideration that the computer should be well qualified to do so, this is essentially made the quality control (QC) tests are used to build a qualified decision-making computer.

The list of questions goes on, and the attempts to solve these questions may help defrosting the term. In general, it is a daunting notion. These attempts make the computer programmers to wish creating machines that learn rather than machines that should be programmed previously. It has become the dream of a large percentage of engineers that the "mechanisms of human brain could be simulated on a computer". [1] Achieve this dream is known as Artificial Intelligence.

II. LUMINOUS STATIONS OF AI

The first beginning with the term Artificial Intelligence was exposed to our culture was the birth of Science Fiction, Mary
Shelley Frankenstein. It is a story wrote early in 1940s. At the end of this story, the readers are left asking if there are limits and boundaries beyond the human brain or if there is more to think about using the human brain? Many other Science Fiction writers used this idea in their writes until they reach to the level of robot, a non-human thinking machine. The story began in the summer of 1956 by Marvin Minsky, who was involved in establishing Artificial Intelligence by using the Science Fiction as his main motivators to enter the world of Artificial Intelligence. During the same summer, a meeting was held between the scholars of Dartmouth College, who would later be considered the founding fathers of Artificial Intelligence. The meeting was considered a focal point in the study of Artificial Intelligence. It opened the doors for many ideas, questions and theories for ordinary people and scientists to attempt to solve together of questions of what is important and essential for thinking [8].

In the mid 1960's, Marvin Minsky improved his motivator in Science Fiction and created a computer program that many scientists next believed to be the Artificial Intelligence. Marvin Minsky wasn't very sure of his achievement until another scientist, Joseph Weizenbaum, stepped forward with a stronger representation of AI. Weizenbaum and Minsky then cooperated and produced more complicated computer programs.

The improvements continued in the computer programs and took different but higher levels until the successful in creating the joke generator, which was a calculator that matched specified groups with behaviors of humans that were programmed in as options. A different subject line was created in the mid 90's by Kim Binstead, her program, JAPE (Joke Analysis and Production Engine), was able to rearrange different words according to meanings and vowels to create smart puzzles.

Nowadays, the Alliance Simulation Group ASG is a syndicate of computer programmers and players interested in evaluating rich simulations of known science-fiction movies like Star Trek, Star Wars, Terminator and Babylon. Some are just text-based but others are full with sounds and graphics. The movie characters could walk, talk and do actions by its self simulating a human through the use of Artificial Intelligence and in some extensive scenes the viewers could notice that the movie star might learn from their mistakes. [4] [6].

III. MODERN APPLICATIONS AND RELATED VISIONS

The computer industry should face the difficulties created by the fast improvement in high tech, it should be able to create programs and applications that solve many human thought processes, and create systems to analyze and create data to meet the customer and the community needs.

There are many applications around us capture the meaning of AI. The simplest application is the computer games, the development in this industry in the last three decades accounts for billions of dollars every year. The persons engaged in computer games develop this industry in a variety of formats: simulation games, action games, adventure games, interactive games and fighting games. The high tech improvement in computer games enables the founders to test their creativity and their own intelligence.

Computer games move along way before it can have a drastic clutch. This industry asks its designers always to develop programs that would simulate human behaviors in order to improve more sophisticated games. To achieve this dream, the designers simulate the reality and lately achieve a more interactive form of this rapid industry the 3D games which spread widely and let the player feel deeply as he is inside the game. The 3D computer games present challenges to human mankind, it is not only a computer-controlled actions of the soldiers and animals inside these games but also an exploration of human creativity.

Another application made the researchers pushed forward to uncover new ground, the invention of robots. Robots are used widely in many fields, and many believed that they should only be for unthinking and repetitive tasks or for dangerous but straightforward tasks [7]. In the mid of the last century, the major car factories had a few hydraulically machines, they were all hand crafted. Nowadays companies like TOYOTA who produce many types and models every year depends majorly on robots as workers. Many jobs inside such companies are considered to be robots job exclusively.

Many fields were invaded by robots like modern car wash stations, the robotic machine here uses its senses to tell the main computer what temperature the water should be, what detergents should be used, and the style of wash the car is getting, e.g. Normal or Super wash. Some robots are invisible to the naked eye, so they called small insects, and are used and have been developed for medical treatments; they can help with diabetes patients since it can operate like an insulin injecting pump, this insulin spread to the whole body instead of the defected pancreas. These medical robots could also be helpful with intracellular surgeries like spinal cords surgeries and ophthalmological surgeries. In these medical fields, doctors can depend on robots since they are more efficient, adaptive to the task at hand and professional to use some of the instruments as very precise tools. Not only this, but some systems were designed to be capable of diagnosing diseases, administering drugs and taking actions automatically on patients.

Robots also used widely in modern armies, they are now considered to be employers in the huge American government Agency the FBI. Robots can help in dismantling bombs from a site without putting the soldiers' life in dangerous. Robots are used to large extent in warfare, a recent example of using AI in warfare is the Gulf War, one of the final reports said that many high tech weapons such as 'Smart Bombs' were used, it looks like a very sophisticated systems which used superior guidance capabilities but internally they don't contain any neural networks. The use of robots in warfare is also risky when it fall in the wrong hands, used in the wrong ways and when sophisticated computer systems thought to be faultless but indeed it may have. This has been proven to be right when a whole British battalion of armored vehicles were accidently annihilated by an allied American stealth [5]. The Gulf War gave a clear proof that it is serving its ultimate purpose and when used in the appropriate field can move men far away from the killing fields.

A daily known example is the computers that auto-fix problems in modern vehicles, like the smart mirror in front of the driver, which can absorb the strong light from the cars behind the estimated car, so this will not conflict the driver. Some modern
cars prevent the car moving backward when the car is very close to an obstacle and some cars have smart air conditioner which can control the temperature of the air emitted depending on the air inside and outside the driver room.

The extent use of robots in industrial, medical and many other fields will affect the workers. The owners of the major industrials factories and companies believe that human workmanship is required less and less needed. This will lead soon the workers to have no jobs and try very hard to find new jobs. Nobody denies that robots don't need a coffee breaks or a lunch time and the company that owns the machinery have control over the robot. This problem could be solved by learning the workers to do other essential jobs in the production line or in positions that robots can't do like secretary, human resources and make decisions on whether or not to hire somebody. Another problem obviously seen, a robot designed to operate a complex surgery would not be able to draw a flower, and the robot that is designed to construct a car would not be able to assemble a pen, and this is due to the shortage of information in that field. This problem occurs because the robot can't search information from its subfields and connect them together to create a smart thinking machine.

A new term appeared lately with the wide use of robots, the microbot. Which made a revolution of engineering, and the most famous microbot named Genghis, which is able to walk, turn and jump. It is considered to be full of life; it can walk over obstacles by pulling legs in and out, it can recognize the voice of its owner and meet his or her demands.

The applications go behind the borders, and with the wide use of Artificial intelligence in many fields, many new definitions for the term continue to appear taking into consideration the circumstances of completing a certain task. [9]

IV. CONCLUSION

Many believe that systems built upon computers could conceivably handle any problem, as long as the system proves itself. But the human works indeed indirectly lead to the solution of the problem. Actually the more critical the problems that system must deal with, the more efforts should be taken from the programmers and the scientists. So it is extremely hard to separate between a machine to take any forward step and the human brain.

As people continue in their demands, computer revolution will not stop, and the boundaries drift away, but people should keep in minds that the decisions made by computers does not necessarily make the best decision and the human judgment is a major ingredient to decision making, but not necessarily at a fixed point in the system. [10]

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Spatial Variation of Radio Refractivity Across Nigeria

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Abstract - The monthly average radio refractivity of Sokoto, Ikeja, Lokoja, have been determined using the data of temperature, pressure and relative humidity between 1971 and 1980 of Nigeria Meteorological Agency (NIMET). The work employed ITU-R model to determine the various parameters. The result showed that there was variation in the monthly radio refractivity of the study areas but more noticed in Sokoto compared to Ikeja and Lokoja. It was shown that Sokoto with the highest elevation has the lowest average monthly refractivity while Ikeja with the lowest elevation has the highest average monthly refractivity.

The analysis from Refractive Gradient \( \frac{dN}{dh} \) and Effective Earth Radius Factor \( k \) shows that propagation of radio wave in the three regions (Ikeja, Lokoja and Sokoto) is mostly super-refractive.

Rainfall and Water vapour seem to be the major factors that responsible for difference in their refractivity.

Although, the relationship between the radio refractivity with respect to the latitudes and longitude of the study areas is not very clear, the radio refractivity was then concluded to be inversely proportional to the elevation of a study area.

Index Terms - Atmospheric pressure, Radio refractivity, Spatial variation, Temperature.

I. INTRODUCTION

Radio refractivity is defined as the product of the refractive index less than one unit and one million (equation1). The ratio of the velocity of the radio propagation in free space to that in medium is called refractive index.

The radio refractivity is related to refractive index, \( n \), by the equation given as (Manning, 1999):

\[ N = (1 - n) \times 10^6 \]  

where \( N = \text{Radio Refractivity} \) and \( n \) Refractive Index of air.

According to Priestley and Hill, 1985, the atmosphere radio refractive index depends on air temperature, humidity, atmospheric pressure and water vapour pressure. Also, any little changes in any of these variables can make a significant influence on radio-wave propagation since it can cause radio signals to be refracted over the whole signal path. This can to some extent affects the radio frequency signal to be propagated beyond the designed radio horizon which may in the process interfere with other radio signal transmitted on the same frequency.

According to Okoro and Agbo, 2012, the propagation of radio wave signal in the troposphere is affected by many processes such as the changes of meteorological parameters like temperature, pressure and humidity. In other words, the changes in these parameters or any of these parameters will result in strengthening or weakening of propagated radio signal.

At high altitudes, the value of the refractive index \( n \) approximates to 1, and also, in a well–mixed atmosphere, pressure, temperature and humidity behave in a way that they decrease exponentially as a function of height above the Earth's surface (Tamošiūnaitė, et al., 2010).

According to Agbo, et al., 2013, there is need for special consideration of the refractive properties of the lower atmosphere when one is planning or designing terrestrial communication systems. This is because of multi-path fading and interference that can result from trans- horizon propagation.
This work considers mainly how the radio refractivity is influenced by the latitude, longitude and elevation of the study areas by considering the locations of higher latitude, longitude and elevations in the country.

II. SOME RELATED WORKS

Some of the related works reviewed in this work are as follows.

i. Bawa et al., (2015): “Study of Average Hourly Variations of Radio Refractivity Variations across Some Selected Cities in Nigeria”. The work was conducted on the Average Hourly Variations of Radio Refractivity Variations across Some Cities in Nigeria. It made use of three years meteorological data which was measured from January 2010 to December 2013 using Vantage Pro 2 automatic weather station, and it was discovered by them that average hourly variations of refractivity in the dry season was due to the variations of the wet component (humidity).

ii. Ogherohwo, et al., (2014): “Prognostication of Radio Refractivity in Transmission link: Diurnal and Seasonal Variation of Surface Refractivity over Jos-Plateau state”. The research was conducted on the diurnal and seasonal variation of surface refractivity over Jos-Plateau state, using the data of ten months (August 2012-May 2013) which was acquired from Nigeria meteorological Agency (NIMET), Jos, Plateau state. From their result, it was showed that surface refractivity has higher values during wet season than dry season.

iii. Okoro and Agbo (2012): “The Effect of Variation of Meteorological Parameters on the Tropospheric Radio Refractivity for Minna”. The work investigated the effect of diurnal variations meteorological parameters on the tropospheric radio refractivity during dry and rainy seasons for Minna. The calculations of hourly averages of radio refractivity during dry (February) and rainy (August) seasons were done using the data obtained from the Center for Basic Space Science, Nsukka. The results revealed that the hourly averages of radio refractivity during rainy season (August) was higher than the results in dry season (February).

iv. Ayantunji, and Okeke, 2011: “Diurnal and seasonal variation of surface refractivity over Nigeria”. They carried out the study of Diurnal and Seasonal Variation of Surface Refractivity over Nigeria, using four years in-situ meteorological data from eight locations over Nigeria- Nsukka, Sokoto, Minna, Akure, Jos, Lagos, PortHarcourt and Makurdi. They observed in their result that the diurnal variation seems to be mainly caused by the dry component in the rainy season and the wet component in the dry season.

v. Valma, et al., 2010: “Determination of Radio Refractive Index using Meteorological Data”. The main goals of this paper were to apply the well-known model ITU–R model to determine the radio refractive index – values using local geographical and meteorological data of the study area (Lithuanian) in different seasons of a year and different day times and to be compared with the average value of refractive index at a ground level under standard atmosphere conditions. It was found out by them that the radio refractive index calculated at high altitude was different from that at the ground level.

III. MATERIALS AND METHOD

3.1 Materials

The work made use of secondary data which are the monthly average temperature, atmospheric pressure and relative humidity of ten years (1971 - 1980 ) for Sokoto, Ikeja and Lokoja obtained from Nigeria meteorological Agency (NIMET). The monthly average of each of the data was taken by dividing the sum by the ten years to get the average value for each month.

3.2 Method

The research will made use mathematical formulas are used for determining the parameters which were used to determine the radio refractivity, N. These parameters are the saturated vapour pressure, e_s and vapour pressure, e. The following are the procedures for determining the radio refractivity:

a. Radio refractivity

i. Calculation of saturated vapour pressure (e_s): The saturated vapour pressure is the pressure of a liquid when it is in equilibrium with the liquid phase. It depends mainly on the temperature of the vapour or air. It is determined using the equation given as (Manning, 1999):

$$e_s = 6.11 \exp \left[ \frac{17.26(T - 273.16)}{T - 35.87} \right] - 2$$

where T is the air temperature in Kelvin (K), e_s is the saturated vapour pressure in hectopascal (hpa) and exp is exponential given by a constant value of 2.718.

ii. Calculation of vapour pressure (e): Vapour pressure is defined as the measurement of the amount of moisture in the air. Vapour pressure is determined using the equation given as (Manning, 1999):

$$e = e_s \times \frac{H}{100} \quad \text{------------------------ 3}$$
Where \( H \) is the relative humidity in percent, \( e \) is the vapour pressure in hectopascal (hpa) and \( e_s \) is the saturated vapour pressure calculated from (2) above.

iii. Calculation of Radio Refractivity (N): Radio refractivity is the physical property of the medium as determined by its index of refraction. Radio refractivity is also the product of the refractive index less than one unit and one million. Radio refractivity is calculated using the equation given as (Manning, 1999):

\[
N = 77.7 \frac{P}{T} + 3.73 \times 10^5 \frac{e}{T^2} \]

Where \( P \) is the air pressure in (hpa), \( e \) is the vapour pressure in hectopascal (hpa) and \( T \) is the air temperature in Kelvin (K).

3.3 About the study areas

The study areas- Sokoto, Ikeja and Lokoja are three state capitals in Nigeria. Sokoto is the capital of Sokoto state, Ikeja is the capital of Lagos state and Lokoja is capital of Kogi state. Kogi state is in north-central Nigeria, Sokoto is in North-West Nigeria and Lagos is in South-West Nigeria. The study location for Sokoto is on latitude 13.030 N, Longitude 5.20E and elevation 270.0 m, Ikeja is on latitude 6.580 N, Longitude3.330 E and elevation 4.0m, and Lokoja is on latitude 7.80 N, Longitude6.730E and elevation 128.0m.

IV. RESULTS AND DISCUSSIONS

Table 1.0 shows the calculated radio refractivity of three state capitals in Nigeria- Sokoto, Ikeja and Lokoja which were carefully chosen in terms of magnitude of their latitude, longitude and elevation in the country. From the result, it was observed that there was variation in the monthly radio refractivity of the three study areas. It was also observed that Sokoto, the Sokoto state capital has the average radio refractivity of 301.6216 N-units, Ikeja, the Lagos state capital has the average radio refractivity of 375.4484 N-units and Lokoja, the Kogi state capital has the average radio refractivity of 373.1611 N-units.

Table 1.0: Average monthly Radio Refractivity of Sokoto, Lagos (Ikeja) and Kogi Lokoja

<table>
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<th>N Ikeja</th>
<th>N Lkj</th>
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</tr>
<tr>
<td>NOV</td>
<td>293.4229</td>
<td>378.5692</td>
<td>366.9709</td>
</tr>
<tr>
<td>DEC</td>
<td>290.3378</td>
<td>375.5852</td>
<td>357.6222</td>
</tr>
</tbody>
</table>

In other words, Sokoto has the lowest average monthly radio refractivity followed by Lokoja and the Ikeja being the highest, though the difference between the average radio refractivity of Ikeja and Lokoja is just very little (2.28 N-units). But Sokoto has an elevation of 270.0m, Lokoja has an elevation of 128.0m and Ikeja has an elevation of 4.0m above sea level. It can be said that the elevation of the study area is related to the average radio refractivity considering the fact that the location with the highest elevation has the lowest average radio refractivity and the location with the lowest elevation has the highest average radio refractivity. This is in line with the result of the work of Tamošiūnaitė, et al., 2010.

In addition, the result also shows that Sokoto has the maximum and minimum monthly radio refractivity of 355.4059 N-units and 271.9619 N-units respectively, Ikeja has the maximum and minimum monthly radio refractivity of radio refractivity of 382.2086 N-units and 369.25 N-units respectively, while Lokoja has the maximum and minimum monthly radio refractivity of 380.81 N-units and 356.36 N-units in that order (Table 2.0 and Figure 1.0). The maximum and minimum monthly radio refractivity for Sokoto occurred in August and May, the maximum and minimum for Ikeja occurred in February and August, while the maximum and minimum monthly radio refractivity for Lokoja occurred in September and January in that order.
Table 2.0: Maximum and minimum radio refractivity of the study areas

<table>
<thead>
<tr>
<th></th>
<th>Sokoto</th>
<th>Ikeja</th>
<th>Lokoja</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum</td>
<td>355.4059</td>
<td>382.2086</td>
<td>380.809</td>
</tr>
<tr>
<td>Minimum</td>
<td>271.9619</td>
<td>369.2533</td>
<td>356.3559</td>
</tr>
</tbody>
</table>

Fig. 1.0: Bar chart of maximum and minimum radio refractivity of the three study areas

Figure 2.0 shows the graphical representation of the average monthly Radio Refractivity of the study areas. It can be seen from the figure that variation occurred in the average monthly radio refractivity of the study areas but is highly noticed in Sokoto compared to Ikeja and Lokoja. There was serious fluctuation of radio refractivity in Sokoto and this will result in fluctuations of radio frequency signals such as television and Radio broadcasting as well as GSM signal transmissions. It will cause transmitted radio signal not to reach the supposed horizon further leading to fading or transmitting beyond the horizon, thereby leading to interference with other radio frequency signal transmitted on the same frequency by another radio or Television stations.

Fig. 2.0: Graphical representation of the radio refractivity of Sokoto, Ikeja and Lokoja

For Ikeja, the radio refractivity increased from January to February from where it started decreasing until it reaches August when it started rising again until it came to November when it then decreased to gently till the month of December. The radio refractivity was low from January to April as it increased from January to May when it started decreasing until it reached July from where it started increasing till the month of September. From September, the radio refractivity started decreasing sharply until December.

Using reference profile to compute the value of refractivity $N_s$ at the Earth’s surface from $N_0$ as follows:

$$N_s = N_0 \exp \left( -\frac{h_s}{h_0} \right)$$

Where
- $N_s$: Refractivity at surface of the Earth
- $N_0$: Average value of atmospheric refractivity extrapolated to sea level
- $h_0$: scale height (km)
\(h_{s}\): height of the Earth’s surface above sea level

\(N_0\) and \(h_0\) can be determined statistically for different climates. But for reference purposes, a global mean of the height profile of refractivity may be defined by:

\(N_0: 315\)

\(h_0: 7.35\)

### Table 3.0: The computed refractivity

<table>
<thead>
<tr>
<th>City</th>
<th>Height above Sea Level: (h_s) ((\times 10^3) km)</th>
<th>Refractivity ((N_s))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ikeja</td>
<td>4.0</td>
<td>314.8266</td>
</tr>
<tr>
<td>Lokoja</td>
<td>128</td>
<td>309.5618</td>
</tr>
<tr>
<td>Sokoto</td>
<td>270</td>
<td>303.6385</td>
</tr>
</tbody>
</table>

This indicates that the Radio refractivity decrease as the height above sea level increases.

Famoriji J.O (2013) expresses this in this form: “Thus, the range of the radio waves is determined by the height dependence of the refractivity. Thus, the refractivity of the atmosphere will not only vary as the height changes but also affect radio signal”.

Bean B.R and Horn J. D (1959) shows this height dependence of the refractivity \(N\) variations across the United States and that they felt that the U.S. data better illustrate the height dependence of \(N_s\) and the subsequent reduction process employed. It is noted that the coastal areas display high values of \(N_s\) while the inland areas have lower values. There are low values of \(N_s\) corresponding to the Appalachian and Adirondack Mountains, a decrease with increasing elevation of the Great Plains until the lowest values are observed in the Rocky Mountain region and the high plateau area of Nevada.

### Table 4.0: Comparison between Refractivity \((N_s)\) and Average Refractivity \((N)\) of three Cities

<table>
<thead>
<tr>
<th>City</th>
<th>Height above Sea Level: (h_s) (m)</th>
<th>Refractivity ((N_s))</th>
<th>Average Refractivity ((N))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ikeja</td>
<td>4.0</td>
<td>314.8266</td>
<td>375.4484</td>
</tr>
<tr>
<td>Lokoja</td>
<td>128</td>
<td>309.5618</td>
<td>373.1611</td>
</tr>
<tr>
<td>Sokoto</td>
<td>270</td>
<td>303.6385</td>
<td>301.6216</td>
</tr>
</tbody>
</table>

The different in the value is just that the \(N_0\) and \(h_0\) for \(N_s\) are global means values and for reference purposes. The average values \(N\) was computer based on the weather parameters (humidity, temperature and pressure) of the years 1971-1980. In case of \(N_s\) only height was considered. The different therefore is based on the weather parameters.

Refractivity Gradient

Refractivity Gradient happen any time there is a change in the atmospheric air density and atmospheric air refractive index. The change in atmospheric density and refractive index is due to change in temperature of the air medium. i.e due to Temperature Gradient.

From equation

\[N_s = N_0 \exp \left( - \frac{h_s}{h_0} \right)\]

Where \(N_0 = 315\), \(h_0 = 7.35\)km and \(h_s\) = 4m, 128m and 270m for the height of Ikeja, Lokoja and Sokoto respectively above sea level. We used the scale height of 7.35km because it gave a better performance at 200m, but scale height gave a better result at 50m. But for purposes of comparison we used 7.35km.

Differential above equations with respect to \(h_s\)

\[\frac{dN_s}{dh_s} = \frac{-N_0}{h_s} \exp \left( - \frac{h_s}{h_0} \right)\]
Table 5.0: Refractivity Gradient

<table>
<thead>
<tr>
<th>City</th>
<th>Height (*10^-3) km</th>
<th>Refractivity Gradient N-unit/km</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ikeja</td>
<td>4</td>
<td>-42.8338</td>
</tr>
<tr>
<td>Lokoja</td>
<td>128</td>
<td>-42.1172</td>
</tr>
<tr>
<td>Sokoto</td>
<td>270</td>
<td>-41.3113</td>
</tr>
</tbody>
</table>

At standard atmosphere, the refractivity gradient is -39 N-unit/km.

The vertical gradient of refractivity in the lower layer of the atmosphere is an important parameter in estimating path clearance and propagation effects such as sub-refraction, supper refraction and ducting (Akpootu D.O et al, 2017).

We can now use the Refractivity Gradient to identify whether the above is sub-refraction or super refraction using (Akpootu et. al. 2017 and Adediji et.al, 2008)

If \( \frac{dN}{dh} < -40 \)

It is sub-refraction

In this case, the N increase with height and the radio waves moves away from the earth’s surface and the line of sight range and range of propagation decrease accordingly.

If \( \frac{dN}{dh} > -40 \)

It is Supper-refractivity

In this case the N decreases with height and the electromagnetic/radio waves are bent downward toward the earth. The degree of bending depends upon the strength of the super-refractive condition. If the atmosphere’s temperature increases with height (inversion) and/or the water vapor content decreases rapidly with height, the refractivity gradient will decrease and radio waves will bend below the standard or normal path. (i.e. This situation is known as super refraction, and causes the radar beam to deflect earthward below its normal path view. Generally, radar ranges are extended when super refractive conditions exist. However, some targets may appear higher on radar than they would under standard atmospheric conditions. The radius of curvature of the ray path is smaller than the earth’s radius and the rays leaving the transmitting aerial at small angles (less than the standard or normal path) of elevation will undergo total internal reflection in the troposphere and it will return to the earth at some distance from the transmitter. On reaching the earth’s surface and being reflected from it, the waves can skip large distance, thereby giving abnormally ranges beyond the line of sight due to multiple reflections.

\( \frac{dN}{dh} < -157 \)

It is Ducting

In this condition, the waves bend downwards with a curvature greater than that of the earth. Radio energy bent downwards can become trapped between a boundary or layer in the troposphere and surface of the Earth or sea (surface Duct) or between two boundaries in the troposphere (elevated Duct). In this wave guide-like propagation, very high signal strengths can be obtained at very long range (far beyond line-of-sight) and the signal strength may exceed its free space value.

Abdulhadi AbouAlmal, (2015) summary above as follow, “Anomalous phenomena such as super-reflection and ducting may occur when large negative values of reflectivity gradient \( \frac{dN}{dh} \) is obtained.

Large negative value in sense that \( \frac{dN}{dh} < -40 \) (Super refraction)

From the table above the refractivity gradient at Ikeja, Lokoja and Sokoto are of large negative value than -40.

The refractivity gradient obtained for Ikeja, Lokoja and Sokoto are -42.8338 N-unit/km, -42.1172 N-unit/km and -41.3113 N-unit/km respectively.
These indicate that the propagation in this Cities or geographical region is mostly super-refractive. This implies that the Radio waves are bending downward towards the earth. The degree of bending is a function of the strength of the super-refractive condition. As the refractivity gradient continues to decrease, the wave path’s curve will approach the radius of curvature of the Earth. In the super-refraction, the bending of the trajectory of propagating radio waves towards the ground must have its bend greater than its bending in case of normal positive refraction.

Effective Earth Radius Factor, k

The effective earth radius is the radius of a hypothetical spherical Earth, without atmosphere, for which propagation paths follow straight lines while the heights and ground distance being the same for actual Earth with atmosphere and constant vertical gradient of refractivity (abdulhadi A, 2015).

This k, can be used to characterize refractive conditions as normal refraction or standard atmosphere, sub-refraction, super-refraction and ducting. Thus, can be expressed in terms of refractivity gradient as follows:

\[ k \approx \left[ 1 + \frac{\varepsilon N}{\frac{dh}{157}} \right]^{-1} \]

Table 6: Some basic parameters of the three study areas

<table>
<thead>
<tr>
<th>City</th>
<th>Height ((^\ast 10^{-3})) (\text{km})</th>
<th>Effective Radius Factor (k)</th>
<th>ITU reference (k)-factor value is 4/3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ikeja</td>
<td>4</td>
<td>1.38</td>
<td>1.33</td>
</tr>
<tr>
<td>Lokoja</td>
<td>128</td>
<td>1.37</td>
<td>1.33</td>
</tr>
<tr>
<td>Sokoto</td>
<td>270</td>
<td>1.36</td>
<td>1.33</td>
</tr>
</tbody>
</table>

The ITU reference \(k\)-factor \(\frac{4}{3}\) is considered as a normal refraction condition in a standard atmosphere.

If

\[ k < \frac{4}{3} = 1.33 \]

It is sub-refraction

The positive \(k\)-factor values below \(\frac{4}{3}\), indicates the occurrence of sub-refraction where signals bend upward. Meaning that, radio waves propagate abnormally away from the earth’s surface. Also it can be shown when \((k \times a) < a\) radius of the earth, where \(a\) is the actual radius of the earth.

If

\[ k > \frac{4}{3} = 1.33 \]

It is super-refraction

The positive \(k\)-factor values larger than \(\frac{4}{3}\), indicates the occurrence of super-refraction where signals bend downward toward the earth surface. Meaning that, radio waves propagate abnormally toward the earth’s surface. Also it can be shown when \((k \times a) > a\) radius of the earth, where \(a\) is the actual radius of the earth.

If

\[ k < 0 \]

It is ducting

It is referring to as Negative values of \(k\)-factor indicates the occurrence of ducting, where the radio signals or wireless signals gets trapped within two layers and travel for long distance over the horizon. Meaning that, the radio waves bend downwards with curvature greater than that of the earth.

The \(k\)-factor for Ikeja, Lokoja and Sokoto are (1.38), (1.37), and (1.36) and their corresponding refractive gradient are \((-42.8338), (-42.1172), \text{and} (-41.3113)\) respectively, this is an evidence that Radio waves refractivity over the three city is super-refraction because

\[ \left( k > \frac{4}{3} \text{ positive values} \right) \]

and
The k-factor decreases as the height increases. Ikeja being the highest in k-factor, it is an evidence that radio waves refractivity over Ikeja refracted more toward the earth than Lokoja and Sokoto. The signals can be obtained at very long range.

Adediji A.T et al (2008): When super-refraction and ducting are prevalent, very high radio signal strengths can be obtained at very long range (far beyond line-of-sight) and the signal strength may exceed its free-space value.

Moreover, because of the atmospheric refractive index varies with frequency, so does the effective earth radius (k-factor). The index of refraction of the atmosphere ordinary decrease with altitude so that radar or radio waves that transmitted horizontally are refracted downward.

The atmospheric refractive index over the three cities Ikeja (1.000375), Lokoja (1.000373), and Sokoto (1.000302), their k-factor Ikeja (1.38), Lokoja (1.37) and Sokoto (1.36) and their Average radio refractivity Ikeja (375.4484), Lokoja (373.1611) and Sokoto (301.6216).

Generally, the k-factor, the atmospheric refractive index, radio refractivity decreases as the height increases. That is, they all decrease with altitude. So, Ikeja with lowest elevation above sea level has the highest values for k-factor, Atmospheric refractive index (n) and Radio refractivity (N). Sokoto has the least values for the three (i.e. _k, n and N_) because it has the highest elevation.

Since the signals propagation in the three cities are mostly super-refraction, it is necessary to be considered in planning and design of radio communication system in those regions.

Akpootu D.O (2017): The implication of the result is that propagation in this geographical region is mostly super-refractive. The results obtained from this study are highly critical for optimal planning and design of radio links/systems for the study area under investigation and regions with similar climate information.

*Let bring in two parameters (Rainfall and Temperature)*

![Fig. 3.0: Temperature, Rainfall and Refractive Index of Sokoto](image)

The maximum value 355.4059 N-unit at Sokoto was as a result of heavy rainfall (218.0200), because maximum value 355.4059 N-unit corresponds to maximum rainfall (218.0200) both maximum value occurred in August.

![Fig. 4.0 Temperature, Rainfall and Refractive Index of Ikeja](image)
The maximum refractivity 382.2086 N-unit occurred in February at the beginning of rainfall. The maximum of refractivity in the month of February value might be due to:

- Cloudiness at the earlier portion of the year or due to harmattan (a dusty wind from the Sahara that blows toward the western coast of African during the winter) period,
- Sudden increase the temperature in the month of February
- Commencement of rainfall in the this month
- Sudden increase Vapour Pressure of January (25.92438) to February (27.09256)

The major factors that contributed to high refractivity are mainly:

The commencements of rainfall and increase in the humidity or vapour pressure in the month of February. This high refractivity during the month of February are as a result of high moisture or humidity content in the atmosphere. The high temperature may causing temperature inversion that cause air humid or colder air to descended down making the air thicker. This will suddenly increase the density and refractive index of the air creating what we can call density gradient and refractive index gradient. Since the lower part of the earth is high in density and refractive index, the radio refractivity will be expected to high at this period of the year.

![Fig 5.0: Temperature, Rainfall and Refractive Index of Lokoja.](image)

In Lokoja experienced two similar maximum of radio refractivity 380.809 N-unit in May and 380.3407 in September and these are corresponds to rainfall value (179.3909) in May and (216.3182) in September respectively. The rainfall can be seen to be major factors contributed to the rising of Radio refractivity index.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ikeja</td>
<td>117.3553</td>
<td>375.4484</td>
<td>84.475</td>
</tr>
<tr>
<td>Lokoja</td>
<td>98.0825</td>
<td>373.1611</td>
<td>73.2667</td>
</tr>
<tr>
<td>Sokoto</td>
<td>49.8167</td>
<td>301.6216</td>
<td>41.225</td>
</tr>
</tbody>
</table>

![Fig.5.0: Average rainfall, Humidity and Radio refractivity.](image)
It evidence the amount rainfall is another factor (apart from the height from the sea level) that can enhance the refractivity of radio waves above sea level. The Ikeja city has the highest average radio refractivity (375.4484) in year 1971-1980 with average rainfall of (117.3553) and average humidity (84.475) followed by Lokoja with average rainfall (98.0825) and average humidity (73.2667) and then the least is Sokoto.

Valma E et al (2011) stated that, air temperature, Pressure and humidity depend on the height at a point above the ground surface. Even small changes in any of these variables can make a significant influence on radio-wave propagation, because radio signals can be refracted over whole signal path. In a well-mixed atmosphere, pressure, temperature and humidity decrease exponentially as a function of height.

From the above the radio refractivity in the seasons considered is of influence by the changes in the air humidity with height of the city above sea level also with amount rainfall. The radio refractivity and vertical gradient could change when the weather suddenly becomes colder. Significant increase in rainfall and humidity will make air more humid and weather colder. Sudden increase in the rainfall and humidity will cause change in the density and refractive index of the atmosphere resulting into density and atmospheric refractivity vertical gradient. The Ikeja has more rainfall and highest humidity will makes atmosphere more denser and of high atmospheric refractive index than the other two cities, thereby give higher radio refractivity. Since humidity decrease exponentially with the height, we will expect also that Ikeja should have more humidity values that other because of it low elevation.

Surface refractivity is high with respect to topographic altitude because the surface will more saturated with moisture in the rainy season thereby making water vapour in the air to be relatively high and stable. The high average value of radio refractivity over Ikeja (375.444) can be attributed to high average rainfall (117.3553) over the year 1971-1980. The result shows that high average radio refractivity is normally observed during the rainy season. City with much average rainfall is characterized by heavy rainfall e.g Ikeja. This in line with Akpootu D.O (2017) who stated in his research report on radio refractivity over Ikeja that; some areas in Lagos State, which very closed to the Atlantic Ocean, experience rainfall almost throughout the months of the year.

Apart from the different in the height above sea level of the three cities, water vapour also gives evidence of the differences in their refractivity.

Ikeja maximum refractivity (382.2086) (February) corresponds to maximum vapour pressure or humidity (27.09256) (February), Lokoja maximum refractivity (380.809) (May) corresponding to vapour pressure (29.14457) or humidity in month of May but the vapour pressure (29.35261) or humidity from the April might make contribution to month of May refractivity, and in Sokoto maximum refractivity (355.4059) (August) corresponds to maximum Vapour pressure (20.89127).

V. Conclusions

The monthly average radio refractivity of Sokoto, latitude 13.03° N, Longitude 5.2° E and elevation 270.0 m, Ikeja, latitude 6.58° N, Longitude3.33° E and elevation 4.0 m, and Lokoja, latitude 7.80° N, Longitude 6.73° E and elevation 128.0 m have been determined using the data of temperature, pressure and relative humidity for ten years (1971 to 1980) of NIMET.

The result showed that there was variation in the radio refractivity of the study areas but more noticed in Sokoto compared to Ikeja and Lokoja. It was also shown that Sokoko with the highest elevation has the lowest average monthly refractivity while Ikeja with the lowest elevation has the highest average monthly refractivity.

The analysis from Refractive Gradient \( \frac{dN}{dh} \) and Effective Earth Radius Factor k shows that propagation of radio wave in the three regions (Ikeja, Lokoja and Sokoto) is mostly super-refractive.

Rainfall and Water vapour seem to be the major factors that responsible for difference in their refractivity.

Although, the relationship between the radio refractivity with respect to the latitudes and longitude of the study areas is not very clear, the radio refractivity can be concluded to inversely proportional to the elevation of a study area.

VI. Recommendation

As a result of not been able to relate the latitudes and longitudes of the study areas with the radio refractivity, there is need to carry out this work using at least ten study areas or states to be spread across the six geopolitical zones of the country in future works.

REFERENCES


AUTHORS


Second Author – Abdullahi Ayegba, Department of Engineering and Space systems, National Space Research and Development Agency, Abuja and 2Mathson Research Centre-A Division of Mathson Group of schools, Nigeria.
Development of a Low Power Indoor Transmission System with a Dedicated Android App

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** Electronics and Communication Engineering, IST, Bangladesh

{http://dx.doi.org/10.29322/IJSRP.8.5.2018.p7733

Abstract: This Study demonstrates the design, development and the implementation of a low power, portable Indoor Transmission (campus radio) system using Raspberry Pi which facilitates larger scale implementation at moderate cost. It can be locally or remotely controlled and configured for both education and research purposes. This concept may be extended to implement in large college campuses or in any university by some parameter modifications where the latest happenings in an institute can be informed to the students by tuning to the pre-assigned frequency of an FM receiver system. For smart handling, a dedicated Android app is also developed here.

Index Terms: Antenna, FM, Receiver, RPi, Transmitter

I. INTRODUCTION

Campus radio is the communication system normally run by the students of an educational institution, college or even universities. Programs of this radio are generally anchored or performed exclusively by the students or may include programmers from the concerning community where the radio station is based on; while other radio stations exist to provide alternatives to commercial and/or government broadcasting [1-3]. This commercial-free college radio, generally focuses on art not dollar signs, may also be operated for the purpose of non-stop professional trainings, broadcasting educational programs, etc. It is just about being free and independent to pursue new ideas, providing content that isn’t driven by the advertisers and that fits perfectly with the mandate of universities and their students. Also, college radio could be the launching pad for the student artists breaking into the mainstream. It is truly a place for discovery [4-5]. Nevertheless, only the commercial FM radio stations have been flourished in Bangladesh in last six-seven years; those are broadcasting different kind of programs, concerned only light entertainment and the whip of advertisers and vendors. Although they are bombarded with these uninformative commercial media, youths especially students of the country desperately rely on alternative information source and media like YouTube and online blogs. Campus radio could be the valuable alternative even in this age, like the decades back-long before this internet age. Realizing this, Sylhet Engineering College of Bangladesh launched the first ever campus based online radio system in February 2, 2010 [6]. Later ULAB (University of Liberal Arts of Bangladesh) started their Campus Radio (FM) Broadcasting System in October 16, 2011 [7] which is only available for Sun-Wed for a limited period of time (10-1:00). A 24×7 arrangement could have been a relief for the student youths of 16-25 year age. Considering these significant factors, authors are motivated to revive a full-time campus radio system in Bangladesh perspective. Also a low-power, low-cost version was mandatory. This work, hence, develops a Raspberry Pi based campus radio system utilizing its advantages of low-power, low-cost and open-source easy configurations. Its small size (85.60 mm x 53.98 mm x 17 mm with 45g weight) helps to place in a simple case on a wall or to mount inside an electrical box with only a few feet long transmitter wire antenna. Some appropriate programs for this campus radio service are also proposed here considering their significance in academic level.

II. BACKGROUND STUDY

Raspberry Pi:
The Raspberry Pi (RPi) is a low cost, credit-card sized microcomputer developed by Raspberry Pi Foundation, UK [8] including standard keyboard and mouse interfacing facilities, and also can be plugged into a computer monitor or television. It is a tiny device that enables people of all ages to explore computing and/or programming in simple languages like Scratch and Python. This RPi has the ability to interact with the outside world, and has been used in a wide array of digital maker projects, from music machines and parent detectors to weather stations and tweeting birdhouses with infra-red cameras [8]. There are three available models of RPi in market: Model A, Model B and Model B+. The latest RPi Model B+ features the BCM2835 application processor with 512MB RAM, 40 pins GPIO header, 4 USB 2.0 ports, Micro SD card slot, 3.5mm audio jack, HDMI video output, camera connector slot [9] etc.

Raspberry Pi GPIOs:
External electronic devices can be interfaced with RPi through its dedicated GPIO (General Purpose Input/Output) pins which accept I/O commands from RPi. It is possible to store sensor data and manipulate relay or motors attached with GPIOs based upon the program running on the RPi's operating system. [10]
III. PROPOSED SYSTEM

Figure 1 illustrates the block diagram representation of the proposed RPi based campus radio system where a symbolic antenna is connected to GPIO pin-4 of RPi. Here the Pi transmitter uses its built-in sine wave generator which exhibits lots of harmonic distortion and appears as multiple transmissions in the FM band. The Raspberry Pi’s broadcast frequency range is 1-250 MHz and it transmits any sound files through appropriate modulations. On the other side any wireless radio receiver system or mobile phone with FM facilities can be employed.

Figure 1: Block diagram of the proposed Raspberry Pi Based Campus Radio system.

Figure 2: General FM modulation technique employed for RPi Transmission

Figure 2 shows the underlined FM modulation scheme where the first carrier wave is the RPi’s internally generated spread-spectrum clock signal. Second modulating audio signal is the one which the radio system needs to broadcast. Last one is the FM modulated signal that would be available on the GPIO pin 4 to transmit though the antenna

A. Transmission Band Selection

Since there is a number of FM broadcasting channels in Bangladesh, the selection of transmission band of the proposed system is important to avoid the existing channel frequencies. The license of FM radio broadcasting is generally provided from the Ministry of Information, the government of Bangladesh. According to NFAP, frequency is assigned from BTRC to the licensee is from 87.5 to 108 MHz [15]. Table 1 shows the existing 14 FM radio stations (January 2015) and their corresponding frequency bands [16]. Hence, the 103.0 MHz frequency band is selected for this system for the X University to avoid all kind of interference.

Table 1: The list of available FM radio stations of Bangladesh

<table>
<thead>
<tr>
<th>Station Name</th>
<th>Frequency Band (MHz)</th>
<th>Station Name</th>
<th>Frequency Band (MHz)</th>
<th>Station Name</th>
<th>Frequency Band (MHz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radio Foorti</td>
<td>88.0 FM</td>
<td>Dhaka FM</td>
<td>90.4 FM</td>
<td>Radio Capital</td>
<td>94.8 FM</td>
</tr>
<tr>
<td>Radio Amar</td>
<td>88.4 FM</td>
<td>Asian Radio</td>
<td>90.8 FM</td>
<td>City FM</td>
<td>96.0 FM</td>
</tr>
<tr>
<td>Radio Metropolitan</td>
<td>88.8 FM</td>
<td>People’s Radio</td>
<td>91.6 FM</td>
<td>BBC Bangla</td>
<td>100.0 FM</td>
</tr>
<tr>
<td>ABC Radio</td>
<td>89.2 FM</td>
<td>Radio Shadhin</td>
<td>92.4 FM</td>
<td>Color’s FM</td>
<td>101.6 FM</td>
</tr>
<tr>
<td>Radio Today</td>
<td>89.6 FM</td>
<td>Radio Bhumi</td>
<td>92.8 FM</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

B. Methodology

For large variations in locally available accessories with the original standards, the installation and/or configuration processes vary significantly from standard instructions [11]. The complete environment set up and arrangement of the system is done by following steps:

Step 1: To Prepare Raspberry pi for setup

To setup the RPi OS, the required apparatus are: Power Adapter (5V-700mA), HDMI lead: Type A to Type A (to connect with display monitor or TV), HDMI display or HDMI to VGA adapter for VGA display, SD card: 2 GB to 64 GB storage (8 GB used in this work and also minimum recommended for locally available SD cards); SD card reader, USB keyboard and mouse. For display purpose, it is recommended to use only LED monitors available in Bangladesh instead of local LCD monitors. Keyboard, mouse and LED monitors are not necessary later after the initial environment setup.

Step 2: Raspberry Pi OS installation

The software required for SD card formatter [SDF 16.0.0.400], Windows32 disk imager [win32DiskImager-0.9.5], Raspbian- weezy.iso. Considering its certain benefits, “Raspbian” OS is downloaded from [12]. After formatting the SD card using SD card formatter (FAT32), the iso image is burned to SD card using windows32 Disk imager. The details are omitted as the standard procedures of [11] are followed. The config.txt file is needed to edit by uncommenting (removing # sign): “hdmi_force_hotplug=1; hdmi_group=1; hdmi_mode=4; disable_overscan=0”

Step 3: Initial configuration for first boot

After expending the file system for using all the SD card space, the user password change is done. It is necessary to enable “boot to desktop” to “directly boot to desktop” and to enable ssh from the advance option.

Step 4: Network Configuration

For any remote access through/without internet, it is recommended here that the network should be configured as static rather than DHCP [13]. This network configuration is done
by providing following commands “sudo nano
/etc/networks/interfaces” on terminal mode and setting up IP
address, subnet mask and Gateway (for this work 192.168.0.103
with subnet 255.255.255.0 and 192.168.0.111 gateway,
respectively).

**Step 5: Audio Gadget Configuration**
The Advanced Linux Sound Architecture (ALSA) is the
underlying framework responsible for any sound stuff work on
RPi. ALSA provides kernel drivers for RPi itself and for most
USB gadgets that produce or record sound. The following
command is needed to view the list of all connected audio
devices (along with detailed status information) with ALSA:
“pi@raspberrypi-$ cat /proc/asound/cards”. Also the startup of
AalsaMixer is necessary to make sure the volume is loud enough
to listen, using the following command: “pi@raspberrypi-$ aksamixer”. The Up-Down arrow keys of Keyboard can be used to
adjust the volume meter and the Esc key to quit AalsaMixer.

**Step 6: Pi-FM configuration**
To install the pifm library, the following commands of ‘wget’ are
necessary after creation a directory “pifm” in download directory
and ‘tar’ command to unzip the downloaded content:
“pi@raspberrypi-$ wget
www.icrobotics.co.uk/wiki/images/c/c3/Pifm.tar.gz
pi@raspberrypi-$ tar -xzf Pifm.tar.gz”

**Step 7: Finalizing Campus Radio**
After successful installation of pifm, a sample transmission (at
103.0 MHz) of a sample music ‘sound.wav’ is checked by
following commands: “sudo ./pifm sound.wav 103.0”. Any tuned
FM radio receiver in the vicinity (1-2 meter) can receive this
broadcasting.

**Step 8: Antenna Customization**
A simple piece of wire is enough for RPi FM transmitter antenna
to cover a range of 50 meter under the restriction of BTRC [15].
For an optimal antenna, in this work, a 75cm female jumper wire
is attached to pin 4 and insulated with the heat-shrink tubing
(Fig 3). That would effectively make a half-wave dipole antenna
at 100 MHz, near the middle of the FM band. Dab hot glue
around the soldered joint of pin 4 makes the antenna more rigid
so that it can stand up better

![Figure 3](image-url) (a) Customized Antenna (b) Soldered antenna with
GPIO pin 4 of RPi

**Step 9: Development of an Android App “X University
Campus Radio”**
A dedicated android application “X University Campus Radio” is
also developed here for both free program listening and smart
management of the program scheduling. The authentic users
need to log in (through/ without internet) by providing IP address
of the RPi with the pre-assigned password and configure
themselves as administrators. They can upload the ‘to be
broadcasted’ programs and set the appropriate daily or weekly
scheduling.

**IV. ANALYSIS AND DISCUSSION**
The proposed campus Radio system has successfully been
implemented and tested for the desired functionalities. The small
size and low weight of RPi helps to place in a simple case or to
mount inside an electrical box and to place on a wall in any
administrative building room. Nevertheless, the control of these
program schedules every day from the attached desktop or
laptops sound clumsy in a country like Bangladesh where
professional technicians are scarce, alternatives like user friendly
mobile applications were always necessary. Besides, the drastic
rise of the low price multi-featured smartphones with the
introduction of 3G facilities in Bangladesh (November 2013) and
preference of android phones by 93% smartphone users justifies
the necessity of this dedicated Android app developed in this
work.

As 95 per cent of the total internet users of Bangladesh (33.43
million in April 2013, 6.3% of the total population according
BTRC) use the internet through mobile phones [14], an online
version can also be implemented with some more features. Thus
the campus radio will become the valuable alternative source of
information.

**V. CONCLUSION**
This proposed campus radio system aims to serve particular
student communities, informing, educating and entertaining
them. In addition, this system should be sensitive, and respect
the languages, traditions, beliefs and cultures of that community and
also affordable to the community as people should be allowed to
contribute what they can afford to help sustaining the station.
This system can easily be adapted to any educational institutions
without any need of professional administrator. Only it demands
endorsement of the Government and also the keenness of the
institution individuals to accustom with this newer technology.
Availability of RPi board and accessories in the local market is
the major limitation for this massive employment.

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Thank you

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On the Sustainability of Current Account Deficits in Indonesia: Error Correction Mechanism Approach

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Abstract- This study investigates the sustainability of the current account deficits in Indonesia. We employed ECM (Error Correction Mechanism) approach to find out relationship in the long run and short run during 2000 quarter 1 up to 2015 quarter 4. The condition of the current account deficit is inseparable from the macroeconomic indicators. The results of the long run estimation of current account deficits is negatively influenced by real gross domestic product. In the short run estimation of current account deficits is positively influenced by real gross domestic products, real effective exchange rate, and the open economic. While negatively influenced by inflation. The research recommended to the financial policy authority relates to the fluctuation of macroeconomic variables for a policy-making basis on the sustainability the current account deficits in Indonesia, because this is one of the parameters that determine the economic performance of a country.

Index Terms- Current account deficits, Error Correction Mechanism, Macroeconomic indicators.

I. INTRODUCTION

Indonesia is one of the countries that embrace the open economy system in the current era of globalization. A country with an open economy system will conduct economic activities with other countries because some output is sold on the domestic market and some of it is sold in foreign markets. The realization of the relationship of the open economy system is shown by the international trade activities recorded in the current account balance as it is one of the indicators of macroeconomics used to assess the economic stability of a country and reflect the strength of international competitiveness in utilizing the resources owned by the country [1].

The role of the current account balance for a country is, First, the current account balance is one of the key factors for economic growth. Secondly, a country’s current account balance mainly reflects the trade balance. Thirdly, since the current account balance determines the evolution of a country’s stock [2]. The current account imbalance has been a major source of concern by economists [3]–[5]. Consequently, economists are trying to explain the changes in the current account balance to estimate the sustainable levels to cause required changes in the balance. Implications of imbalance and sustainability of the current account are important issues in international macroeconomics because the current account balance reflects the performance of the economy and as a measure to assess economic growth by policymakers and investors [6]–[13].

The process of economic globalization will increase international trade and capital mobility resulting in the current account balance in some countries experiencing a deficit state [14]. The current account deficit is one of the main indicators of external imbalance of global economies [15]–[19]. The concept of current account deficit has long been the focus of research debates for economic policy making [20]–[25]. The trend towards current account deficits can be observed in Indonesia. The current account deficit is challenging because if exposed to large external shocks and have limited capability to finance the current account deficit will result in economic crises such as currency crises, external debt and international reserve reductions for developing countries [11], [26]–[33].

Figure 1 summarizes the condition of the current account balance in Indonesia over the past ten years. Based on figure 1, the current account condition in Indonesia has surplus in 2005 to 2011, but the current account condition has a sustained deficit in 2012 to 2015. The condition of the current account Indonesia fluctuating is inseparable from macroeconomic variable shocks. According to the theory of international financial economics that the condition of the current account is influenced by macroeconomic indicators, such as economic growth, exchange rate and inflation [34]. Based on previous research conducted by [2], [5], [21], [35]–[38], which the current account balance is influenced by economic growth, exchange rate, inflation, and economic openness.

The importance of research about the current account balance are; the first, the current account balance describes the effect of foreign economic transactions on national income; the second, current account balance showing the structure and composition of economic transactions and the international financial position of a country; the third, to assist the government in taking policy. Based on various relevant theories and research, the current account deficits cannot be separated from the influence of macroeconomic variables. The main purpose of this research is to answer some questions between current account deficits and macroeconomic indicators, such as real gross domestic products, real effective exchange rate, open, and inflation in Indonesia. In this respect, Error Correction Mechanism approach was employed to specify the sustainability of the current account deficits in Indonesia from 2000 quarter 1 up to 2015 quarter 4.

II. LITERATURE REVIEW

Research on fluctuations in the current account balance has been done by some previous researchers [39] analyze the current account deficit of 44 developing countries during 1966-1995. Their findings suggest: current account deficits are moderately persistent; GDP growth worsens the current account deficit; temporary increase of public savings or private savings improves the current account balance; temporary appreciation of the real exchange rate or the deterioration of terms of trade widen the current account deficit but their impact in the long term is not significant; a temporary increase of the level of economic growth in developed countries leads to a reduction of current account deficits.

[40] take up quite different econometric methods compare to [39] and their attention is to the medium-term determination of current account. Their empirical analysis consist of a wide database of 18 developed countries and 71 developing economies. The findings show that the budget balance, the initial net foreign assets (NFA) and financial indicators are positively correlated with the current account balance in developing countries. Their model was further expanded by [41], analyzing the impact of the financial crisis in the current account balance. [36] update the work of [40] respectively the impact of legal and institutional indicators.

[42] focus on developing economies and low income states. Among others, they found that the appreciation of the real exchange rate and deterioration of total terms of trade deteriorate the current account deficit. [43] their results suggest that the fiscal balance significantly affects the current account, as well as they argue that the increase of net foreign assets improves the current account balance. [44] and [35] examine the excessive deficits of the current account in the most of new member states of EU. Based on panel data estimations deficits in these countries are mainly determined by the relative income per capita and high capital investments. Analyzing the developing countries of Europe, [45] finds that economic growth and transition index have negative and significant impact on the current account balance.

[6] examines the main determinants of the current account balance to assess the possible extension of current account deficits in selected transition economies, Eastern Europe and the former Soviet Union. The analysis covers the period 1992-2003 and using different estimates for both empirical models (A and B). According to the empirical model A, FYROM for period 2000-2003 captures a current account deficit of 7.1% of GDP, while according to model B, the current account deficit is lower 5.1% of GDP. [38] investigate the potential determinants of current account positions in FYROM for both, the short run and long run dynamics covering the period 1998q1-2013q4. Empirical results indicate that the financial development, fiscal balance and terms of trade are positively correlated with the current account balance, while openness to international trade is negatively correlated with the current account balance.
III. RESEARCH METHODOLOGY

Type and Sources of Data

This study entirely used secondary data sources covering the year ranged from 2000 quarter 1 up to 2015 quarter 4. Data are collected from FED (Fred Economic Data) and BI (Bank Indonesia). The data set includes Current Account (CA), Real Gross Domestic Product (RGDP), Real Effective Exchange Rate (REER), Inflation, Open Economics (OPEN). Table 1 summarized the description of data and data sources used in this study.

<table>
<thead>
<tr>
<th>Variabel</th>
<th>Abbreviation</th>
<th>Description</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Account</td>
<td>CA</td>
<td>Total Current Account Balance for Indonesia, Percent of GDP</td>
<td>Fred Economic Data</td>
</tr>
<tr>
<td>Real Gross Domestic Product</td>
<td>RGDP</td>
<td>Gross Domestic Product by Expenditure in Constant Prices: Total Gross Domestic Product for Indonesia, Index 2010=1</td>
<td>Fred Economic Data</td>
</tr>
<tr>
<td>Real Effective Exchange Rate</td>
<td>REER</td>
<td>Real Broad Effective Exchange Rate for Indonesia, Index 2010=100</td>
<td>Fred Economic Data</td>
</tr>
<tr>
<td>Open Economics</td>
<td>OPEN</td>
<td>Ratio of exports plus imports to GDP for Indonesia, Percent of GDP</td>
<td>Fred Economic Data</td>
</tr>
<tr>
<td>Inflation</td>
<td>INF</td>
<td>Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services for Indonesia, Percent</td>
<td>Bank Indonesia</td>
</tr>
</tbody>
</table>

Model Specification

The analytical tool used in this research is econometric model with ECM (Error Correction Mechanism). Some steps to use the ECM test are; the first is a stationarity test of data using ADF test and Phillips-Perron test which aims to know there is no significant change in the data; the second is if all the variables pass from the unit root test, then the next cointegration test to determine the possibility of long run relationship, in this study used Engle Granger method to test the cointegration of variables by using statistical test ADF-PP test to see the error term (u) of the basic model is stationary or not; the third is long run relationship test, the long run equation on the ECM model is the basic equation, which is not stationary in level; the fourth is a short run relationship test, stationary error term (u) in the basic model, also used as one of the variables in the short-run equation. Short-run equations also use variables that are similar to those of long-run equations, but they have been stationarized on the same order.

This study uses 4 determinants variable to sustainability of current account deficits in Indonesia, it is based on result from relevant research about factors influencing current account deficits, that is:

\[ CA = f(\text{RGDP}, \text{REER}, \text{OPEN}, \text{INF}) \]  \[1\]

Based on the function equation, ECM model can be derived as follows:

The first is the basic model:

\[ CA_t = \alpha_0 + \alpha_1 \text{RGDP}_t + \alpha_2 \text{REER}_t + \alpha_3 \text{OPEN}_t + \alpha_4 \text{INF}_t + U_t \]  \[2\]

Where \( t = \text{year}; \alpha_0 = \text{constant}; \alpha_{1-4} = \text{coefficients}; U = \text{error term}.\)

The second is cointegration of the basic model:

\[ U_t = CA_t - \alpha_0 - \alpha_1 \text{RGDP}_t - \alpha_2 \text{REER}_t - \alpha_3 \text{OPEN}_t - \alpha_4 \text{INF}_t \]  \[3\]

The third is the ECM model:

\[ \Delta CA_t = \alpha_0 + \alpha_1 \text{RGDP}_t + \alpha_2 \text{REER}_t + \alpha_3 \text{OPEN}_t + \alpha_4 \text{INF}_t + \alpha_5 \Delta U_{t-1} + \varepsilon_t \]  \[4\]

Where \( \Delta = \text{change}; U_{t-1} = \text{the one period lagged value of the error term}.\)
IV. EMPIRICAL RESULTS

The analysis first starts with variables checked through Augmented Dickey-Fuller (ADF) test and Phillips-Perron for unit root test in determining the stationarity of variables. Based on table 2, by looking at the value of t-statistics and p-value, which OPEN and INF stationary in level, while CA, RGDP, and REER stationary in first difference. Based on the unit root test in table 2, not all variables stationary in level, but all variables stationary in first difference, so the application of ECM method can be continued.

Table 2: Unit root test statistics

<table>
<thead>
<tr>
<th>Variables</th>
<th>Test</th>
<th>Level</th>
<th>t-statistics</th>
<th>p-value</th>
<th>First Difference</th>
<th>t-statistics</th>
<th>p-value</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA</td>
<td>ADF</td>
<td></td>
<td>-1.700788</td>
<td>0.1795</td>
<td></td>
<td>-10.81266***</td>
<td>0.0000</td>
<td>I(1)</td>
</tr>
<tr>
<td></td>
<td>PP</td>
<td></td>
<td>-2.491380</td>
<td>0.1224</td>
<td></td>
<td>-11.99219***</td>
<td>0.0000</td>
<td></td>
</tr>
<tr>
<td>RGDP</td>
<td>ADF</td>
<td></td>
<td>6.553304</td>
<td>1.0000</td>
<td></td>
<td>-2.968409**</td>
<td>0.0436</td>
<td>I(1)</td>
</tr>
<tr>
<td></td>
<td>PP</td>
<td></td>
<td>6.945524</td>
<td>1.0000</td>
<td></td>
<td>-6.307715***</td>
<td>0.0000</td>
<td></td>
</tr>
<tr>
<td>REER</td>
<td>ADF</td>
<td></td>
<td>-2.018626</td>
<td>0.2783</td>
<td></td>
<td>-8.769815***</td>
<td>0.0000</td>
<td>I(1)</td>
</tr>
<tr>
<td></td>
<td>PP</td>
<td></td>
<td>-1.916161</td>
<td>0.3230</td>
<td></td>
<td>-8.769815***</td>
<td>0.0000</td>
<td></td>
</tr>
<tr>
<td>OPEN</td>
<td>ADF</td>
<td></td>
<td>-3.019143**</td>
<td>0.0386</td>
<td></td>
<td>-</td>
<td>-</td>
<td>I(0)</td>
</tr>
<tr>
<td></td>
<td>PP</td>
<td></td>
<td>-2.165777**</td>
<td>0.0226</td>
<td></td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>INF</td>
<td>ADF</td>
<td></td>
<td>-3.812371***</td>
<td>0.0046</td>
<td></td>
<td>-</td>
<td>-</td>
<td>I(0)</td>
</tr>
<tr>
<td></td>
<td>PP</td>
<td></td>
<td>-3.475396**</td>
<td>0.0119</td>
<td></td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

The notifications ***, ** and * denote 1%, 5% and 10% level of significance, respectively.

Source: Authors’ calculations using e-views 8.

For the second analysis, since the ECM model can be used in this study, it is followed by cointegration test of Engle Granger method by using the ADF-PP test statistic to see the error term from the basic model is stationary or not summarized in table 3. Based on table 3, estimation for Indonesia was found that the variables used in this study have cointegration, since the value of error term from the basic model is stationary in level, this means that the variables studied have long run relationship.

Table 3: Cointegration test statistics of error term from the basic model

<table>
<thead>
<tr>
<th>Variables</th>
<th>Test</th>
<th>Level</th>
<th>t-statistics</th>
<th>p-value</th>
<th>First Difference</th>
<th>t-statistics</th>
<th>p-value</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ut</td>
<td>ADF</td>
<td></td>
<td>-4.227433***</td>
<td>0.0013</td>
<td></td>
<td>-</td>
<td>-</td>
<td>I(0)</td>
</tr>
<tr>
<td></td>
<td>PP</td>
<td></td>
<td>-4.270294***</td>
<td>0.0011</td>
<td></td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

The notifications *** denote 1% level of significance, respectively.

Source: Authors’ calculations using e-views 8.

For the third analysis, since the variables have cointegration and there is a long run relationship, it is followed by long run test summarized in table 4 with coefficients, statistics, and prob. Variables have cointegrated, then there is a long run relationship between current account and variables caused it for the estimate Indonesia, the variable significant affecting current account deficits in the long run are RGDP which are consistent with the research [2], [34], [38], [43]. While REER, OPEN, and INF are not caused current account deficits in long run, which are consistent with the research [5], [21], [35].

Table 4: Long run relationships from basic model

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>t-statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>12.29446</td>
<td>3.300123</td>
<td>0.0016</td>
</tr>
<tr>
<td>RGDP</td>
<td>-0.069598</td>
<td>-6.164468</td>
<td>0.0000</td>
</tr>
<tr>
<td>REER</td>
<td>-0.036231</td>
<td>-1.293251</td>
<td>0.2010</td>
</tr>
<tr>
<td>OPEN</td>
<td>-0.044964</td>
<td>-0.962996</td>
<td>0.3395</td>
</tr>
<tr>
<td>INF</td>
<td>0.012231</td>
<td>0.206297</td>
<td>0.8373</td>
</tr>
</tbody>
</table>

R-squared 0.562015
Source: Authors’ calculations using e-views 8.

For the fourth analysis, since the ECM model can be applied in this study, it is followed by short run test of the same order of each variable summarized in table 5 with coefficients, statistics, and prob. Based on table 5, the one period lagged value of the term error of the short run equation is denote 1 percent of significant that occurs in Indonesia. This condition indicates that there is short run problems caused by insignificant variables. In the estimates for Indonesia, the short run influencing current account deficits are RGDP, REER, OPEN, and INF which are consistent with research [2], [5], [37], [38].

Table 5: Short run relationships estimated from ECM model

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>t-statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-0.136711</td>
<td>-0.260897</td>
<td>0.7951</td>
</tr>
<tr>
<td>D(RGDP)</td>
<td>0.051527</td>
<td>0.127507</td>
<td>0.8990</td>
</tr>
<tr>
<td>D(REER)</td>
<td>0.062598</td>
<td>1.380348</td>
<td>0.1730</td>
</tr>
<tr>
<td>D(OPEN)</td>
<td>0.024132</td>
<td>0.310999</td>
<td>0.7570</td>
</tr>
<tr>
<td>D(INF)</td>
<td>-0.054597</td>
<td>-0.604320</td>
<td>0.5481</td>
</tr>
<tr>
<td>D(RES(-1))</td>
<td>-0.371641</td>
<td>-2.894129</td>
<td>0.0054</td>
</tr>
</tbody>
</table>

R-squared: 0.539559

Authors’ calculations using e-views 8.

V. CONCLUSION

This paper used an ECM (Error Correction Mechanism) approach to analyze long run and short run relationships on the sustainability current account deficits in Indonesia with various macroeconomic indicators that influence it. The estimated results in the long run for Indonesia, based on the coefficient of determination (R-squared) of the ability of variables in this study explained the condition on the sustainability of current account deficit in Indonesia is 56.2015%. The current account deficits condition in Indonesia in the long run is determined by Real Gross Domestic Product with a negative influence. This condition occurs because if the country experiences an increase in gross domestic product with a relatively high percentage of other countries, then its current account will decrease. If real income increases then consumption of goods will also increase as a portion of the increase in consumption of imports, this condition caused the current account will be deficits.

The estimated results in the short run for Indonesia, based on the coefficient of determination (R-squared) of the ability of variables in this study explained the condition on the sustainability of current account deficit in Indonesia is 53.9559%. The current condition of the current account deficit in Indonesia is determined by all the independent variables used in this study. This condition occurs because in the short run stability of macroeconomic indicators such as Real Gross Domestic Products, Real Effective Exchange Rate, Open Economics, and Inflation is influenced by many things that come from internal factors and external factors, so that Indonesia as a developing country involved in trading activities international are vulnerable to this.

The current account deficits are inseparable from the macroeconomic indicators. Indonesia should focus on the variable that has the greatest effects in the long run and short run to keep its stability for current account balance. Based on the coefficient value of the long run estimation result that the biggest effect on the sustainability current account deficits in Indonesia is the Real Gross Domestic Products and the biggest effect for the short run is Real Effective Exchange Rate. Based on this, the government of Indonesia should prioritize to maintain the stability of Real Gross Domestic Products and Real Effective Exchange Rate so that current account deficits can be controlled. If Indonesia is able to maintain the stability of the macroeconomic indicators, overall for Indonesia will have stable condition of the current account balance.

REFERENCES


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Comparative Analysis of Physico-Chemical Parameters for Snow, Ground and River Water of Leh District

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Abstract- Water quality plays a very important role in deciding its suitability for Human consumption and other uses. The physico-chemical parameters of water are the main criteria in determining its quality. This paper deals with study of physico-chemical parameters of different water sources as snow, ground and river water of Leh district. The study was carried out in the month of March 2017. The analysis of collected water samples was carried out using known standard methods. Results were compared for water collected from different sources and it was found that contamination level with respect to physico-chemical and mineral parameters for snow water was less when compared to Leh groundwater, Thiksey monastery and Karu river water. Iron concentration was above the desirable level in all the collected samples. Hence it is recommended that the water should be properly treated for Iron removal before consumption.

Index Terms- Physico-Chemical Parameters, Leh district, Snow, River

I. INTRODUCTION

Water is one of the vital components of our life as it is needed for drinking, irrigation, other household/domestic and industrial activities. Among the various needs of water the most essential need is drinking. Generally surface and ground water are two major sources for supply of drinking water. Surface water comes from lakes, reservoirs and rivers. Groundwater comes from wells/aquifers. Nowadays drinking water demand is on the rise due to increasing population and depleting fresh water sources. Initially groundwater was considered as uncontaminated but with time its quality is getting deteriorated due to different natural and anthropogenic causes. Among the anthropogenic causes are heavy use of fertilizers and insecticides for increasing crop yield as well as other industrial effluents. Consumption of contaminated water leads to several water borne diseases in human population.

Leh lies in a cold desert, if seen from the perspective of surrounding area, it is called oasis in a desert since it is surrounded by icy cold mountain range of the Himalayas, one of the highest in the world. From geographic point of view this region is strategically very important since it lies near to Indo-Pakistan, Indo-China border and hence deployment of huge armed forces is there for protecting the border areas. During winter season, the tough climatic conditions pose a challenge to the soldiers when the temperatures decline rapidly far below zero degree centigrade. Among the challenges faced by defence and civilian population the most severe one is availability of drinking water. At extreme altitudes, most of the water supply systems fail at subzero temperatures and in absence of any power supply the only viable alternative of drinking water which is in abundance is snow.

So far according to literature reports drinking water quality has been studied for Leh region by Dolma K et al (Dolma K et al, 2015) [1] and Bharti V. K et al (Bharti V. K et al, 2017)[2]. They have carried out baseline study of drinking water quality of samples collected from different sources such as ground, river, tube well and spring of Leh District. In this view it was a thought of interest to study the physico-chemical parameters of snow melted water as it has not been included in previous studies.

Hence, In this study we have carried out the analysis of physico-chemical properties of melted water from snow collected from high altitude of the order of 12000 to 18340 ft in Leh region of India, along with supply water and river water of the same district. The properties of snow melted water was compared with supply water as well as river water for assessing its quality with respect to pH, TDS, turbidity, conductivity and salinity, along with essential minerals and contaminants like iron and fluoride.

II. EXPERIMENTAL

A total of 18 samples were collected from nine different locations (Fig 1&2) of Leh (two samples were collected from each location) in the month of March 2017. Prior to sample collection all the plastic bottles were thoroughly washed and dried. The bottles were rinsed with water sample to be collected at the time of collection. For snow the samples were collected as such in dried bottles. Proper labeling was done after collection. Parameters like temperature and pH were measured at the sampling site using a thermometer and portable pH meter. During samples collection, the latitude, longitude and altitude of all the sampling sites along with the source were recorded [Table I] using a GPS system (Model: Garmin GPS 72H). Sampling location map is made by Google earth 6.1 and QGIS 2.12 software (Fig. 1).
The bottles were then taken to the laboratory in an icebox to avoid unusual change in water quality and stored at 4°C for further analysis of turbidity, TDS, conductivity, salinity, mineral properties like presence of cations and anions, total hardness, iron and fluoride as per standard procedures used for water analysis (APHA, 2005) [3]. AR grade reagents, deionized water and borosil glasswares were used for preparation of solutions. pH was estimated by digital pH meter (EuTech pH 610). TDS, electrical conductivity and salinity were measured by using (Multiparameter EuTech CD 650). Turbidity was determined by using turbidity meter (EuTech TN 100). Mineral properties like presence of cations and anions were determined by using Ion Chromatograph (Metrohm 882 Compact IC Plus). Total hardness was determined by complexometric titration using Erichrome Black-T as an indicator (EDTA method). Iron was estimated via colorimetric method by using UV-Vis spectrophotometer (Analytikjena SPECORD 205). Fluoride was estimated by ion meter. (Thermoscientific ORION 4 STAR)

III. RESULTS AND DISCUSSIONS

Fig 1 and 2 show water collection area along with points of collection (visual photographs, 2D & 3D images). The details of coordinates as well as information regarding source and altitude are shown in Table 1. Thus water samples were collected from three sources i.e. snow, underground supply water from Leh as well as Thiksey monastery and Karu river. The range of altitudes was from 11480 to 18340 ft.

Physico-chemical and mineral analysis of all the collected water samples from different locations of Leh was carried out and results are shown in Table 2, 3 and 4 along with comparison with BIS standard values. The results obtained from this study are discussed below.

All the collected water samples were colorless and odourless. At the time of sample collection, the air temperature ranged between -10°C to 10°C. For snow samples the temperature recorded was -4°C.

pH:

The pH of any water body is a measure of its acidic or basic property. It is one of the very important parameters in determination of water quality since it affects solubility of various metallic contaminants. Fluctuations in pH value of any water body are related to discharge of industrial contamination or human waste or sometimes due to biological activity. The change in pH further leads to changes in physico-chemical parameters of water. Higher pH includes the formation of trihalomethanes which are toxic (BIS-10500, 1981)[4]. Alkaline pH value is witnessed due to presence of alkaline earth metals (Na, K) that interact with soluble CO forming carbonates and bicarbonates which result in shifting the pH up over 7 (Jena et al. 2013) [5]. In the present study the value of pH is found to be normal for all sources ranging between 6.54 to 7.63. The highest value of pH 7.63 was for sample collected from Thiksey and lowest 6.54 was for sample collected from Leh.

Turbidity:

Turbidity of water is a measurement of how cloudy or murky it is. It is a good measure of water quality and is affected by a number of factors. It is caused by particles suspended or dissolved in water that scatter light making it appear cloudy. Particulate matter generally includes clay and silt, fine organic and inorganic matter, phytoplanktons, algae and other microscopic organisms (Das and Shrivastva, 2003) [6]. High turbidity being an indicator of presence of large amounts of suspended solids significantly reduces the aesthetic quality of water source (Verma et al. 2012) [7] It increases the cost of water treatment for drinking and food processing. Generally turbidity causing factors can be either natural or human induced. Natural factors include erosion from upland, stream channel movement etc. Human activities can also be a cause of erosion. Although the substances resulting in high turbidity may not be intrinsically harmful, but their effects are because turbidity interferes with disinfection during water treatment and provides a medium for microbial growth. These microbes include bacteria, viruses and parasites which cause symptoms such as nausea, cramps, diarrhea etc.

In this study the turbidity of collected water samples is in the range of 0.12 to 75.5 NTU which exceeded the permissible value. It is observed that snow melted water showed high turbidity compared to water collected from Karu river which showed lowest turbidity. It may be due to human activities and presence of suspended particulate matter.

Total Dissolve Solids (TDS):

TDS is in general proportional to degree of pollution. It is considered as an indicator of salinity of water and describes all solids dissolved in water. TDS comprise inorganic salts (Ca, Mg, Na, K, HCO₃⁻, Cl⁻ and SO₄²⁻) and some small amount of organic matter dissolved in water. TDS can also be influenced by changes in pH because it leads to precipitation of some of the solutes as well as affects solubility of suspended matter. Water containing more than 500mg/L of TDS is not considered desirable for drinking water supplies. (BIS-2296, 1982; Shrinivasa Rao and Venkateshwaralu, 2000; Murhekar, 2011) [8]-[10]. In this study TDS of collected water samples varied from 6.45 to 627.0 mg/L which is above the permissible limit of BIS/WHO standards. The minimum value was recorded for snow melted water and maximum for Thiksey monastery ground water.

Electrical Conductivity (EC):

EC is a measure of ability of water to conduct electrical current which provides a general indication of water quality with respect to amount of total dissolved solids such as presence of cations and anions, their concentration and mobility etc. Thus as the concentration of dissolved salts increases, electrical conductivity also increases. Conductivity of water also varies with changes in temperature. In the present study the conductivity of collected water samples is found to be in the range of 5.56 to 537.5 μS/cm.

Salinity:

Salinity of any water body is correlated to its TDS, since it indicates the presence of dissolved solids. Small amounts of dissolved salts in natural waters are required for the life of aquatic plants and animals but higher quantities lead to severe health issues like increased blood pressure (BP) or hypertension.
leading way to cardiovascular diseases (CVD) (McMichael, 2003) [11]. The minimum salinity value was recorded at Khardung La with 15.15 mg/L and maximum at Thiksey with 626.7.

**Total Hardness:**

Total hardness (TH) is the property of water which prevents the latter formation with soap leading to precipitation of soap by forming of complex with cations present in water (Jena et al. 2013 ) [5]. It is caused due to the presence of cations like Ca²⁺, Mg²⁺, Fe⁺⁺ etc. TH of collected water samples was observed to be in the range of 15 to 225mg/L. Snow samples showed lower values whereas Thiksey monastery ground water showed highest value.

**Anions: F⁻, Cl⁻, PO₄³⁻, SO₄²⁻, NO₃⁻**

Fluoride is required in low concentration by human body to prevent dental caries but very high concentration of fluoride causes fluorosis which affects the teeth and bones. Moderate amounts lead to dental effect but long term ingestion of large amounts result in severe skeletal disorders (Bharti et al. 2017) [12]. In the present study the concentration of fluoride in water samples was observed to be in the range of trace amounts to 1.24mg/L which is within the permissible limit of BIS standard. Chloride generally occurs in natural, surface and ground water in varying concentrations. It is not harmful to human beings unless present in high concentration. At high concentrations (>250mg/L) it imparts a salty taste to water along with increasing the corrosive property of water. Chloride usually comes from inorganic salts like NaCl, KCl, CaCl₂ and MgCl₂ which may be provided by soil, industrial, municipal and animal waste (Gopalkrishna, 2011) [13]. In the present study Cl⁻ concentration is below the permissible level of BIS guideline. The Cl⁻ in the study area varied between 2.85 to 28.75mg/L. This clearly indicates that all water samples of study area are within desirable limit and hence fit for consumption.

Nitrate is found in surface and ground water due to human activities like excessive use of nitrogenous fertilizers in agriculture as well as disposal of domestic and industrial waste (Tank and Chippa, 2013 ; Puckett and Cowdry, 2002) [14-15]. Excess of nitrates consumed by humans particularly infants is likely to cause health hazards and may lead to Methaemoglobininemia (blue baby) disease. In our study distribution of nitrate in water samples is observed to be in the range of trace amounts to 0.83mg/L which is well below the permissible limit in all sources of water.

It has been reported that Sulphate occurs naturally in water because of leaching from gypsum and other common minerals (WHO, 2003) [16]. The sulphide minerals add the soluble sulphate into the groundwater through oxidation process. In the present investigation sulphate concentration ranged from trace amounts to 64.42 mg/L. Samples collected from ground water Leh, Karu river and Thiksey monastery showed very levels of sulphate contamination which may be due to leaching from rocks of this region or anthropogenic causes.

Phosphate occurs in surface or ground water due to discharge of domestic waste, detergents, fertilizers, insecticides and industrial wastes. Discharge of municipality sewage also results in high amount of phosphate (Benzamin, et al. 1996) [17]. The phosphate content in most of the study area was detected in trace amounts. The samples were collected during March when it was snow all over hence most of the samples showed no phosphate contamination. However the remaining samples showed phosphate concentration in the range of trace amounts to 0.93mg/Lit. Comparative high values in some of the collected samples may be due to rain, surface water runoff, agriculture run off etc.

**Cations: Na⁺, K⁺, Ca²⁺, Mg²⁺, Fe³⁺**

Sodium is one of the most abundant elements of the alkali earth group in the earths crust. Sodium concentration plays an important role in evaluating the groundwater quality for irrigation because its presence causes an increase in the hardness of soil as well as a reduction in its permeability (Tizani, 1994) [18]. For low level of sodium in any area the cultivation might be affected with low production. In our study sodium was present in the range of trace amounts to 9.12 mg/L. higher values were observed for samples collected from Thiksey monastery.

Potassium is an essential element for both plants and animals. Major source of potassium in natural fresh water is weathering of rocks but the quantities increase in the polluted water due to disposal of waste water (PATIL and PATIL, 2010 ))[19]. Very high potassium concentration may be harmful to human nervous and digestive system. In the present investigation potassium concentration ranged from trace amounts to 0.69 mg/L.

The range of concentration of Ca, Mg and Fe cations was observed to be from trace amounts to 0.82mg/L, trace amounts to 25.03mg/L and 0.56 to 0.81mg/L respectively. Concentration of Ca was comparatively higher in some snow samples whereas Mg concentration was higher in river, Leh and Thiksey monastery samples. Iron was present in almost all samples above the desirable limit of 0.30mg/L but below 1.0mg/L.

**IV. COMPARISON OF DIFFERENT WATER SOURCES**

**Snow melted water**

Samples 1-6(a,b) are snow melted water samples, altitude varying from 12,744 (sample no. 1) to 18,340ft (sample no. 5). pH for all the samples was observed to be within permissible limit varying from 6.6 for sample no. 5b and 6a to 7.5 for sample no. 1a respectively. Turbidity is in the range 2.89 for 1a (12,744ft) located near Leh to 75.5 for 2a (13,450ft) within the same location. Such a huge variation of Turbidity values for snow samples could not be understood. However from the photographs for snow collection of samples Fig (1a-d) it becomes clear that the mud beneath the snow which is clearly visible as patches between snow covered areas may be responsible for high turbidity values for the melted water from the snow. So the samples were kept undisturbed for 24hr. The turbidity of all the collected snow samples came drastically down (<1NTU) in the range 0.15 to 0.86NTU.

This shows that initially observed high turbidity values may be due to suspended impurities, mud etc which settled on keeping the samples undisturbed. Hence it can be assumed that turbidity of decanted snow melted water samples was within desirable limit as per BIS standard.

The TDS was observed to be in the range of 6.45 (5a sample, ht 18,340ft) to 59.5 (1b sample, ht 12,744ft). Hence
results show that snow melted water from the highest point of collection does not contain any dissolved matter which is reflected in its very low TDS value whereas samples from lower heights show some dissolved impurities although both values are within the desirable limit as per BIS standard.

Total hardness values range from 15 to 30 which signify presence of trace quantities of alkaline earth metals salts.

With respect to cationic contamination it was observed that sample 1b (ht 12,744ft) showed presence of Na, K, Ca and Mg ions (max conc) in amounts 0.69, 0.33, 0.82 and 0.17mg/L respectively. Sample 2a also showed presence of K and Ca ions in 0.18 and 0.69mg/L conc. Some more samples 3b, 6a and 5b also showed presence of very small amounts of Na, Ca and Mg. Surprisingly snow melted water showed presence of Fe in the range 0.57 to 0.81mg/L which may be due to leaching from beneath the surface soil and rocks.

Thus, on average it can be stated that the concentration of all the present cations is either within the permissible or desirable limit.

Regarding anionic contamination F was not observed in any of the samples. Cl was in range 2.85 for 1a to 9.27mg/L for 4b. Phosphate was in range 0.05 for 2a to 0.16 for 6a, sulphate was in the range of trace amounts to 0.19 for 5b and nitrate in the range from trace amounts to 0.09 for most of the samples.

All the physico-chemical analysis results show that maximum obtained values are within desirable limit or if exceed are still within permissible limit. None of the results show high deviation from permissible values subject to melt water has to be consumed after sedimentation and decantation. Hence under above conditions water is fit for consumption.

Groundwater Leh and Thiksey monastery

Samples 7a and 7b were collected from groundwater Leh and 9a and 9b from Thiksey Monastery. pH was observed to be in the range of 6.5 to 7.6. Turbidity was also in the range 2.3 to 51NTU. TDS ranged from 207 to 627. Thiksey monastery sample showed higher TDS with respect to permissible limit but is still within permissible limits. Total hardness ranged from 90 to 225mg/L. These values signify presence of alkaline earth metal cations. IC analysis confirmed the presence of sodium in range 2.5 to 9.1mg/L for groundwater Leh and Thiksey monastery respectively. Magnesium was also observed in the range 15 to 25mg/L. Hence it can be assumed that high concentration of Mg may be responsible for hardness of water. The iron concentration was in range 0.56 to 0.58mg/L. Iron concentrations have exceeded the desirable limit of 0.3mg/L.

Among the anionic species fluoride was found in Leh groundwater samples in conc range 0.12 to 1.24. Chloride was present in range from 16 to 28mg/L. Phosphate was observed in range trace amounts to 0.37mg/L and sulphate from 12 to 64mg/L. Nitrate was present in trace quantities.

As per the literature reports Bharti et al have reported hardness values as high as 300 for the tube well water samples of Leh district [34°07’46.27” N and 77°31’33.40”E Ht 10,547ft]. According to their hardness contributing ion was calcium but according to our results main contributing ion is Mg as Ca was present in trace quantities.

River water

Samples 8a and 8b are river water samples. The height was 13,490ft. The collected water samples showed pH from 7.3 to 7.4, turbidity in the range of 0.12 to 57.40. TDS was from 224 to 287mg/L. Total hardness was observed to be in range 90-150mg/L. Among anions fluoride, phosphate and nitrate were present in trace quantities or <1mg/L. Chloride was observed in range from 14.6 to 21.7mg/L and sulphate from 32.51 to 47.50mg/L. Among the cationic impurities K and Ca were present in trace quantities, Na in the range from 2.05 to 3.72mg/L and Mg from 3.23 to 13.45mg/L. Iron was observed to be in the range of 0.71 to 0.74mg/L.

V. Conclusion

In the present study the values for different physico-chemical parameters in most of the collected snow and water samples were found within the desirable or permissible limit as prescribed by BIS standards. The snow melted water samples showed high turbidity values which came down after leaving them undisturbed overnight. TDS for nearly all the samples was within desirable limit except for Thiksey monastery groundwater sample which was within permissible limit. Presence of small amounts of chloride and sulphate was observed in most of the samples but far below the desirable limit. Presence of cationic minerals as Na, K and calcium was observed either in trace quantities or in very low concentration except Mg which was present in higher quantities compared to other cations but still within desirable limit. Iron was found in concentration above desirable limit for all the collected samples. Hence it is recommended that the water should be properly treated for Iron removal before consumption.

Acknowledgement

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Figure 1: Location map of water collection points (2D & 3D image)
Figure 2: (a) Snow collection spots
Figure 2: (b) Groundwater Leh collection point and (c) Thiksey Monastery collection point
Figure 2: (d) River water collection points

Table 1: Details of sampling sites and sources of collected water samples

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Sample code</th>
<th>Water source/ Locality</th>
<th>Latitude</th>
<th>Longitude</th>
<th>Altitude</th>
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<td>Snow</td>
<td>34.184832</td>
<td>77.596092</td>
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<td>2.</td>
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Table 2: Physico-chemical quality of collected water samples

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<th>Sample No.</th>
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<th>Conductivity (µs/cm)</th>
<th>TDS (mg/L)</th>
<th>Turbidity (NTU)</th>
<th>Salinity (mg/L)</th>
<th>Total Hardness (mg/l)</th>
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<td>207.70</td>
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Table 3: Anionic composition of water collected from different sites

<table>
<thead>
<tr>
<th>Sample code/Property</th>
<th>F(^-) (mg/L)</th>
<th>Cl(^-) (mg/L)</th>
<th>PO(_4)(^-) (mg/L)</th>
<th>SO(_4) (mg/L)</th>
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Table 4: Cationic composition of water collected from different sites

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Emotional Maturity Variation among College Students with Perceived Loneliness

Aleena Maria Sunny, Julia Grace Jacob, Neha Jimmy, Drishya Theres Shaji, Cilvania Dominic

" Department, Institute Name
"" Department, Institute Name, if any

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Abstract- The study intends to measure the emotional maturity variation between day scholars and hostellers who are affected by the feeling of perceived loneliness, within 18-20 age group. The sample includes 60 hostellers and 60-day scholars consisting of 30 boys and 30 girls respectively under each group. To get the sample of students with perceived loneliness, Perceived Loneliness Scale (L-SCALE) developed by Dr. Praveen Kumar was used. The tool used for measuring emotional maturity was Emotional Maturity Scale (EMS) by Dr. Yashvir Singh. To compare the mean scores on emotional maturity of hostellers and day scholars, Independent Sample t test was used. Results revealed that there is no significant difference in emotional maturity between hostellers and day scholars. However, significant difference was found between emotional maturity of girls and boys. The study revealed yet other interesting observations and findings that endeavor scope for further research in this topic.

Index Terms- Perceived loneliness, Emotional maturity

I. INTRODUCTION

Emotional maturity is a subjective characteristic of an individual which varies across different age groups and gender. A mature individual is capable of handling stressful life circumstances effectively. Emotional maturity is something on which individuals can constantly work over and improve. It enables individuals to create the life they desire. When an individual is faced with difficulties it is his/her level of emotional maturity that determines his/her ability to cope. A mature individual is one who has developed intellectually, emotionally and spiritually.

Loneliness is also a subjective feeling. Being alone is different from loneliness. One may perceive himself/herself as lonely even when surrounded by friends and loved ones. Loneliness is something everyone feels at some point of life. For instance, when moving away from home and homeland etc. Human beings have a fundamental need for belongingness. If this need is not satisfied they may experience problems like anxiety, frustration, emotional disturbances, depressions and various other psychosomatic difficulties. Surprisingly, one study in United Kingdom, which surveyed millions of people, showed that one in ten people didn’t feel that they had a single friend. (Topping, 2016)

Transition from school to college is a complex process for most of the students. Adjusting to college life brings changes in values and attitudes of most of the students. It is also a period during which students are in high for their belongingness need. The new circumstances can either satisfy their need or things may become more worse. This may depend on the level of emotional maturity of students. For an emotionally mature student going to college, brings a chance to encounter new friends, opportunities, new culture and new experiences which in turn results in his or her overall growth and development.

Students are mostly mature intellectually but not emotionally. Emotional maturity enables students to understand and manage one’s own and others emotions effectively. Adolescence is a period of drastic changes both biologically and mentally. During this period one get excited very soon. Their mood may soon change from high to low or vice versa. This can be a factor of lack of emotional maturity. Therefore, knowing the level of emotional maturity among students enables professionals to give proper educational guidance.

In the age of social media, students are provided with more information that makes them feel overloaded. Overloading students with information and knowledge do not make them mature emotionally. They may feel frustrated and may have emotional backups and social media enables students to have more friends and relations than ever before. But it only has short term effects on one’s mental well-being. Loneliness expert Cacioppo said that use of social network as a substitute for human contact is like eating celery when one is hungry. It has only a momentary benefit and is not the real nourishment. Students who are emotionally mature create and maintain intimate bonds and relations.

Lokniti-CSDS Youth Survey in India in 2016 reported that around 4 out of 10 youngsters who are studying, felt regular or occasional depression. Perceived loneliness can be a reason for this as 30% sample reported feeling of loneliness. In the same survey 6% of students reported that they felt like committing suicide. (Kumar, 2016) This is a large number. Emotional immaturity could be a reason for this. An emotionally mature student may think over and over about his/her problems and takes proper coping mechanisms.

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They may not choose for the option suicide. So a study on emotional maturity and perceived loneliness is relevant in providing proper educational guidance and assistance for students.

Some students move from their homeland to other areas for higher education. This may leave a void in their minds which pave the way to feelings of isolation and loneliness. The level of emotional maturity to an extent determines their ability to handle this situation effectively. It can also be influenced by gender differences. It is also seen that college students are more vulnerable to emotional stress arising from academic pressures, family problems, complications in romantic relationships etc. If their need for affection, attention is not satisfied, it may lead to many psychological problems. So, it was important to study emotional maturity and aspects of perceived loneliness among college students.

II. REVIEW OF LITERATURE

The study intends to measure the emotional maturity between day scholars and hostellers who are affected by feeling of perceived loneliness; within 18-20 age group. Here we take a different approach, describing emotional maturity as a byproduct of perceived loneliness. Emotional maturity is a subjective personal characteristic varying across all age groups including adolescents. Perceived loneliness is especially acute during adolescence, because the experience of physical isolation and social isolation, and changes in the way that each are perceived, based on the emotional maturity of each individual. Identifying the phenomena of emotional maturity and perceived loneliness as inevitable aspect of student growth and development is important. In the present circumstances, youth as well as children are facing difficulties in life. These difficulties are giving rise to many psycho-somatic problems such as anxiety, tensions, frustrations and emotional upsets in day to day life. So, the study of emotional life is now emerging as a descriptive science, comparable with anatomy. One is expected to have higher emotional maturity in order to lead an effective social life. It is also true that our behavior is constantly influenced by the emotional maturity level that we possess. Especially, the adolescents who are observed to be highly emotional in their dealings need to be studied with respect to their feeling of being lonely. The study is vital in educational guidance and counseling of college students.

Perceived loneliness

In 2013, Journal of adolescence published an article on “Understanding loneliness during adolescence: Developmental changes that increase the risk of perceived social isolation” (Laursen & Hartl, 2013) They understood loneliness as a product of perceived social isolation. They defined perceived social isolation as the awareness of unwanted social isolation, which can be prompted by or lead to social pain. Adolescent egocentrism is a largely discredited notion that adolescents are obsessed with themselves and believe that their personal experiences are unmatched by those of others. Expectations for autonomy and demands for the individuation prompt changes in social relationships attained at a time when adolescents are cognitively and physiologically vulnerable to perceptions of social isolation. A rapidly changing social world produce more physical isolation and opportunities to experience social isolation while in the presence of others.

Research on “Perceived social isolation and Cognition” (Cacioppo & Hawkley, 2009) indicates that perceived social isolation is a risk factor for, and may contribute to, poorer overall cognitive performance, faster cognitive decline, poorer executive functioning, more negativity and depressive cognition, heightened sensitivity to social threats, a confirmatory bias in social cognition that is self-protective and paradoxically self-defeating, heightened anthropomorphism, and contagion that threatens social cohesion. The study also asserted the fact that differences in attention and cognition impact emotions, decisions, behaviours, and interpersonal interactions that can in turn contribute to the association between perceived social isolation and cognitive decline and between loneliness and morbidity.

A cross-sectional study “The effect of social isolation on cognition performance in older adults” (Whitehouse, 2013) examined the influence of social isolation on cognitive performance among older adults aged 65-84 years old. This study examined the impact of four different types of social isolation (social loneliness, emotional loneliness, perceived social support and objective social isolation) on global cognition and cognitive domains. Results showed that various forms of social isolation may be differentially important for cognitive performance in the older adult, with social loneliness the only measure of social isolation that influences cognition. The results also suggested that if a form of social isolation affects cognition, the different cognitive domains such as global cognition, fluency, language and visuospatial ability will respond in a similar pattern. Explanations of why social loneliness influences cognition is discussed.

Adolescents now live in a technological world where, by using a mobile phone they have greater opportunity to interact with people almost everywhere. Study on “Loneliness and Mobile Phone” in a sample of 527 university students who are from different departments, have shown that more the time adolescents spent on mobile phones, less will they engage in face to face interactions. This situation makes them experience perceived loneliness (Tan, Pamuk, & Dönder, 2013). A similar study conducted on “Social Media Use and Perceived Social Isolation Among Young Adults in the U.S” with a sample of 17787 U.S adults of age 19-32 showed that individuals with high social media usages seem to feel more socially isolated than their counterparts with lower social media usages. (Primack, et al., 2017)

In 2009, a study “Social Disconnectedness, Perceived Isolation, and Health among Older Adults” (Cornwell & Waite, 2009)was conducted with an effective sample of 2910 respondent. Using population-based data from the National Social Life, Health, and Aging Project, they combined multiple indicators of social isolation into scales, assessing social disconnectedness (e.g., small social network, infrequent participation in social activities) and perceived isolation (e.g., loneliness, perceived lack of social support). They examined...
the extent to which social disconnectedness and perceived isolation have distinct associations with physical and mental health among older adults. Results indicated that social disconnectedness and perceived isolation are independently associated with lower levels of self-rated physical health.

Emotional Maturity

In the recent year, a study “Emotional Maturity of adolescents in relation to intelligence, academic achievement and environmental catalysts” (Majinder, 2001) was done on a sample of 356 eleventh standard students selected on the basis of multistage randomisation technique. The analysis of the data revealed that there is a positive correlation between emotional maturity and general intelligence which implies that students having high I.Q level have high emotional maturity in contrast with those with low I.Q level (having low emotional maturity) and that there is no significant relationship between emotional maturity and academic achievement. Another major result stated was that the physical, psychological, school and social environment of the adolescents are closely associated with their level of emotional maturity.

Another environmental factors such as gender and working status of the mother did not prove to impact emotional maturity of the adolescence. One major finding of this study was that the emotional maturity of hostellers and day scholars had no significant difference. This is of great relevance to our present study.

Another study (Gakhar, 2003) which contradicts the above specified one, probes into the relationship between emotional maturity and self-concept on academic achievement of 200 students at secondary stage. A significant negative correlation was found between self-concept and emotional maturity. A negative correlation was found between academic achievement and emotional maturity. There is significant difference in the emotional maturity of boys and girls as well as that of students from urban and rural areas. However, in this study too, there weren’t any significant difference in the emotional maturity of students who live in hostels and those who are day scholars.

In the year 2006, a research was conducted on (Bansibihari & Sarwade, 2006) effect of emotional maturity of teachers (of different secondary school of Nandurka and Dhule district of Maharashtra) in their teaching and it was found that female teachers are emotionally more mature than male teachers and have more effective teaching. Henceforth, this study also helps us to infer that gender of an individual affects his or her emotional maturity.

A study conducted by P.K. Nanda and Asha Chawla in the preceding year (2007) done on 60 randomly selected college going girls of age 17-22 concluded that girls of joint families were emotionally stable compared to those living in nuclear families. The study asserted the fact that joint family system has a great impact on emotional stability. It might be due to the reason that in joint family there is more opportunity for disclosure of pent up emotions and more adults to help the young ones through stressful times unlike in nuclear family where there are less adults and most of the mothers working. Thus, we can tell that home environment and living conditions for sure affect one’s emotional maturity (Nanda & Asha, 2007).

Study on (emotional maturity and coping strategies among the students pursuing rehabilitation, 2013), studied in August 2013 proved that there is a relationship between people's emotional maturity and coping methods they prefer. Less emotionally mature people tend to prefer rather primitive and often inefficient coping methods, while more mature people lean towards more sophisticated and more useful methods. The results indicating relation between emotional maturity has correlation with confronted coping and positive reappraisal coping. There is no significant difference in level of emotional maturity and ways of coping among the students with respect to their gender. There is significant difference found in seeking for social support as a way of coping, among students.

In the same year another study on emotional maturity and self-concept of students of higher secondary level (Panimalar, Sasikumar, & Fathima, 2013) showed significant difference in emotional maturity of male and female students which helps us to conclude that gender does in fact affect a person’s emotional maturity. The study also stated that the emotional maturity of a student was not affected by the facts like his family being nuclear or joint, factors like parent’s occupation, urban-rural home environment and the soft friendly nature of parents. This finding again evokes contradiction to studies in previous years.

Research was conducted on emotional maturity, self-confidence and academic achievement of adolescents in relation to their gender and urban-rural background by Krishnan Lal in the year 2014. One of the major findings of the study was that there is significant difference between the male and female adolescents on emotional maturity. The urban and rural adolescents show similarity on emotional maturity but there is difference in self-confidence, the rural adolescents showing higher self-confidence. On the academic achievement front, the urban adolescents stand better than the rural adolescents. (Krishnan, 2014)

A study was conducted on emotional maturity among the post-graduate students by Kalaiselvan. The sample of the study comprised of 160 postgraduate students, studying at Bharathidasan University College Perambalur. The researcher has used purposive sampling method to collect the data from 50 respondents. Questionnaire method was adopted to collect the data regarding emotional maturity of the respondents. The major findings of the study revealed that 45.5 per cent of the respondents have moderate level of emotional maturity, 30.0 per cent of the respondents have high level of emotional maturity and 24.2 per cent of the respondents have low level of emotional maturity. The study also suggested that marital status of the students may affect the emotional maturity. The researcher concluded that emotional maturity of the students was much influenced by the department they belong to and educational level of their mothers. Thus, it is evident here that emotional maturity is not only the effective determinant of personality pattern, but also helps to control the growth of individual development. (Kalaiselvan, A study on emotional maturity among the post-graduate students, 2016)

Finding of the study linking Emotional Maturity to stress and Self confidence in the year of 2016 on a sample of 105 students of standard 11-12 concluded that adolescents with high emotional maturity have significantly high stress and self-confidence.
when compared to those with low emotional maturity. The scales such as emotional maturity (Singh and Bhargav, 1994), Self Confidence Inventory (Rekha Agnihotri, 1987) and Students’ Stress Scale (Deo, 1997) were administered on the selected sample. The study also stated that sex of adolescents does not influence their stress and self-confidence. Adolescents with high emotional maturity showing significantly high stress may be attributed to the fact that naturally the emotionally matured people are highly sensitive and more concerned to the happenings of the world and get themselves involved in each and every aspect of life which in turn makes them to feel more stressful. Similarly, adolescents with high emotional maturity have better ability of managing, directing and controlling themselves in each and every action thus results in their high self-confidence. (Pastey & Aminbhavi, 2006)

As the above studies in all these years gives inconsistent results with respect to questions regarding whether emotional maturity is affected by urban-rural background and gender, there is more scope for research to confirm these aspects.

Emotional Maturity and Perceived Loneliness

A study on “Adjustment, emotional control and perceived loneliness among adolescents” (Agarwal, 2014) held with a randomly selected sample of 120 adolescents, aimed to study the effect of type of schooling and gender on adjustment, emotional control and perceived loneliness, showed that there were no significant difference between day scholars and hostellers in terms of emotional control, which implies that type of schooling didn’t have an effect on emotional control of adolescents. Type of schooling significantly affected perceived loneliness of adolescents. Hostellers were found to experience more perceived loneliness in comparison to the day scholars. But there was no significant difference found between males and females in terms of their emotional control, and perceived loneliness which implies that gender of participants didn’t have an effect on emotional control of adolescents and their perceived loneliness as well.

Study on “Emotional maturity among senior secondary school students in relation to their self-esteem, home environment and mental health” (Singh, 2011) aimed to find out the relationship between emotional maturity of senior secondary school students and their self-esteem. The sample consisted of 400 students of class XI and XII in the age ranging 17 to 18 years. The study concluded that students who received rewards, nurturance and permissiveness at home have better emotional maturity. Students who experienced more control, protectiveness, punishment, deprivation of privileges, conformity, rejection and social isolation were found to possess lesser emotional maturity. A positive and significant correlation was found between emotional maturity and self-esteem; emotional maturity and mental health which indicates that higher the self-esteem and better the mental health, higher will be the emotional maturity. A negative and significant correlation was found between emotional maturity and social isolation as a dimension of home environment which indicates that with the increase in social isolation at home there will be decrease in emotional maturity. This finding can be attributed to understanding that emotional maturity experienced by hostellers who are deprived of rewards, nurturance and permissiveness due to the rules and norms of the hostel surrounding.

Certain studies among all these above specified ones revealed that children who experienced good home environment have better emotional maturity but it is in contradiction with findings of other studies which stated that hostellers were emotionally more mature as compared to non-hostellers. Research on gender differences in development of autonomy reveals several inconsistencies. So, our study aims to clarify these inconsistencies.

III. METHODOLOGY

The process of data collection was done in two levels. At the first level, Perceived Loneliness Scale (L-SCALE) questionnaires were administered on the target population of 18-20 age group college students and their scores were measured. The students who scored high on perceived loneliness were taken as the sample population. At the second level, Emotional Maturity Scale (EMS) questionnaires were administered to the sample population and scores were interpreted and results compared.

Problem Statement
Hostellers will be more emotionally mature than day scholars.

Objectives
• To check the emotional maturity difference between hostellers and day scholars.
• To check the emotional maturity difference between girls and boys.

Research Design
Quantitative exploratory survey research design.

Variables
Independent variable: Perceived loneliness of hostellers and day scholars.
Dependent variable: Emotional maturity of hostellers and day scholars.
Theoretical Definitions
Perceived loneliness is a complex and usually unpleasant emotional response to isolation or lack of companionship which can be felt even when surrounded by other people. (Sahu, K; Gupta, D, 2016)

Emotional maturity can be defined as the ability to identify, control, and display appropriate emotions as per situation. (Simon, 1974)

Operational Definitions
Perceived loneliness is a subjective feeling of lack of connectedness and dissatisfaction in social contact despite having good social relations.

Emotional maturity is the ability to empathise, share, listen, take responsibility for one's own behaviour, care about the feelings and needs of others and manage one’s own feelings without being affected physiologically or psychologically.

Hypothesis
There is no difference in the emotional maturity level between hostellers and day scholars.

Sample
College students within age group 18-20, who were studying various subjects in an arts and science college within Kottayam zone of Kerala, were chosen as the population of the study. The study consisted of a sample of 60 day scholars and 60 hostellers (both boys and girls in each category). Perceived Loneliness scale (L-SCALE) questionnaires were administered as the screening tool to find out perceived loneliness among college students. Students who scored high (i.e., above 107) for this questionnaire were selected as sample population. Emotional Maturity Scale (EMS) questionnaires were then administered on this sample population.

Sample Size
Total participant population: 120 students with perceived loneliness.
Hosteller students with perceived loneliness: A sample of 60 hosteller students consisting of 30 boys and 30 girls.
Day scholar students with perceived loneliness: A sample of 60 day scholar students consisting of 30 boys and 30 girls.

Source of sample
1 Hosteller population: Arts and science college within Kottayam district Kerala
2 Day scholar population: Arts and science college within Kottayam district Kerala

Inclusion criteria
- Students with high score on perceived loneliness questionnaire
- Students within 18-20 age group

Exclusion criteria
- Students studying in arts and science college outside Kottayam zone
- Students who could not follow English language
- Students with psychiatric complaints
- Students studying psychology courses
- Differentially abled students
- Students with other neurological conditions
- Students studying in professional colleges

Tools
Perceived loneliness scale (L-SCALE) by Dr. Praveen Kumar Jha is a standardized scale. The loneliness scale possesses fairly high reliability. It was determined by Kuder-Richardson formula and test-retest reliabilities obtained were 0.87. The validity of L-scale was established. (Praveen, 1997)

(L-Scale) is a self-report research tool which gives a holistic estimate of loneliness of an individual in a five-point Likert format. Emotional maturity scale (EMS) prepared by Dr. Yashvir Singh and Dr. Mahesh Bhargava (1999) was used to measure emotional maturity. Emotional maturity scale has a total of 48 items and is a self-reporting five-point scale. Higher the score on the scale, greater is the degree of the emotional immaturity and vice-versa. EMS Scale measure different dimensions of emotional maturity like (a) Emotional stability (b) Emotional progression (c) Social adjustment (d) Personality integration (e) Independence. The test-retest reliability of the scale was 0.75. (Yashvir & B, 1999). Validity of the scale was 0.64.

Procedure
Consent forms to participate in current study were distributed, to the target population of hostellers and day scholars. Willing participants were given Perceived Loneliness Scale (L-SCALE) questionnaire developed by Dr. Praveen Kumar, which measure scores of perceived loneliness. Students who scored high on perceived loneliness were taken as the sample of study. On this sample,
Emotional Maturity Scale (EMS) questionnaires by Dr. Yashvir Singh were administered. The scores were interpreted and results were compared.

Data Analysis

Descriptive statistics were used to analyse the sociodemographic details of the sample. To compare the mean scores on emotional maturity of hostellers and day scholars, Independent Sample t test was used, since the groups fulfilled the conditions for normality.

Ethical Considerations

- Informed consent of participant taken
- Anonymity of the participant maintained
- Confidentiality maintained
- Students studying psychology courses excluded
- No clues or Misleading information provided to the participants prior to the administration of questionnaires
- Questionnaires randomly allotted and not given intentionally to lonely people
- Participants were free to leave the study whenever they wanted
- No monitory benefits provided to participants
- Free psycho-education about overcoming perceived loneliness and effective management of emotions given, under the supervision of a professional.

IV. RESULTS

The study intended to compare the emotional maturity between day scholars and hostellers, with perceived loneliness. The participants were within 18-20 age limit. The sample was taken from an arts and science college and consisted of undergraduates studying various subjects. Out of 272 students (both day scholars and hostellers) who filled the questionnaires, 120 were found to have perceived loneliness. Emotional maturity of these 120 students consisting of equal number of day scholars and hostellers with 30 boys and 30 girls under each category, was measured and analysed.

According to Perceived Loneliness Scale (L-SCALE) developed by Dr. Praveen Kumar, students who scored above 107 were categorised to have feeling of perceived loneliness. Emotional maturity measured using Emotional Maturity Scale (EMS) by Dr. Yashvir Singh, categorised students who scored 50-80, 81-88, 89-106 and 107-240 as extremely emotionally mature, moderately emotionally mature, emotionally immature and extremely emotionally immature, respectively

4.1 Descriptive statistics

![Graph 4.1.1 Sample size](http://dx.doi.org/10.29322/IJSRP.8.5.2018.p7736)

Pie-chart showing the sample size of day scholars and hostellers, (both boys and girls) under study
Table 4.1.2 shows the number and percentage of students who were screened out to have perceived loneliness from each category which includes hosteller boys, hosteller girls, day scholar boys, and day scholar girls. The final sample of 120 consisted of 25% students representing each formerly mentioned category. From the table, it is evident that it was difficult to get hosteller girls and day scholar boys, with perceived loneliness, when compared to the other 2 categories.

<table>
<thead>
<tr>
<th>Category</th>
<th>No. of questionnaires given</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hosteller boys</td>
<td>43</td>
<td>30</td>
<td>25</td>
</tr>
<tr>
<td>Hosteller girls</td>
<td>83</td>
<td>30</td>
<td>25</td>
</tr>
<tr>
<td>Day scholar boys</td>
<td>78</td>
<td>30</td>
<td>25</td>
</tr>
<tr>
<td>Day scholar girls</td>
<td>68</td>
<td>30</td>
<td>25</td>
</tr>
<tr>
<td>Total</td>
<td>272</td>
<td>120</td>
<td>100</td>
</tr>
</tbody>
</table>

Out of 43 hosteller boys who filled the questionnaires, 30 were found to have perceived loneliness.

Out of 83 hosteller girls who filled the questionnaires, 30 were found to have perceived loneliness.
Out of 78 day scholar boys who filled the questionnaires, 30 were found to have perceived loneliness.

**Graph 4.1.2.3**

distribution of day scholar boys with perceived loneliness

Out of 68 day scholar girls who filled the questionnaires, 30 were found to have perceived loneliness.

**Graph 4.1.2.4**

distribution of day scholar girls with perceived loneliness

**Table 4.1.3 Distribution of day scholars and hostellers (both boys and girls) with perceived loneliness:**

<table>
<thead>
<tr>
<th>Category</th>
<th>No. of questionnaires given</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hostellers</td>
<td>126</td>
<td>60</td>
<td>50</td>
</tr>
<tr>
<td>Day scholars</td>
<td>146</td>
<td>60</td>
<td>50</td>
</tr>
<tr>
<td>Total</td>
<td>272</td>
<td>120</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4.1.3 shows the number and percentage of hostellers and day scholars, with perceived loneliness, including both boys and girls in respective categories. The sample of 120 students consisted of 50% day scholars and 50% hostellers, with perceived loneliness.
Out of 126 hostellers who filled the questionnaires, 60 were found to have perceived loneliness.

Out of 146 day scholars who filled the questionnaires, 60 were found to have perceived loneliness.

**Table 4.1.4 Emotional maturity variation among hosteller boys:**

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extremely emotionally mature</td>
<td>1</td>
<td>3.33</td>
</tr>
<tr>
<td>Moderately emotionally mature</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Emotionally immature</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Extremely emotionally immature</td>
<td>26</td>
<td>86.67</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4.1.4 shows the emotional maturity variation among hosteller boys. Among 30 hosteller boys, 3.33% were found to be extremely emotionally mature, 10% emotionally immature and 86.67% extremely emotionally immature.
The above graph shows the emotional maturity variation among hosteller boys. Among 30 hosteller boys with perceived loneliness, 1 was found to be extremely emotionally mature, 3 emotionally immature and 26 extremely emotionally immature.

Table 4.1.5 Emotional maturity variation among hosteller girls:

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extremely emotionally mature</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Moderately emotionally mature</td>
<td>2</td>
<td>6.67</td>
</tr>
<tr>
<td>Emotionally immature</td>
<td>5</td>
<td>16.67</td>
</tr>
<tr>
<td>Extremely emotionally immature</td>
<td>23</td>
<td>76.66</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4.1.5 shows the emotional maturity variation among hosteller girls. Among 30 hosteller girls, 6.67% were found to be moderately emotionally mature, 16.67% emotionally immature and 76.66% extremely emotionally immature.

The above graph shows the emotional maturity variation among hosteller girls. Among 30 hosteller girls with perceived loneliness, 2 were found to be moderately emotionally mature, 5 emotionally immature and 23 extremely emotionally immature.
Table 4.1.6 Emotional maturity variation among day scholar boys:

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extremely emotionally mature</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Moderately emotionally mature</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Emotionally immature</td>
<td>5</td>
<td>16.67</td>
</tr>
<tr>
<td>Extremely emotionally immature</td>
<td>25</td>
<td>83.33</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4.1.6 shows the emotional maturity variation among day scholar boys. Among 30 day scholar boys, 16.67% were found to be emotionally immature and 83.33% extremely emotionally immature.

Graph 4.1.6.1

The above graph shows the emotional maturity variation among day scholar boys. Among 30 day scholar boys with perceived loneliness, 5 were found to be emotionally immature and 25 extremely emotionally immature.

Table 4.1.7 Emotional maturity variation among day scholar girls:

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extremely emotionally mature</td>
<td>2</td>
<td>6.67</td>
</tr>
<tr>
<td>Moderately emotionally mature</td>
<td>1</td>
<td>3.33</td>
</tr>
<tr>
<td>Emotionally immature</td>
<td>4</td>
<td>13.33</td>
</tr>
<tr>
<td>Extremely emotionally immature</td>
<td>23</td>
<td>76.67</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4.1.7 shows the emotional maturity variation among day scholar girls. Among 30 day scholar girls, 6.67% were found to be extremely emotionally mature, 3.33% moderately emotionally mature, 13.33% emotionally immature and 76.67% extremely emotionally immature.
The above graph shows the emotional maturity among day scholar girls. Among 30 day scholar girls with perceived loneliness, 2 were found to be extremely emotionally mature, 1 moderately emotionally mature, 4 emotionally immature and 23 extremely emotionally immature.

**Table 4.1.8 Emotional maturity variation among hostellers (both boys and girls):**

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extremely emotionally mature</td>
<td>1</td>
<td>1.67</td>
</tr>
<tr>
<td>Moderately emotionally mature</td>
<td>2</td>
<td>3.33</td>
</tr>
<tr>
<td>Emotionally immature</td>
<td>8</td>
<td>13.33</td>
</tr>
<tr>
<td>Extremely emotionally immature</td>
<td>49</td>
<td>81.67</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td>100</td>
</tr>
</tbody>
</table>

From table 4.1.8 showing emotional maturity variation among 60 hostellers (consisting of both boys and girls), 1.67% were found to be extremely emotionally mature, 3.33% moderately emotionally mature, 13.33% emotionally immature and 81.67% extremely emotionally immature.

The above graph shows the emotional maturity variation among hostellers. Among 60 hostellers (consisting of both boys and girls) with perceived loneliness, 1 was found to be extremely emotionally mature, 2 moderately emotionally mature, 8 emotionally immature and 49 extremely emotionally immature.
Table 4.1.9 Emotional maturity variation among day scholars (both boys and girls):

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extremely emotionally mature</td>
<td>2</td>
<td>3.33</td>
</tr>
<tr>
<td>Moderately emotionally mature</td>
<td>1</td>
<td>1.67</td>
</tr>
<tr>
<td>Emotionally immature</td>
<td>9</td>
<td>15</td>
</tr>
<tr>
<td>Extremely emotionally immature</td>
<td>48</td>
<td>80</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td>100</td>
</tr>
</tbody>
</table>

From table 4.1.9 showing emotional maturity variation among 60 day scholars (consisting of both boys and girls), 3.33% were found to be extremely emotionally mature, 1.67% moderately emotionally mature, 15% emotionally immature and 80% extremely emotionally immature.

Graph 4.1.9.1

The above graph shows the emotional maturity variation among day scholars. Among 60 day scholars (consisting of both boys and girls) with perceived loneliness, 2 were found to be extremely emotionally mature, 1 moderately emotionally mature, 9 emotionally immature and 48 extremely emotionally immature.

Table 4.1.10 Emotional maturity variation among boys (both hostellers and day scholars):

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extremely emotionally mature</td>
<td>1</td>
<td>1.67</td>
</tr>
<tr>
<td>Moderately emotionally mature</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Emotionally immature</td>
<td>8</td>
<td>13.33</td>
</tr>
<tr>
<td>Extremely emotionally immature</td>
<td>51</td>
<td>85</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td>100</td>
</tr>
</tbody>
</table>

From table 4.1.10 showing emotional maturity variation among 60 boys (consisting of both hostellers and day scholars), 1.67% were found to be extremely emotionally mature, 13.33% emotionally immature and 85% extremely emotionally immature.
The above graph shows the emotional maturity variation among boys. Among 60 boys (consisting of both hostellers and day scholars) with perceived loneliness, 1 was found to be extremely emotionally mature, 8 were emotionally immature and 51 extremely emotionally immature.

Table 4.1.11 Emotional maturity variation among girls(both hostellers and day scholars):

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extremely emotionally mature</td>
<td>2</td>
<td>3.33</td>
</tr>
<tr>
<td>Moderately emotionally mature</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Emotionally immature</td>
<td>9</td>
<td>15</td>
</tr>
<tr>
<td>Extremely emotionally immature</td>
<td>46</td>
<td>76.67</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td>100</td>
</tr>
</tbody>
</table>

From table 4.1.10 showing emotional maturity variation among 60 girls (consisting of both hostellers and day scholars), 3.33% were found to be extremely emotionally mature, 5% moderately emotionally mature, 15% emotionally immature and 76.67% extremely emotionally immature.

The above graph shows the emotional maturity variation among girls. Among 60 boys (consisting of both hostellers and day scholars) with perceived loneliness, 2 were found to be extremely emotionally mature, 3 emotionally immature, 9 moderately emotionally mature and 46 extremely emotionally immature.
Table 4.1.10 shows the emotional maturity variation among the sample of 120 students including both day scholars and hostellers. Out of 120 students, 2.5% were found to be extremely emotionally mature, 2.5% moderately emotionally mature, 14.17% emotionally immature and 80.83% extremely emotionally immature.

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extremely emotionally mature</td>
<td>3</td>
<td>2.5</td>
</tr>
<tr>
<td>Moderately emotionally mature</td>
<td>3</td>
<td>2.5</td>
</tr>
<tr>
<td>Emotionally immature</td>
<td>17</td>
<td>14.17</td>
</tr>
<tr>
<td>Extremely emotionally immature</td>
<td>97</td>
<td>80.83</td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4.1.10 shows the emotional maturity variation among the sample of 120 students including both day scholars and hostellers. Out of 120 students, 2.5% were found to be extremely emotionally mature, 2.5% moderately emotionally mature, 14.17% emotionally immature and 80.83% extremely emotionally immature.

Graph 4.1.12.1

Out of 120 students with perceived loneliness, 3 were found to be extremely emotionally mature, 3 moderately emotionally mature, 17 emotionally immature and 97 extremely emotionally immature.

4.2 Inferential Statistics

4.2.1 t-test result comparing emotional maturity score of boys and girls

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Standard error mean</th>
<th>t</th>
<th>df</th>
<th>P</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Girls</td>
<td>60</td>
<td>121.85</td>
<td>20.52</td>
<td>2.65</td>
<td>3.8766</td>
<td>118</td>
<td>0.000175</td>
<td>nil</td>
</tr>
<tr>
<td>Boys</td>
<td>60</td>
<td>139.11</td>
<td>27.82</td>
<td>3.59</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Since conditions of the data being parametric, with normal distribution etc. were satisfied, independent sample t-test was used to interpret the result.

N denotes the total number of students in each group under study. The study consisted of 60 girls and 60 boys. Mean value of girls and boys is 121.85 and 139.11 respectively. Standard deviation denoted by SD, of girls is 20.52 and that of boys is 27.82. 2.65 and 3.59 are the standard error of mean of girls and boys respectively. t value of the sample is 3.8766 with degrees of freedom(df)118. The two-tailed P value is 0.000175. This difference is considered to be statistically significant at 0.05 level.

Since there is significant difference in the mean of both the population, the assumption which states the emotional maturity level of girls and boys to be same is rejected. As the assumption is proved wrong, it can be concluded that there is difference in emotional
maturity of girls and boys. It is evident from the table that girls are more emotionally mature than boys (as they have lesser emotional maturity score)

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emotional maturity score of girls</td>
<td>121.85</td>
</tr>
<tr>
<td>Emotional maturity score of boys</td>
<td>139.11</td>
</tr>
</tbody>
</table>

Table 4.2.2 shows the mean emotional maturity score of boys and girls to be 121.85 and 139.11 respectively.

4.2.3 t-test results comparing emotional maturity levels among hostellers and day scholars:

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Standard error mean</th>
<th>t</th>
<th>df</th>
<th>P</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hostellers</td>
<td>60</td>
<td>133.33</td>
<td>28.23</td>
<td>3.64</td>
<td>1.2032</td>
<td>118</td>
<td>0.2313</td>
<td>Accept</td>
</tr>
<tr>
<td>Day scholars</td>
<td>60</td>
<td>127.67</td>
<td>23.11</td>
<td>2.98</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Since conditions of the data being parametric, with normal distribution etc. were satisfied, independent sample t test was used to interpret the result.

N denotes the total number of students in each group under study. The study consisted of 60 hostellers and 60 day scholars. Mean value of hostellers and day scholars is 133.33 and 127.67 respectively. Standard deviation denoted by SD, of hostellers is 28.23 and that of day scholars is 23.11. 3.64 and 2.98 are the standard error of mean of hostellers and day scholars respectively. t value of the sample is 1.2032 with degrees of freedom(df)118. The two-tailed P value is 0.2313. This difference is considered to be not statistically significant at 0.05 level.

Since there is no significant difference in the mean of both the population, we accept the null hypothesis which assumes the emotional maturity level of day scholars and hostellers to be same. As the null hypothesis is proved right, it can be concluded that emotional maturity of hostellers and day scholars are same.
Table 4.2.4 Emotional maturity scores of hostellers and day scholars

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emotional maturity score of hostellers</td>
<td>133.33</td>
</tr>
<tr>
<td>Emotional maturity score of day scholars</td>
<td>127.67</td>
</tr>
</tbody>
</table>

Table 4.2.4 shows the mean emotional maturity score of hostellers and day scholars to be 133.33 and 127.67 respectively.

Graph 4.2.4.1

The above graph shows the emotional maturity of hostellers and day scholars. Emotional maturity value of 60 hostellers is 133.33 and that of 60 boys is 127.67. According to the manual, emotional maturity decreases with increase in emotional maturity score.

V. DISCUSSION

The study indirectly describes emotional maturity as a byproduct of perceived loneliness. The dependent variable which was measured and analyzed was the emotional maturity of college students (18-20 age) and the independent variable manipulated was perceived loneliness. 120 college students with feeling of perceived loneliness were screened out and their emotional maturity levels were studied.

Perceived loneliness is a subjective experience often defined in terms of one's connectedness to others, when he or she is not satisfied in his or her social relations. It can be caused due to social, mental, physical and emotional factors. A person may feel lonely even when surrounded by people. Study conducted in the year 2013 by Luersen and Hartle on “Understanding loneliness among adolescents: Developmental changes that increase the risk of perceived social isolation” said that rapidly changing social world made a person more prone to experience social isolation. Any type of social network and sense of belonging can benefit our health. However, research shows that we need face-to-face contact and intimate human connections to engage biological systems that have evolved for millennia to preserve our mental and physical well-being. The latest research on loneliness was led by John .T. Cacioppo from the University of Chicago. The researchers found that for older adults, perceived social isolation is a major health risk that can increase the risk of premature death by 14 percent. (12 signs of emotional maturity, 2012)

Emotional maturity means, in essence, controlling your emotions rather than allowing your emotions to control you. One is expected to have higher emotional maturity in order to lead an effective social life. It is also true that our behavior is constantly influenced by the emotional maturity level that we possess. Studies have proved that one’s feeling of perceived loneliness greatly affects his or her emotional maturity. Especially, the adolescents who are observed to be highly emotional in their dealings need to be studied with respect to their feeling of being lonely. Students nowadays are incapable of controlling their emotions, managing the pressures of daily life. Based on Cacioppo and Hawkley’s study on “Perceived social isolation and Cognition” in the year 2019, it can be understood that students with perceived loneliness have poor cognitive performance, faster cognitive decline, more negativity and depressive cognition.

Rashee Singh’s study of 2011 on “emotional maturity among students in relation to their home environment and self-esteem” had discovered that students who experienced social isolation possessed less emotional maturity and another study by Anu Agarwal on “Adjustment, emotional control and perceived loneliness among adolescents” had revealed that hostellers were more prone to perceived loneliness. On reviewing these studies, we had assumed that college students living in hostels or as, paying guests would be more emotionally mature when compared to day scholars because hostellers are the ones living away from home, with others from different regions having different cultural background, where they would automatically become independent, learn to manage their emotions and adapt accordingly unlike day scholars who are dependent on parents, who are spoiled by the care they receive.
contradiction to our beliefs, the result interpreted showed no difference in emotional maturity of hostellers and day scholars. The result is consistent with one of the latest study in 2014 conducted by Anu Agarwal. This might be because day scholars are more involved in taking up family responsibilities, they are more exposed to parental ways of dealing family problems which in turn influence their emotional maturity. All these factors somehow balance the emotional maturity of hostellers and day scholars. During emotional breakdown, hostellers have intimate roommates as their immediate support system; likewise, for a day scholar, the care and affection of parents and siblings serve as their immediate support system.

It is to be noted that on comparing hostellers and day scholars, the number of people coming under different levels of maturity is almost the same between these 2 groups. However, one striking factor seen was the high number of people who were found to be extremely emotionally immature. This might be because, present generation have not gone through much hardship when compared to former ancestors and life made easier with all facilities spoon-fed obstruct the development of a strong emotional mind. Age group of the participants might also be the reason for such a low level of emotional maturity. 97 of the sample of 120 students were found to be extremely emotionally immature. Only very few students were found to be extremely emotionally mature and moderately mature. But there are a few people falling under emotionally immature category as well. Findings of Rashee Singh’s study in 2011 which claimed the negative correlation of perceived loneliness and emotional maturity is revalidated in the present study. Higher the feeling of perceived loneliness of a student, lesser is his or her emotional maturity.

Thus, the result emphasizes the prolific need to observe the behavior of college students as one’s emotional maturity is greatly manifested in his or her behavior. Number of suicide cases, depression, anxiety and certain psychosomatic problems are increasing among students of this generation. This might be due to their inability to manage family problems, complicated romantic relationships, academic pressures, inconsistency between what they want to achieve and what the society or relatives expects them to be, environmental changes that comes along with the sudden transition from school life to college life, and some other trivial reasons as well. The study is vital in educational guidance and counseling of college students. Helping the emotionally immature students who are affected by feeling of perceived loneliness, to handle pressures and problems of college as well as personal life will help improve their quality of life.

Results comparing the emotional maturity between girls and boys, proved girls to be more emotionally mature compared to boys. This result contradicts the findings of a study done in 2014 by Anu Agarwal which says that gender did not affect one’s emotional maturity. In our society, girls are brought up with more restrictions and discipline when compared to boys. Unlike the boys who take advantage of the freedom given to them indulging in all sorts of drinking, smoking and other peer activities, girls of the sample have many rules governing their lives regarding curfews, expressing of emotions etc making them stronger in managing emotional problems. These might be the reasons why girls of the sample were found to be more emotionally mature than boys.

From table 4.1.2, it is evident that it was easy to get hosteller boys with perceived loneliness. This again asserts the revelations of Anu Agarwal’s study in 2014. This might be due to their difficulty to handle the emotions of being away from home, lack of social support from peers, academic pressure etc. It was very hard to get hosteller girls and day scholar boys with perceived loneliness when compared to the other two categories. This again asserts the finding of our study which proved boys to be emotionally immature than girls. Thus it is evident that hosteller girls are more efficient in adjusting to the new surroundings, managing their emotions when compared to hosteller boys. Similarly, it can be understood that day scholar boys are less prone to be affected by feeling of perceived loneliness when compared to day scholar girls and this might be due to the freedom enjoyed by day scholar boys.

The above mentioned results provide further more revelations; Hosteller boys are more affected by feeling of perceived loneliness than day scholar boys. This might be because day scholar had motor bikes of their own and enjoyed tripping, had more freedom when compared to hosteller boys of the sample who had limited money and transportation sources to go out with their friends even if they wanted to and missed their homes more. Day scholar girls are more affected by feeling of perceived loneliness when compared to hosteller girls. It was observed that hosteller girls more easily bonded with their roommates and could share their emotional difficulties with each other, they could talk to their close ones overnight also and this helped them feel connected. But most day scholar girls could not freely talk out their relationship problems, problems at college to their parents or siblings, they had restrictions in using phone to talk to their friends also.

Finally when we compare hostellers and day scholars, it can be seen that students having perceived loneliness is slightly more common in hostellers when compared to day scholars. We did not compare the emotional maturity between hosteller boys and hosteller girls, between day scholar boys and day scholar girls or the emotional maturity between hosteller girls and day scholar girls, between hosteller boys and day scholar boys due to the presence of many confounding factors. However, it can be simply guessed from the distribution of students with perceived loneliness that, hosteller girls are more emotionally mature than hosteller boys, day scholar girls and day scholar boys are more emotionally mature than hosteller boys, day scholar girls.

Emotional maturity is not something which is formed within a few years of college life. It is something that’s been shaped right from childhood, when a child interacts with the external environment simultaneously trying to balance his or her inner conflicts as well. Thinking the other way round, an emotionally immature child when unable to adapt with the new environment in college life, will be more vulnerable to feeling of perceived loneliness. This could be a possible reason why hosteller boys with perceived loneliness were more prevalent compared to the other categories of the population under study.

Taking consideration of the results of the study, it was decided to provide psycho education to the sample of students under the supervision of a professional to help them overcome the feeling of perceived loneliness, deal effectively with daily life problems including academic pressures, family problems, relationship problems, social pressures, to boost up their self-esteem and mental well-
being etc. On account of social responsibility, one day session was held for the students in college in order to make them aware about the relevance of the topic

VI. SUMMARY

The overriding purpose of this study was to compare the emotional maturity between day scholars and hostellers, with perceived loneliness. The participants were within 18-20 age limits. There are people who find themselves lonely though everyone nowadays are connected by social media. But the factor which makes them feel lonely was unknown. This fact provokes curiosity. With this immense curiosity to know the reason behind this trend, different variables were chosen which were thought to be useful for clarifying the doubt. At this point the thought about emotional maturity came to mind and this was because, inability to regulate one’s intense feelings was thought to induce lonely feelings in individuals. So the variables perceived loneliness and emotional maturity were combined.

Before beginning the study, it was assumed that hostellers would be emotionally mature than day scholars since they came to a new surrounding and adapts to new situation by their own and previous research studies proved that so. But when the results were interpreted variations were found. This study was chosen because it was considered to be relevant in the present scenario and the relevance of this study was that emotional maturity is a necessary factor for happy and contented life. And also inability to manage emotions effectively can affect student’s achievement motivation and stress management. So measuring the emotional maturity of people with perceived loneliness could reveal how emotional immaturity or maturity is related with perceived loneliness.

Identifying the factors like emotional maturity and perceived loneliness as inevitable aspect of student growth and development is important. In the present scenario, youth as well as children are facing difficulties in life. These difficulties are giving rise to many psycho-somatic problems such as anxiety, tensions, frustrations and emotional upsets in day to day life. So, the study of emotional life is now acquiring importance. Thus to find out the level of emotional maturity of students with perceived loneliness is relevant. Also this study showed that factors like being a hosteller or day scholar does not affect a student’s emotional maturity.

Review of the related literature helped us to acquaint ourselves in the area intended to conduct research. It helped in recognizing and identifying the problems and selecting an area of interest and it also helped us to avoid unintentional duplication of well-established findings. Then the major part of the study, data collection was started. The method chosen for data collection was survey method. In order to obtain the data for the study, at first consent forms regarding the participation in current study were distributed to the target population of day scholars and hostellers. Those who were willing to participate were given the Perceived Loneliness (L-SCALE) questionnaire developed by Dr. Praveen Kumar, which measures the level of perceived loneliness. Students who scored high in the L-SCALE were taken as sample of our study. The sample was taken from an arts and science college, who were doing different courses. There were total 272 questionnaires given out of which 120 students were found to have perceived loneliness. On this sample, Emotional Maturity Scale (EMS) questionnaire by Dr.Yashvir Singh was administered. Then the emotional maturity of these 120 students was measured and interpreted. The sample consisted of equal number of day scholars and hostellers, with 30 girls and 30 boys in each category. The scores were recorded, interpreted and results were evaluated thoroughly.

There were many challenges faced during the collection of data. Many questionnaires given were returned incomplete and out of the ones received back, only few were found with perceived loneliness. During scoring it was found that hosteller boys with perceived loneliness were easily available than hosteller girls. This shows hosteller girls are efficient in adapting to situations.

From the results obtained, it was found that within 126 hostellers who filled the questionnaires, 60 were found with perceived loneliness and within 146 day scholars who filled the questionnaires, 60 were found with perceived loneliness. While evaluating emotional maturity among the 60 hostellers with perceived loneliness, 1 was found to be extremely emotionally mature, 2 were moderately emotionally mature, 8 were emotionally immature and 49 were extremely emotionally immature. And within the 60 day scholars (consisting of both boys and girls) with perceived loneliness, 2 were found to be extremely emotionally mature, 1 was moderately emotionally mature, 9 were emotionally immature and 48 were extremely emotionally immature. And overall out of the 120 students with perceived loneliness, 3 were found to be extremely emotionally mature, 3 moderately emotionally mature, 17 emotionally immature and 97 extremely emotionally immature.

The data was interpreted using Independent sample T-test. On interpreting the result, it could be understood that there was no significant difference in the mean of both populations. And thus it was concluded that there was no significant difference in the emotional maturity of hostellers and day scholars. But the amazing fact found is that out of 120 samples, 97 were found to be extremely emotionally immature, 17 were emotionally immature, 3 were moderately emotionally mature and 3 were extremely emotionally mature. Another striking result found was, within the sample of 60 boys and 60 girls boys, boys has scored high on the emotional maturity scale.

The result was surprising because an individual is expected to have higher emotional maturity in order to lead an effective social life. But majority of upcoming generation lacks this ability and very few could still hold this ability. This could be the reason for the increasing suicide rates, depression and various mental illnesses among present day students. Here was the scope of this research. This study could find out that majority of individuals are extremely emotionally immature. Since majority students were found lacking emotional maturity remedies to make them emotionally mature could be developed. And this is important because this can affect student’s achievement motivation and ability to deal with stress effectively. This study could also show whether people with perceived loneliness are emotionally immature or not and also this study could reveal whether gender play a role in emotional maturity and it was found that boys were more emotionally immature than girls. And this was contrast to the belief everyone held from very
beginning that boys were more emotionally strong than girls. But from now on more focus can be laid on boys in order to strengthen their ability to manage emotions. The students were given effective classes to improve their ability to effectively manage emotions and to overcome feeling of perceived loneliness.

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Evaluation of HIV knowledge among general practitioners in health centers in Brazzaville

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Abstract- Background: Advances in HIV care have reduced mortality and the number of new infections. HIV knowledge among general practitioners and HIV prevention are important elements in the fight against HIV. In the Republic of Congo, reluctance to address this issue persist among general practitioners.

Purpose of the study: This study aimed to explore the influence of HIV representation in HIV prevention and testing and to assess HIV knowledge among general practitioners in Brazzaville.

Method: This is a qualitative study by semi-directed interviews with general practitioners recruited in a reasoned manner and in maximum variation, in the health centers of Brazzaville.

Results: Thirty-five interviews were required to obtain saturation of the data. The majority of general practitioners are involved in screening and prevention, but none are involved in the treatment and monitoring of patients. For some, the subject is difficult to address because of the image it conveys to the patient, or to their own embarrassment. For others the relationship of trust allows to address the subject. Some are related to the context of the consultations, the doctor-patient relationship, the patients and their reactions. Others are related to the doctors themselves: the sexual approach or their formation.

Discussion: Physicians respond well to their role of primary care except for the treatment for which they do not feel concerned because of other specialties. The image conveyed by HIV and the lack of training remain difficult obstacles to overcome.

Better information of the population seems to be a way to make the approach to HIV prevention and screening more acceptable to patients and more systematic in the practice of doctors. Nevertheless, their involvement and training are essential. Conclusion: Our study shows, on the one hand, that the representation of HIV of general practitioners can strongly influence their attitude towards HIV. The trivialization of HIV is not effective in the Republic of Congo, it is premature to address the trivialization of HIV testing, the key to care.

Index Terms- HIV, Knowledge, General practitioners, Health centers, Brazzaville

I. INTRODUCTION

According to the UNAIDS 2017 report, about 36.7 million people worldwide living with HIV/AIDS at the end of 2016. Of these, 2.1 million were children (<15 years old). Most of these children live in sub-Saharan Africa and were infected by their HIV-positive mothers during pregnancy, childbirth or breastfeeding [1].

In the central african region, in the Republic of Congo, HIV/AIDS remains a major public health problem, with the number of newly infected people falling from 5,200 in 2005 to 7,600 in 2016. In 2016, there were 1100 children newly infected with vertical transmission. The number of people living with HIV has increased from 6,000 in 2005 to 91,000 in 2016 [2]. An estimated total of 91 000 individuals are living with HIV in the Republic of Congo et seulement 21 000 people living with HIV who are on treatment[2].

The UN goal on HIV/AIDS to reach 90-90-90, will be difficult Achieving these goals will eliminate HIV transmission by 2020 [2,3]. In 2016, 29% people living with HIV who know their HIV status ; 23% people living with HIV who are on treatment and people living with HIV who are virally suppressed are not known [2].

For people living with HIV, HAART is a valuable tool for surviving HIV infection [4,5]. Treatment of HIV is an important strategy in fighting the HIV epidemic, with public and individual health benefits [6–9].

One of the reasons for the HIV epidemic is an insufficient knowledge of HIV and its spread in both the general population and among health professionals [10–12]. Health professionals should be the best trained to fight this epidemic[13].

General practitioners (GPs) are the primary point of access to healthcare, including sexually transmitted infection (STI) care. The majority of healthcare for people with STIs is provided by GPs where they receive syndromic treatment for STIs by following the national treatment guide against STIs [14,15]. A study conducted in the Netherlands revealed that around 70% of STI consultations are taking place in the general practice, and more than 30% of HIV patients are diagnosed in this setting [16].

Health professionals, especially doctors and equipment, are not distributed throughout the national territory in proportion to the population, regional disparities and those between urban and rural areas are important.

The general practitioner has a primary role: to treat health problems, or to refer patients after a suitable referral to a specialist [17]. The general practitioner is therefore the specialist
in health monitoring, prevention, care and treatment of patients in his community [18,19]. The general practitioner is, because of his specific exercise of proximity and ground, the center of care networks. It is a privileged partner of public health actions: prevention, screening, health and social education [20–23].

In the Republic of Congo, the majority of citizens in case of illness visit a general practitioner who can be the main educator for health prevention, including that related to HIV/AIDS. In this context, this study was conducted to understand the phenomena that can influence the involvement of general practitioners in the prevention and detection of HIV/AIDS infection in institutions in Brazzaville, Republic of Congo, in 2017.

II. METHODS

Design
It was a cross-sectional, qualitative study conducted with general practitioners, in the form of a thorough interview. It was qualitative survey by semi-directive individual interviews conducted with general practitioners. We asked permission from health facilities, to collect a list of general practitioners who regularly practice in these places. A standard letter had been submitted to the administrative department of these health facilities and presented to each general practitioner. This letter, sent by the National Institute for Research in Health Sciences, presented the study and asked the agreement of the doctor to participate then the authorization of the health facility to allow the realization of the investigation.

Study zone
The study was conducted in 5 health facilities in Brazzaville, Republic of Congo. The city of Brazzaville is the political and administrative capital at a distance of 512 km East of Pointe-Noire, the economic capital of the Republic of Congo, located in the extreme south of the country. This area is commonly known for its oil activity, which is still the main sector of the economy of our country.

Important parameters
In HIV prevention, health facilities also offer integrated HIV counseling and testing services and the PMTCT program. According to the Comité National de Lutte contre le VIH/SIDA (CNLS) report, Brazzaville is the first city with 3.1% HIV prevalence [24].

Qualitative data were generated from 35 well-informed GP respondents through in-depth interviews. The sampling unit was the health facilities while the units of study were the general practitioners who agreed to participate in the study.

Study population and recruitment
The study population was that of general practitioners practicing in Brazzaville in August 2017. Recruitment was conducted with general practitioners Brazzaville, appointments were taken directly to the health center, taking care to explain the topic of study. Recruitment was carried out in order to obtain the most diversified sample possible. Thirty-five interviews were conducted before reaching saturation of the data.

Preparation and completion of interviews
The interviews were prepared using a maintenance guide. The interviews were all conducted in the health centers of the doctors interviewed and written on the survey form. It was stated systematically that it was anonymous interview.

Interview Analysis
We did the sentence-by-sentence analysis of the data collected, according to the questions asked. No analysis grid, no themes are defined in advance. To increase the internal validity of the study, the interviews were re-read.

Saturations of the data
The number of interviews has not been determined in advance. The interviews were interrupted when no new code appeared in the analysis of the last two interviews. The sample size of our study was obtained by "data saturation" at the end of the 33rd interview. This was verified by two additional interviews bringing the total number of interviews to 35.

During recruitment 35 general practitioners were contacted, 8 doctors refused to participate in the study after the first contact: - because they were short of time, their schedule was too busy for 5 of them. - because they did not feel concerned by the subject for 2 of them. - did not want to be evaluated - judged that there were too many questions in the questionnaire - no justification for one of them

Study population
Health establishments
We requested by mail the administrative service. We had confirmation of the feasibility of our data collection and the acceptance to participate. Of the 94 health facilities requested, unfortunately, fewer than 20 health centers participated in the study. The majority of integrated health centers in Brazzaville do not have general practitioners. In reference hospitals, there are several general practitioners. We also surveyed private clinics and social health centers.

General practitioners
Each health facility has given us a list of general practitioners. In total, we had 66 general practitioners. Of the 66 questionnaires distributed to general practitioners, 35 have agreed to participate and were completed, representing a participation rate of 58.3%. There were 31 general practitioners did not participate: 17 doctors did not answer the questionnaire and 14 refused to participate. The first part of the questionnaire included the socio-demographic characteristics of each participant.

The majority of general practitioners refused to mention their name, age, sex, seniority and place of work, so as not to be identified later. They considered the survey as a personal assessment and feared that their medical practices would be criticized.

Inclusion criteria
All GPs who agreed and responded to the questionnaire were included in our study. GPs who refused to participate in the study or did not respond were excluded from our study. GPs who
agreed to participate but did not respond to the questionnaire were excluded. The inclusion of health facilities lasted 1 month, from August 1 to 31, 2017. The doctors were included over a period of 1 month.

Elaboration of the questionnaire
This is an anonymous qualitative questionnaire comprising 4 parts: Identification of the general practitioner, representations on the preventive activity to the general practitioner, representations on the HIV disease, representations on the patients, representations on the role of the general practitioner, representations on HIV prevention, representations on HIV testing, representations on the approach to sexuality, representations on training, representations on new recommendations.

In the identification characteristics of the general practitioner, we collected: age, sex, grade and seniority. The questions concerning the intensity of their activity, their training on the care of people living with HIV and the number of HIV-positive patients for whom they are responsible were the subject of the questionnaire. Finally, we asked general practitioners if they had activities parallel to their work. All parts of the questionnaire were transcribed in an Excel table version 10.

The criterion required to define the size of the sample was the so-called "data saturation" phenomenon. It was obtained when the data collected in a new interview no longer provides new information. This was confirmed by conducting two additional interviews.

Data collection
The individual interviews were conducted using an interview guide. This was developed by defining the topics to be treated from a review of the literature and objectives of our study. Each theme was addressed by an open question, formulated in the most neutral way possible, and questions of stimulus. An information collection card made it possible to record the characteristics of the participants. The interviews were not recorded, but were directly transcribed ad integrum using a Windows computer and Excel Microsoft Word software.

Ethical and financial aspects
No data on patients was collected. The questionnaire was anonymous. The study was not the subject of internal funding. All included GPs were assigned a number. Matches of numbers with their names were made on another confidential file.

III. Results

Characteristics of interviews
The interviews took place throughout August 2017. The average length of interviews was 45 minutes, ranging from a minimum of 30 minutes to a maximum of 60 minutes. The interviews all took place in the medical offices of the interviewed doctors.

Characteristics of general practitioners

Table 1 summarizes the characteristics of general practitioners.

1. Representations on the preventive activity to the general practitioner

How do you approach the prevention activity in general in your daily practice?

For the majority of doctors, prevention is not optimal because there is not enough time, but screening is systematically offered to patients. Prevention is important among women attending antenatal clinics.

MG3 "Very little prevention of HIV, more often the possible screening when we receive a patient".

MG13 "Hygiene rule, be careful about all patients or the serological status is not known".

What is the place for prevention activity in general in your daily practice?

All cited the important role of prevention in their daily practice, attention and put on this vulnerable population at risk.

MG28 "Occupies a primordial place especially in the pregnant woman".


Many doctors have indicated that not only the clinical signs suggestive of an infection, but the lifestyle, the prenatal test were all circumstances that could lead to addressing the subject on HIV. In general, routine consultations remain an ideal opportunity to approach prevention. Some doctors have mentioned risky behaviors such as the use of soiled objects or sexual intercourse. Prescriptions for the screening test are done during prenuptial tests, prenatal tests and risk behaviors.

MG5 "In the face of a suspicious clinical picture of immunodeficiency, a woman and a man of childbearing age who came for consultation, before and after screening, " patient with signs of the disease ".

MG10 "In the usual way, especially in the context of healthy lifestyle in community between partner".

MG18 "During prenatal testing, among adolescents who come to know sex for the first time and in all patients in general".

MG22 "Sexual Behavior at Risk, Use of Sharps".

MG30 "During routine medical consultations".

MG7 "Patients having sex without a condom or if the condom is torn apart, patients wanting to have a child, pregnant woman or patient wanting to know their condition".

MG18 "During prenatal testing, in front of a long-term fever picture; during a preoperative assessment; during prenatal consultations, during a general assessment (at the request of the patient)".

MG35 "Unprotected sex, pregnant women, before transfusion (or donation of blood)".

Under what circumstances do you offer an HIV test?

MG18 "Cases of rape; after needlestick used by the hospitalized patient, during unprotected sexual intercourse suspecting his partner "

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What are the difficulties in doing prevention?

Attitude and perception were highlighted as difficulties in making prevention, but also knowledge of HIV in patients.

MG9 "The first difficulty is the level of education of patients, the prejudices of patients for the disease".

MG11 Offering a screening test: resistance to screen or a lack of knowledge of HIV in patients.

MG21 "Reluctance of some patients to use the condom, lack of didactic tools allowing the diffusion of the message".

What are difficulties to tackle HIV prevention?

The main prevention-related issues cited by general practitioners were the non-acceptance of the HIV-related discussion due to the fear of death, the refusal to learn more, the various beliefs.

MG5 "Generally patients hate to hear this disease because they think directly about death".

MG10 "Religious beliefs, customs or simply refusal".

What can be the difficulty of offering a screening test?

Three major difficulties appear as a brake to offer the HIV test.

MG9 "Refusal to consent to screening for a patient with an acceptable general condition".

MG16 "Psychological state of the patient".

MG18 "If one partner is reached without the other knowing it; religious beliefs".

What can be the difficulties in doing prevention?

Two paths of orientation on the difficulties encountered by general practitioners: the patient at the heart of prevention, who must give his approval, but also the health system that has failing points in particular in the material resources or the quality of training.

MG13 "Voluntary refusal of means of prevention, lack of means of prevention, inattention".

MG14 "The difficulties of prevention are: mass consultation (too many patients waiting), inefficiency in training, information and communication".

2. Representations of HIV/AIDS disease

In summary the evocation of this disease is subject to psychosis, this disease has a negative and destructive connotation.

MG16 "A feeling of large-scale destruction of human life, as everyone can suffer from it".

MG17 "HIV evokes a scourge for me, which is weakening youth and a problem of care".

MG22 "A serious illness that anyone can catch, but everyone can avoid".

3. Patient representations

What is the patient's view of HIV today?

Doctors talk about patient resentment of the disease.

MG13 "A lot of patients do not accept this disease and they think it's witchcraft".

MG15 "Negative outlook vis-à-vis the unaffected population".

MG16 "There is always no fear of discrimination and the sight of others and also the fear of death".

How are patients sensitized to HIV?

Doctors have indicated various means of awareness, but some thought that it would be necessary to sensitize also by sessions in groups of words and workshops.

MG17 "They are sensitized through the media, hospitals, Integrated Health Center, Church, NGO".

MG23 "Inform and raise awareness through sessions, workshops to establish a dialogue on the subject by changing the patient's behavior".

What means do they have to inform themselves?

Several provisions are cited as means of information in the fight against HIV/AIDS.

MG10 "These are the mobilization sessions that are done at work the population and the medical staff at the health worker is supposed to do a health education".

MG21 "Anonymous and Voluntary HIV Treatment and Testing Center, National HIV/AIDS Program, Hospitals and Media".

4. Representations on the role of the general practitioner

What is your personal experience with HIV?

Few doctors had experience with HIV; They did not have HIV-positive patients among their patients, and felt they had little expertise in monitoring HIV patients. They redirected immediately to a specialist for follow-up.

MG7 "No more outside theoretical knowledge".

MG11 "I warn with advice, I put the diagnosis and put the patients back to the monitoring unit".

What is the role of the GP in relation to HIV?

Most GPs spoke of prevention, screening, but also compliance.

MG24 "Encourage patients to observe sexual health conditions and to follow their treatment on a regular basis".

MG26 "To inform more precisely all sexually active patients of the existence of the disease, means of prevention, encourages the voluntary screening, to detect any patient and to ensure the psychological support, by encouraging the taking of the treatment and the follow-up of the patient HIV positive".

5. Representations on HIV prevention

How do you approach HIV prevention in your daily practice?

GPs cited talking about prevention, or explaining the disease to patients.

MG7 "Follow hygiene procedures and recommendations for handling needles, wearing gloves, bibs and goggles during unsafe procedures".

MG14 "HIV prevention is done by: condom use, abstinence and fidelity".

MG26 "Explanation of pathology, transmission route, means of prevention (condoms, abstinence and fidelity)".

What are suggestions for improving HIV prevention?
Several recommendations, all focused on information and communication around HIV/AIDS.

MG2 "Advertising campaign, information on TV or radio, stand in neighborhoods, training of medical and paramedical agents".

MG12 "Disseminate information, continuous training, self-training, encourage voluntary testing".

MG15 "The door-to-door campaign to educate as many people as possible".

MG19 "Try to help, providers with motivations; train and retrain providers (midwives, general practitioners, gynecologists, etc.); to use social networks, TV, conference debates; integrated into the school curriculum".

6. Representations on HIV testing

How do you approach the prevention activity in general in your daily practice?

Here, the patient is at the center of the process. All occasions where the doctor could be in front of a patient were opportunities to carry out a prevention activity. The doctors revealed that there was patient involvement as a trigger to address the prevention activity.

MG "As part of an infectious assessment to assess the general condition of the patient. Upon personal and voluntary request for a screening report".

MG30 "During the consultation, if there is suspicion, we do the counseling and we propose to the patients to do".

MG32 "Psychological care precedes the screening process. It is necessary to obtain the adhesion of the patient beforehand".

What would your suggestions be for improving HIV testing?

Doctors suggest making tests available in all health facilities and systematically screening for HIV in a health check.

MG10 "Make available in all hospitals and Integrated Health Centers, screening tests and in a systematic way".

MG15 "Free screening at home, in the markets, in the meeting centers".

MG25 "Propose a test in any health check first, or even school report, improve the medicine SVR".

7. Representations on the approach to sexuality

How do you relate to the approach of sexuality?

Doctors thought that sexuality should be approached while talking about HIV, although there are other modes of contamination. Talking about sexuality was also their responsibility.

MG3 "Certainly, transmission is not only about sex but we can not dissociate sexuality and HIV".

MG14 "Sexuality is not a taboo subject; addressing this topic with patients would be wise and responsible in order to provide advice.

How do you feel about talking about it?

GPs thought of talking about sexuality helped in the prevention of sex-related diseases.

MG8 "No discomfort as long as it can help prevent primary, secondary and tertiary entanglement".

Some said that they proudly participated in increasing the level of knowledge of patients and the life expectancy of people through information.

MG32 "A pride in bringing knowledge to those who need it. Sense of being able to save human lives through information (health education)".

How is this subject addressed? Do you speak spontaneously?

Doctors all thought that sexuality was difficult to approach with patients, but ways to address the subject could be created.

MG12 "It is approached in a context of trust and speak in a progressive way with method".

MG22 "No, you have to find a trick especially when you are dealing with a lady or an approved person".

Depending on the patient, some doctors could find a way to convey information about sexuality.

MG23 "No, it is a delicate subject I approach it according to the level of education of the patient".

Some doctors thought that sexuality was little approached because of the modesty that implies or related taboos on this subject.

MG9 "Taboos, religious dogmas".

MG15 "Modest parents find it almost unnatural to talk about their sexuality to a person".

MG27 "Shame especially when there is a big age difference between the two opposite sexes".

8. Training Representations

What is your personal training on HIV?

Most doctors have not yet done any training on HIV, they are all documenting to acquire the information needed to care for HIV-positive patients.

MG9 "Self-taught, apart from courses taught in faculty as a student".

MG18 "Actually, I have not done any HIV training yet, but I am researching myself. Personally, I will be interested in doing so."

What do you think about GP training on HIV?

All the doctors thought that the knowledge of HIV and antiretrovirals should be systematically deepened among the general practitioners who are the main actors in the care of patients.

MG19 "It would be really important to train GPs because the majority of patients are diagnosed by GPs".

MG26 "That would be a good thing because many people still do not know the ARV molecules on the market and when to prescribe them to the patient".

MG27 "GPs should be the first line of defense against HIV. I therefore for the systematic training of all general practitioners on the management of HIV.

What would your training needs be for HIV?

GPs were unanimous about their training needs, which encompassed all stages of patient management, particularly antiretrovirals and the recurring problems of ARV resistance.

MG16 "Training for comprehensive care of patients; the problems related to the resistance of the different molecules".

MG21 "Continuing and Specific Training Needs on HIV/AIDS, Doing an Internship in a Center for the Care of HIV-Positive Patients".

MG22 "to be continually trained on the new recommendations of the new molecules available".
What are new recommendations on HIV prevention and testing?

Some doctors knew the new recommendations but found that they were not known enough, the others had not heard about them.

**MG21** "Yes, but the disclosure is not well done"

**MG25** "no"

GPs all wanted to be trained on patient management and to disclose recommendations on HIV prevention and testing.

**MG3** "Train general practitioners on the screening, care and follow-up of patients on the HIV-positive organized continuing education and provide the appropriate equipment (screening test)"

**MG21** "Make available ARVs, widely distribute the document on new recommendations establish follow-up action on the implementation of these new recommendations"

**MG9** "Provide free rapid tests in all Congo health centers"

**MG35** "Inform patients, systemic screening of all graduates, students and any jobseeker, in the administration"

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**IV. DISCUSSION**

**Discussion on the method**

The objective of the study was to explore the representations and practices of general practitioners in Brazzaville in HIV, the realization of a qualitative study, method of reference in this area, was the most suitable for this survey[25]. There are therefore very few studies on the subject even in France, where two studies can be cited in reference [26,27]. The individual interviews of the general practitioners allowed to identify the free expression of their opinion [25]. The number of physicians interviewed was low as 33 physician interviews were required to reach saturation of the data. The main bias of the method was the interviewer and his ability to carry out the interview was also an important point.

**Various doctors informed and concerned**

Our research questioning was oriented towards general practitioners. With regard to health, general practitioners play a role of legitimate mediators to the population. Faced with questions from any type of patient, these health professionals advise, inform, warn patients about diseases. And eventually these general practitioners decide on medical prescriptions or proper medical guidance. Secondly, general practitioners can be considered as hybrid actors. They have some expertise on issues related to maintaining health and pathogenesis while not being specialists themselves. In addition, they are also citizens more or less aware of the problems of prevention, care of patients. Considering the composite nature of the professional and civic roles and status of these practitioners, we sought to know more precisely what their knowledge of HIV was, how they were confronted, in their daily practice, with these questions and what were their degrees of information.

The surveys conducted are therefore a qualitative approach aimed at having a picture of HIV knowledge, but also the diversity of perceptions and attitudes about HIV and people living with HIV and not about HIV. The representativeness of opinions referred to a sample of practitioners who would himself be in the image of the entire profession.

**Prevention activity in general medicine**

Most general practitioners considered that prevention had an important place in general practice. Yet a sense of difficulty for a preventive approach on a daily basis was evident. The main difficulties were the time constraint, the lack of training, the lack of patient adherence to the prevention discourse.

**Role of the GP in the face of HIV**

GPs have the mission of caring for people, for primary health care, which includes not only participation in the HIV prevention and information effort, but also involvement in screening and testing. the announcement of a positive diagnosis and the therapeutic follow-up. In our study, they had a stronger representation of their role in HIV prevention and screening than in tracking seropositive patients.

**HIV prevention and testing practices**

In our study we note that the approach of prevention and the proposal of the HIV test are also associated with certain types of patients and at "key" moments and "targeted" audiences: during prenatal consultations, prenuptial , in front of an alarming clinical picture or at an increased sexual risk. Few doctors talked about prevention in other circumstances and their advice was confined to condom use. Doctors initiated the discussion on HIV.

**Prevention and the proposal for an HIV test**

Our study showed that general practitioners thought that addressing HIV prevention and testing was difficult, taking into account the difficulty of collecting information about patients' lives or sexual practices. Some physicians used the doctor-patient relationship, built on trust and confidentiality, to address issues of sexuality or HIV prevention.

Primary HIV prevention involves explaining the modes of infection, including sexual abuse, risky practices, means of protection, and possibly how to use them.

The prescription of the screening test may need to assess the risk of contamination, this can not be done without questioning patients on their orientation or their sexual practices. The approach to these questions is therefore naturally placed in the field of sexuality. Our study shows that the need for patient consent when prescribing HIV serology, and therefore the possibility of refusal, may also appear as a brake, from which physicians avoid the subject.

Our study is the first conducted on knowledge of HIV among general practitioners in Brazzaville, it is comprehensive including 35 general practitioners public with a high response rate of 50%. But our results need to be nuanced because they are statements and not observed practices, and there may be a difference between what is said and what is actually done by the doctors.

**Sick doctor’s relationship holds back dialogue around HIV**

Doctors feared causing discomfort during conversations with the patient, a fear that was a drag on HIV education, prevention and testing. However, some doctors, on the other hand, did not have difficulty talking about sexuality or HIV with their patients.
New HIV testing recommendations

Our study gave us an inventory of the knowledge of general practitioners in the city of Brazzaville, this study can help health authorities to highlight the shortcomings to consider to ensure the success of the national program to fight HIV/AIDS.

Updating general practitioners’ knowledge of HIV requires both training and the implementation of new recommendations by the relevant health authorities. Most doctors are unaware of the country's HIV recommendations, which is already a barrier to updating knowledge and changing practices. The publication of a repository for general practitioners regarding new recommendations will help to better guide them. In fact, the most invested physicians will tend to have a more spontaneous prevention discourse and to offer their patients easy screening.

Our study shows that the majority of general practitioners were not trained on HIV, but they were interested in continuing education. These practitioners thought it was necessary to update or deepen their knowledge about HIV. It would still be necessary to divulge the information in order to interest as many doctors as possible. The degree to which physicians are trained on HIV is likely to influence how they approach the subject with their patients.

In our study not all doctors followed HIV-positive patients, but referred them. Following HIV patients is a factor that reinforces the doctor's representation of having to play a role in the fight against the epidemic.

In the light of our results, adequate initial training of general practitioners, both in theory and in practice, seems necessary, emphasizing the essential role of GP in HIV prevention. Continuing education is also to be developed by organizing training seminars on HIV / AIDS taking into account the needs of the MGs and the available means. An interest should be created for all general practitioners to have basic training in HIV prevention. This is very important for facilitating future prevention and screening actions as part of the national HIV program.

V. CONCLUSION

This survey shows the importance and the key role that general practitioners play in the care of people living with HIV in the Republic of Congo. Role that remains very little addressed in our country, whether clinical aspects, their practice or the role of referent in the prevention of HIV or even the care of people living with HIV at the same time local or national level.

The problem revealed the presence of a fairly high number of general practitioners with limited skills. To optimally utilize general practitioners, ongoing HIV training should be initiated to enhance their level of knowledge. The creation of a network of GPs to improve communication between health facilities and general practitioners would lead to better standards for outpatient HIV/AIDS care.

ABBREVIATIONS

CNLS: Conseil National de Lutte contre le VIH
HIV/AIDS: Human Immunodeficiency Virus/ Acquired Immunodeficiency Syndrome

GPs : General practitioners
PLWA: People Living With HIV/AIDS

DECLARATIONS

Ethics approval and consent to participate

The administration of the institute wanted by this survey to evaluate the general practitioners in order to see how to improve the quality of their practice. This study is part of an evaluation of knowledge of HIV among general practitioners in Health Centers in Brazzaville. The administration validated the survey card. Participation in the study was on voluntary and unanimous basis. And participants were also briefly about the objectives of the survey and the anonymous nature of data. Formal approval for conducting the study was obtained from the head master of the IRSSA. Researchers informed the study participants about the objectives and the questionnaires were anonymous to ensure the confidentiality of data provided. General practitioners who decided to answer the questionnaire were considered as having given their consent to participate in the study.

CONSENT TO PUBLISH

I confirm that the data are freely available and can be published according to Infectious Disease of Poverty regulations without needing consent.

AVAILABILITY OF DATA AND MATERIALS

We did not obtain consent to share data obtained from the questionnaire and key informant interviews, however the datasets used and/or analysed during the current study available from the corresponding author on reasonable request.

COMPETING INTERESTS

The author declares that there is no competing interest.

AUTHORS’ CONTRIBUTIONS

GLLS conceived the idea for the study, data analysis, interpretation, and reporting stage of this manuscript, and have seen and approved the final version.

ACKNOWLEDGEMENTS

My acknowledgement goes to Institut national de Recherche en Sciences de la Santé for the fund and for their sincere support. I am grateful also to referral hospital for allowing me their premises. Study participants are also acknowledged for accepting invitation to participate in the study.

Role of the funding source

Sponsors had no role in the process of research, data analysis, or decision to publish. The corresponding author had access to all data, and had final responsibility for the decision to submit for publication.
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Characterization and Treatment of Textile Effluent 
By Photocatalytic Method

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Abstract- Textile industry is one of the important industries in the world that provide large employment with less required special skills and play a major role in the economy of many countries. The textile industry uses various chemicals and large amount of water during the production process. The waste water produced from this textile industries contains large amount of dyes, which are capable of harming the environment and human health. oxidation of organic and inorganic pollutants by photochemical method is rapidly becoming an attractive technique for purify the water and wastewater treatment. A photo reactor setup consist of UV lamp and compressor. We take 250 ml of raw sample has to been treated and then add various dosage of TiO₂. This sample is treated for 2 hours under UV lamp in the photo reactor. The results indicate that the photocatalytic decolouration process can efficiently treat textile effluent and reduce the levels of COD, Calcium Hardness, pH, Turbidity, Alkalinity, Total solids, Total dissolved solids and Total suspended solids. But this method is not favourable for BOD.

Index Terms- Titanium dioxide, Photo catalysis, UV light and Wastewater treatment.

I. INTRODUCTION

The textile industry is the important for the massive raw material and textiles manufacturing base. Three different types of fibres used in the manufacture of various textile products and various types of dyes are used. The textile industry utilizes various chemicals and large amount of water during the production process. The wastewater produced during this process contains large amount of dyes and chemicals containing trace metals such as Cr, As, Cu, and Zn which are capable of harming the environment and human health. The textile wastewater can cause typhoid, diarrhea, cancer, liver damage, kidney damage, gastroenteritis, cholera, haemorrhage, ulceration of skin, nausea, skin irritation dermatitis. The whole treatment process involves three steps: The primary treatment involves removal of suspended solids most of the oil and grease and gritty material. The secondary treatment is carried out using micro organism under aerobic or anaerobic conditions and involves the reduction of BOD, phenol and remaining oil in the water and control of colour. The tertiary treatment involves the use of electro dialysis, reverse osmosis, adsorption and ion exchange to remove the final contaminates in the wastewater. The selection of purification method depends on the characterization of parameters and types of wastewater. In our project we choose photocatalytic method because it is very economical, requires minimum care, low cleaning cost, non-toxic, eco-friendly etc. photocatalysis is defined as “acceleration by the presence of as catalyst”. A catalyst does not have the property to change in itself or being consumed in the chemical reaction. This definition includes photosensitization, a process by which a photochemical alteration occurs in one molecular entity as a result of initial absorption of radiation by another molecular entity called the photosensitized. There are two types of photo catalyst such as homogeneous and heterogeneous. Heterogeneous photocatalysis employing metal oxides such as TiO₂, ZnO, SnO₂, and CeO₂ has proved its efficiency in degrading a wide range of distinct pollution into biodegradable compounds and eventually mineralizing them to harmless carbon dioxide and water. In our project we choose titanium dioxide. Titanium dioxide photo catalysis was considered as one of the most important practical catalytic due to its optical and electronic properties, low cost, high level of photo catalytic activity, chemical stability and non toxicity. Furthermore it is abundant and thus inexpensive.

II. EXPERIMENTAL

2. 2.1Materials

For the present study, effluent samples were collected from a textile industry at Erode district in Tamilnadu. The effluent samples were collected from the all stages of dyeing processing such as spinning, weaving, knitting, dyeing, printing etc. The effluent was collected in polythene containers of five litres capacity and were brought to the laboratory with due care and was stored at room temperature. Chemicals used for the analysis of spent liquor were analytical grade reagents. The physical and chemical characteristics of textile wastewater effluents parameters such as pH, Total solids (TS), Alkalinity, COD, BOD, Total Dissolved solids (TDS), Total Suspended Solids (TSS), Calcium, Total hardness were analysed as per standard procedures.
2.2 Photocatalytic Mechanism

When photocatalyst titanium dioxide (TiO\(_2\)) absorbs Ultraviolet (UV) radiation from sunlight or illuminated light source (fluorescent lamps), it will produce pairs of electrons and holes. The electron of the valence band of titanium dioxide becomes excited when illuminated by light. The excess energy of this excited electron promoted the electron to the conduction band of titanium dioxide therefore creating the negative-electron (e\(^-\)) and positive-hole (h\(^+\)) pair. This stage is referred as the semiconductor’s ‘photo-excitation’ state. The energy difference between the valence band and the conduction band is known as the ‘Band Gap’. Wavelength of the light necessary for photo-excitation is:

\[
1240 \text{ (Planck's constant, } h) / 3.2 \text{ev (band gap energy)} = 388 \text{ nm}
\]

![Figure 2.2 Photocatalytic mechanism](image)

2.3 Design of Photoreactor

The photo-catalytic reactor was designed by a hexagonal shape which has six phases, which is made up of wooden box. The designed photo-catalytic reactor were consists of three lamp at the top of the reactor at 8 watts. It has a magnetic stirrer with a magnetic bar to avoid the settlements of the particles in the beaker. The reactor performance will be evaluated on the basis on percentage of conversion. The reactor was operated for three hours. Photochemical oxidation of organic and inorganic pollutants is rapidly becoming an attractive technique for water purification and wastewater treatment. Since artificial sources of light require much energy delivery and more efficient. This method is recommended for toxicity contaminants in a specific concentration range below the recommended levels for recovery and above the levels for conventional biological treatment. Selection of a light source and an oxidation system and determination of key-parameters play an important role in the treatment efficiency. Sufficient UV penetration into the radiated liquid is of crucial importance; especially for an non transparent environment the UV radiation is only available very close to the UV lamp surface. High mass transfer rates for efficient interaction between the pollutant and the photocatalyst and for high oxygen uptake at the gas-liquid interface is another requirement for practical applications. In this regard, reactor design for efficient wastewater treatment has been a challenging problem. Many types of photo reactors have already been studied, implemented, reported and patented. This project presents a revision of some conventional and novel photo reactors equipped with UV lamps or working under solar radiation for wastewater treatment in laboratory and industrial scales.

![Figure 2.3 Photoreactor setup](image)
III. RESULTS AND DISCUSSION

The Textile industry is one of the most important Sources of water pollution. The type of this textile waste water has to be characterized for higher values of COD, Colour, Calcium Hardness, Turbidity, pH, Alkalinity, Total Solids, Total Dissolved Solids, Total Suspended Solids and BOD. However there was observed a significant decline in the values of the physiochemical parameters. Apparently, the effluent sample collected during textile process and washing operation were blue in colour and giving pungent smell. It is desirable to find out an optimum catalyst loading for efficient reduction. A series of experiments was carried out by varying the amount of catalyst Titanium dioxide (TiO₂) from 2g to 10g per 250 ml of sample and ultra violet (UV) irradiation time of 2 hrs.

3.1 COD

Table 3.1 COD calculation

<table>
<thead>
<tr>
<th>Dosage of TiO₂ in (g)</th>
<th>COD in mg/l</th>
<th>Efficiency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>300</td>
<td>75</td>
</tr>
<tr>
<td>4</td>
<td>250</td>
<td>80</td>
</tr>
<tr>
<td>6</td>
<td>200</td>
<td>82</td>
</tr>
<tr>
<td>8</td>
<td>150</td>
<td>87</td>
</tr>
<tr>
<td>10</td>
<td>100</td>
<td>91</td>
</tr>
</tbody>
</table>

Figure 3.1 COD Chart

As seen from the above chart, the percentage (%) reduction in COD is almost increased at every dosage 2g, 4g, 6g, 8g and 10g of TiO₂ Catalyst. Results show that 91% of COD can be reduced in 10 g of TiO₂.

3.2 CALCIUM HARDNESS

Table 3.2 Calcium Hardness calculation

<table>
<thead>
<tr>
<th>Dosage of TiO₂ in (g)</th>
<th>Hardness (mg/l)</th>
<th>Efficiency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>100.2</td>
<td>65.44</td>
</tr>
<tr>
<td>4</td>
<td>92.18</td>
<td>68.21</td>
</tr>
<tr>
<td>6</td>
<td>80.16</td>
<td>72.35</td>
</tr>
<tr>
<td>8</td>
<td>76.15</td>
<td>73.74</td>
</tr>
<tr>
<td>10</td>
<td>60.12</td>
<td>79.26</td>
</tr>
</tbody>
</table>
After the completion of Calcium Hardness test, the percentage (%) reduction in Calcium Hardness is almost increased at every dosage 2g, 4g, 6g, 8g and 10g of TiO$_2$ Catalyst. Results show that 79.26% of calcium hardness can be reduced in 10 g of TiO$_2$.

### 3.3 TURBIDITY

#### Table 3.3 Turbidity calculation

<table>
<thead>
<tr>
<th>Dosage of TiO$_2$ in (g)</th>
<th>Turbidity (NTU)</th>
<th>Efficiency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>32</td>
<td>27</td>
</tr>
<tr>
<td>4</td>
<td>25</td>
<td>43</td>
</tr>
<tr>
<td>6</td>
<td>15</td>
<td>65</td>
</tr>
<tr>
<td>8</td>
<td>12</td>
<td>72</td>
</tr>
<tr>
<td>10</td>
<td>9</td>
<td>79</td>
</tr>
</tbody>
</table>

![Figure 3.2 Calcium Hardness chart](image-url)

After the completion of Calcium Hardness test, the percentage (%) reduction in Calcium Hardness is almost increased at every dosage 2g, 4g, 6g, 8g and 10g of TiO$_2$ Catalyst. Results show that 79.26% of calcium hardness can be reduced in 10 g of TiO$_2$. 

### 3.3 TURBIDITY

#### Table 3.3 Turbidity calculation

<table>
<thead>
<tr>
<th>Dosage of TiO$_2$ in (g)</th>
<th>Turbidity (NTU)</th>
<th>Efficiency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>32</td>
<td>27</td>
</tr>
<tr>
<td>4</td>
<td>25</td>
<td>43</td>
</tr>
<tr>
<td>6</td>
<td>15</td>
<td>65</td>
</tr>
<tr>
<td>8</td>
<td>12</td>
<td>72</td>
</tr>
<tr>
<td>10</td>
<td>9</td>
<td>79</td>
</tr>
</tbody>
</table>
The percentage (%) reduction in Turbidity is almost increased at every dosage 2g, 4g, 6g, 8g and 10g of TiO\(_2\) Catalyst. Results show that 79% of turbidity can be reduced in 10 g of TiO\(_2\).

### 3.4 pH

<table>
<thead>
<tr>
<th>Dosage of TiO(_2) (g)</th>
<th>pH value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>8.6</td>
</tr>
<tr>
<td>4</td>
<td>8.5</td>
</tr>
<tr>
<td>6</td>
<td>8.4</td>
</tr>
<tr>
<td>8</td>
<td>8.4</td>
</tr>
<tr>
<td>10</td>
<td>8.3</td>
</tr>
</tbody>
</table>

pH value is decreases at every dosage 2g, 4g, 6g, 8g and 10g of TiO\(_2\) Catalyst. Results show that 8.3 pH value is reduced in 10 g of TiO\(_2\).
3.5 ALKALINITY

Table 3.5 Alkalinity calculation

<table>
<thead>
<tr>
<th>Dosage of TiO₂ in (g)</th>
<th>Alkalinity (mg/l)</th>
<th>Efficiency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>300</td>
<td>33</td>
</tr>
<tr>
<td>4</td>
<td>270</td>
<td>40</td>
</tr>
<tr>
<td>6</td>
<td>220</td>
<td>51</td>
</tr>
<tr>
<td>8</td>
<td>190</td>
<td>57</td>
</tr>
<tr>
<td>10</td>
<td>150</td>
<td>66</td>
</tr>
</tbody>
</table>

As seen from the above chart, the percentage (%) reduction in Alkalinity is almost increased with dosage 2g, 4g, 6g, 8g and 10g of TiO₂ Catalyst. Results show that 66% of alkalinity can be reduced in 10 g of TiO₂.

3.6 TOTAL SOLIDS

Table 3.6 Total Solids calculation

<table>
<thead>
<tr>
<th>Dosage of TiO₂ in (g)</th>
<th>Total solids (g)</th>
<th>Total dissolved solids (g)</th>
<th>Total suspended solids (g)</th>
<th>Efficiency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>23.6</td>
<td>21.3</td>
<td>2.3</td>
<td>43</td>
</tr>
<tr>
<td>4</td>
<td>23</td>
<td>20.8</td>
<td>2.2</td>
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</tr>
<tr>
<td>6</td>
<td>21.7</td>
<td>20</td>
<td>1.7</td>
<td>59</td>
</tr>
<tr>
<td>8</td>
<td>21.1</td>
<td>20.1</td>
<td>1</td>
<td>62</td>
</tr>
<tr>
<td>10</td>
<td>21</td>
<td>20.5</td>
<td>0.5</td>
<td>69</td>
</tr>
</tbody>
</table>
The above chart represents the percentage (%) reduction in Total suspended solids is almost increased at various dosage 2g, 4g, 6g, 8g and 10g of TiO\textsubscript{2} Catalyst. Results show that 69% of Total suspended solids can be reduced in 10 g of TiO\textsubscript{2}.

### 3.7 FINAL RESULTS

<table>
<thead>
<tr>
<th>Dosage of TiO\textsubscript{2} in (g)</th>
<th>COD (%)</th>
<th>Calcium Hardness (%)</th>
<th>Turbidity (%)</th>
<th>Alkalinity (%)</th>
<th>Total Solids (%)</th>
<th>pH Values</th>
<th>BOD (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2g</td>
<td>75</td>
<td>65.44</td>
<td>27</td>
<td>33</td>
<td>43</td>
<td>8.6</td>
<td>53</td>
</tr>
<tr>
<td>4g</td>
<td>80</td>
<td>68.21</td>
<td>43</td>
<td>40</td>
<td>56</td>
<td>8.5</td>
<td>47</td>
</tr>
<tr>
<td>6g</td>
<td>82</td>
<td>72.35</td>
<td>65</td>
<td>51</td>
<td>59</td>
<td>8.4</td>
<td>42</td>
</tr>
<tr>
<td>8g</td>
<td>87</td>
<td>73.74</td>
<td>72</td>
<td>57</td>
<td>62</td>
<td>8.4</td>
<td>37</td>
</tr>
<tr>
<td>10g</td>
<td>91</td>
<td>79.26</td>
<td>79</td>
<td>66</td>
<td>69</td>
<td>8.3</td>
<td>32</td>
</tr>
</tbody>
</table>

This graph shows the final efficiency of COD, Total solids, Alkalinity, Turbidity, Calcium and BOD. The removal of COD, Total solids, Alkalinity, Turbidity and Calcium increases based on the various dosage of TiO\textsubscript{2}. Adding various dosage of TiO\textsubscript{2} is directly proportional to reduction efficiency. This method is not suitable for BOD.
IV. CONCLUSION

The textile industry consists of a series of processes which lead to discharge of harmful pollutants into the effluent stream. These pollutants if released unchecked and untreated can cause adverse effects to the environment and aquatic life. Hence, the effluents from textile industries need to be properly treated and discharged. The textile industry utilizes various chemicals and large amount of water during the production process. The waste water produced during this process contains large amount of dyes and chemicals containing which are capable of harming the environment and human health. The textile waste water can cause hemorrhage, ulceration of skin, nausea, skin irritation and dermatitis. The chemicals present in the water block the sunlight and increase the biological oxygen demand thereby inhibiting photosynthesis and reoxygenation process.

The effluents treated with advanced oxidation process were found to reduce high value of pH (7.2), COD (1200 mg/l) 91% reduction in 10g of TiO$_2$, Calcium hardness (290 mg/l) 79.26% reduction in 10g of TiO$_2$, Alkalinity(450 mg/l) 66% reduction in 10g of TiO$_2$, TSS(1.3 g), TDS (22.3 g), TS (21g) 69% reduction in 10g of TiO$_2$, Turbidity(44NTU) 79% reduction in 10g of TiO$_2$, BOD (121.82 mg/l) 53% reduction in 2g of TiO$_2$ and Colour intensity(Dark yellow). Photocatalytic activity of TiO$_2$ was studied on different commercial dye and organic pollutants. Further studies were carried out using various concentration of TiO$_2$ and it was found that 2g, 4g, 6g, 8g and 10g of TiO$_2$ in 250 ml effluent sample and 2 hours was most effective for photoreduction. The developed method shows that TiO$_2$ have great potential in reduction of organic pollutants in effluents and was applied commercially in treatment of textile effluent. The decline in physiochemical parameter values shows the effect of decolourization ability of TiO$_2$.

ACKNOWLEDGMENT

We extend our heartfelt thanks to our department professors who provided insight and expertise that greatly assisted this research. We would like to thank our college for providing the proper platform for the technical support of this research work.

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A Literature Review on Voltage Regulation Techniques in Power System

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Abstract- Voltage Stability is an extreme issue in control frameworks, which consistently achieve working points of confinement forced by monetary and ecological conditions. At whatever point there is an adjustment in stock the framework voltage level changes. With the drop in voltage level, the responsive power request increments. In the event that the receptive power request isn't met, at that point it prompts additionally decrease in transport voltage bringing about the falling impact on neighboring districts. Henceforth to keep up the voltage profile inside allowable cutoff points ends up basic. This paper audits different strategies and procedures with their preferences and impediments embraced to hold the voltage level. The audit presents affectability based control methodologies, Control in light of basic qualities of energy framework, auxiliary voltage control techniques, plan and ideal arrangement of FACTS gadgets utilizing different streamlining calculations for VAR pay. This paper gives a writing audit of proposed techniques and arrangement ways to deal with organize and upgrade voltage control and responsive power administration, with an accentuation on applications at transmission and sub-transmission level.

Index Terms- Voltage profile, Reactive power, Sensitivity Analysis, FACTS, Secondary Voltage control.

I. INTRODUCTION

Voltage and receptive power framework control is by and large performed following common examples of burdens, in view of disconnected investigations of day by day and regular activities. The conventional and ebb and flow rehearse is to utilize settled every day or regular timetables for responsive power control. These conventional and enhanced practices are tested by the noteworthy increment in control age from sustainable assets, for example, disseminated sun powered age and sun oriented power plants. Work to confront these difficulties has been centered basically at the dispersion level, while approaches centered around the transmission and sub-transmission level have gotten less consideration.

With the appearance of the system and different conditions under which they work the receptive power and voltage profile administration winds up fundamental in order to guarantee the framework security and to utilize the responsive sources in an ideal way. Framework security is all around guaranteed with the arrangement of much interconnections yet this itself makes the framework security more intricate with the perspective of voltage control. This interconnected framework works diversely with a state of receptive power in view of structure and the place at which the generators are found. Henceforth it winds up troublesome for the administrators to discover the issues and their effect in order to take the fundamental activities. In light of conservative and natural restrictions, dependably the buyers are situated a long way from the power stations. It is additionally unrealistic to broaden the system which comes about the framework to work nearer to as far as possible. Subsequently, receptive power and its comparing voltage control has turned into a basic factor which makes it basic to control. As of late here, the way the capacities are upgraded with a superior assurance is appeared. The means followed in accomplishing better voltage profile control are: establishment of OLTC transformers, inductor or capacitor, pointers of voltage disappointment, control to upgrade the stream of energy, programmed voltage controller.

This paper gives a survey of proposed techniques and arrangement ways to deal with facilitate and upgrade voltage control and responsive power administration, with an accentuation on sub-transmission applications. Whatever is left of this paper covers a short outline of customary pragmatic way to deal with voltage control and receptive power administration; a couple of cutting edge industry applications in a few sections of the world; and a few proposed arrangements in the writing, generally centered around utilization of ideal power stream approaches.

II. DIFFERENT LEVELS OF VOLTAGE CONTROL

There are different levels of voltage control, for example, essential, auxiliary and tertiary. Essential level comprises of generators with programmed voltage controllers in order to protect amid the expansion in its breaking points. The critical point of control in optional level is to have a control over the voltage inside the framework. This includes in exchanging the brought together control to focal point of control. Consequently by this methods for control a flawless and a whole control and coordination wind up conceivable which brings about (I) solid voltage profile (ii) better utilization of responsive assets. The tertiary level control decides the ideal voltage profile and arranges the auxiliary controllers in view of sparing and wellbeing factor.

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III. OPERATING MEASURES TO PREVENT VOLTAGE COLLAPSE

Framework plan and different working measures embraced keeping in mind the end goal to avoid voltage fall are i) Application of the gadgets to remunerate VAR prerequisite. ii) System voltage control and control on VAR yield of the generators. iii) Managing the tap changing of the transformers. iv) To drop the heap amid under voltage. v) Proper task of defensive gadgets and their control.

IV. CONTROL TECHNIQUES BASED ON SENSITIVITY ANALYSIS

Mamandur et al., [1] built up a technique in order to have improvement in profile of voltage and to decrease the misfortunes of the framework by having control on voltages of generators, on tap settings of transformer, responsive influence assets that are flexible [2]. The utilized strategy depends on direct affectability relations keeping in mind the end goal to decrease misfortunes of the system and framework execution affectability relating ward and control variable. Double straight writing computer programs was utilized as a part of the assurance of modification of control factors ideally and additionally to fulfill the requirement. In the underlying cycle the size of the progression isn't constrained and was restricted in the accompanying emphases [3]. The power stream count was performed after each cycle. A calculation was proposed by Rama Iyer et al., [4] which can diminish the misfortunes in influence and in addition improve the voltage. Calculation fuses a technique which disregards crisscrossing arrangement around the point that is ideal. In every emphasis control stream computation was excluded. Subordinate factors were wiped out by affectability network depending on conditions of load stream. In both the strategies, it is required either to acquire finish backwards or to get halfway converse of Jacobian framework with a specific end goal to discover affectability grid, consequently including additional time especially for mass power frameworks [2].

A system was created by Elangovan [5] to assess line misfortunes sensitivities in light of factors, for example, voltages of the generator, influence save of VAR sources, setting on transformer tap. Eigen vector of transposed Jacobian lattice were utilized to produce the coefficient esteem. In this strategy Jacobian grid backwards isn't required yet this may not be much simple since it expands the unpredictability of eigen vector assurance with the expansion in size of the network. Bijwe et al., [6] displayed a control strategy to enhance voltage profile by methods for decreasing whole of weighted voltage deviation by first request inclination technique. A model of steady symmetric power stream communicated in rectangular co-ordinate was utilized. Consistent Jacobian network were utilized both in control stream and in Lagrangian multiplier computation utilizing enhancement method. The features of this method are

(I) Lagrangian multiplier estimation is profoundly simple and successful (ii) consistent Jacobian network is utilized as a part of energy stream and also in Lagrangian multiplier figuring. (iii) figuring of paltry transport control amid cycle of energy stream since Jacobian is highlighted with voltage varieties. Singh and Raju [7] developed a framework which is expertized in controlling the voltage. The methodology of control depends on the control transport affectability with reference to the transport damaging the points of confinement and the edge of control. At the point when this strategy was contrasted and decentralized strategy it is uncovered that this method is with higher exactness and includes couple of therapeutic strides of voltage control when considered with decentralized system. Hong and Yang introduced a skill technique for development in voltage amid low extreme possibility and to embrace the applicable advances to maintain a strategic distance from fall of the framework when accounted with high possibilities. The affectability for a heap voltage change to a variety of the OnLoad Tap Changer (OLTC) tap is utilized to confirm the necessity of locking OLTC taps for administrators. Another model joining factors for both voltage and dynamic power, for generator receptive power restrict was introduced for voltage soundness thinks about about [8]. Aghamohammadi et al., [9] proposed a neural system based strategy for online evaluation and for enhancing the edge of voltage strength at a more noteworthy speed. Voltage Stability Assessment Neural Network (VSANN) attempts to appraise the Voltage Stability Margin (VSM) on the web and to improve it. VSANN input design comprises of voltage profile of the system estimated by phasor estimation unit. The featuring perspectives are its capacity for VSM examination in view of affectability endless supply of the transport and VAR compensators. For a given moment VSM can be ascertained specifically from the learning of voltages of transports is the essential value of this strategy. Henceforth variety in framework topology coming about because of blackout does not have any impact on VSANN execution. Kulprakash et al., [10] centers around enhancing voltage by remunerating the VAR prerequisite based on deviation of voltage of the transport and in light of similar investigation done amongst hypothetical and genuine VAR esteem. The solidness examination was likewise done utilizing distinctive records, for example, Novel Line Stability Index (NLSI), Fast Voltage Stability Index (FVSI) and Line Quality Factor (LQF) which are more able to distinguish edge of framework security.

V. CONTROL TECHNIQUES BASED ON STRUCTURAL CHARACTERISTICS OF POWER SYSTEM

The vast majority of the issues being looked in control frameworks can be all around unraveled with a thought of basic relations on different parameters. Tajudeen et al., [11] have established the trademark files in light of innate structure utilizing parcelized Yadmittance lattice. Perfect generators, proclivity of generator and impact of structure on generator and load electrical fascination locales have contributed for the lists. With the records acquired the undertaking of assurance of the area of the new generator is streamlined and the area along these lines decided is likewise one of a kind. This area is identified with generator which is weakest and having more noteworthy electrical separation when alluded with generators and are with most prominent potential in infusing genuine power in framework. Tajudeen et al., [12] exhibited change of voltage profile by applying idea of circuit hypothesis and by Yadmittance parcel on systems. Eigen esteem deterioration and
divided Y-induction grid recognize the area for VAR compensators. Transports related with littlest eigen esteem have overwhelming impact on whole voltage of system based on contrarily corresponding connection existing between transport voltage and eigen esteems. This uncovers the exceedingly appropriate areas for dispensing VAR compensators since these transports are those which have more noteworthy electrical separation from generators. State factors of VAR compensators are comprised in stack stream strategies and consequently control stream arrangement can be utilized to decide the proper compensators sizes.

VI. CONTROL TECHNIQUES BASED ON SECONDARY VOLTAGE CONTROL

Dragan [13] endeavored auxiliary voltage control amid unsteadiness because of voltage in light of prior outcomes around there. At first the examinations of essential, decentralized and unified auxiliary voltage control at stack level for basic framework amid shakiness because of voltage is performed. Results uncover that a superior steadiness edge is accomplished when SVC is actuated on AVRs as opposed to with essential voltage control execution. In the event that the voltage flimsiness is as of now started pilot transport voltage control isn't compelling. Two conceivable Centralized Secondary Voltage Control (CSVC) crisis modes were considered. In first approach, three stages of direction was utilized to change the set purposes of generator programmed voltage controller where each progression is of eight seconds bringing about early damping of swaying. Then again, generator programmed voltage controller set focuses were done in five stages of littler size. Dragan researched probability of expanding solidness edges through co-appointment of Automatic Secondary Voltage Control and versatile parameter change in control framework stabilizer. The circles of control, for example, Automatic Secondary Voltage control and power framework stabilizer influence same parameter on different grounds and in this manner influenced one is setpoint of AVR. Inside a couple of arrangement of direction steps programmed optional voltage control makes framework achieve consistent state with better edge of solidness. Then again, by methods for control framework stabilizer parameter versatile resetting, framework execution was changed with expanded edge of solidness inside existing relentless state. Subsequently these two circles of control guarantee edge of dependability in bigger framework. Shenghu Li et al., [14] proposed show in view of affectability for temperate dispatch of VAR to hold SVC VAR save and additionally to keep up the voltage profile at the alluring level. Reference voltage, static voltage normal for framework, edge of control, inclines are the elements deciding the Static VAR Compensator capacity of control. Basic Static VAR Compensator is recognized by susceptance increase amid pay and it is that gadget which isn't inside the points of confinement of control and this facilitates the SVC yield at different areas. Gehao Sheng et al., [15] exhibited a technique to actualize and co-ordinate SVR framework depending on multi-operator hypothesis. Each controller is characterized as the controlling specialist and the technique well uses essential voltage controller to hold voltage under general and save activity. The feature of this strategy is its ability to perform under possibility. Rui Jovita et al., [15] displayed a technique including Joint Voltage Control and line drop pay that is fit in controlling the voltage at an area which is most distant from control station. The features are prerequisite of a gadget for correspondence amid annoyance just and snappier reaction. Auxiliary voltage control reference is consequently characterized for whenever without the worry of the administrator.

VII. MODELLING AND OPTIMAL PLACEMENT OF FACTS DEVICES FOR VAR COMPENSATION

Laszlo Gyugyi depicted the way controllable synchronous voltage sources were utilized as a part of transmission control stream and as unique compensators. On contrasting this usage and regular techniques, it demonstrates a superior trademark execution and its capacity for edge control and voltage impedance in transmission frameworks [16]. What's more it is equipped for having an autonomous control on VAR compensators alongside coordinate dynamic power trade with AC framework. Henceforth giving a compelling reaction to different dynamic unsettling influence [17]. Preecha Preedavichit et al., [18] have considered the settings of FACTS gadgets as one of the controlling parameters while defining for the dispatch of receptive power ideally. The impact of this strategy on minimization of framework misfortunes was investigated. Plan includes static models of Static Var Compensator (SVC), Thyristor Controlled Phase Angle Regulator (TCPAR), Thyristor Controlled Series Compensator (TCSC). Ideal area for FACTS gadgets are gotten utilizing affectability lists introduced. Detailing of ideal responsive power dispatch issue with FACTS gadgets result in considerably more diminishment in genuine power misfortune when contrasted and ordinary strategies. Ideal Reactive Power Dispatch (ORPD) with FACTS definition upgrades the voltage alongside minimization of genuine power misfortunes. Prada et al., [19] have tended to the opposite connection between extent of voltage and VAR in transports with control on voltage and their resultant prompting voltage crumple. This is checked by a record det D' for a given purpose of task. This connection is confirmed for all ideal power stream situations once in the wake of sitting and measuring of VAR assets were finished. Result in this way acquired is worthy if all D' > 0, else a requirement is incorporated new in the OPF issue. Basic voltage from Qg-V is added to have legitimate voltage control and the issue is continued to acquire another arrangement. Saiedpour et al., [20] have considered by methods for fluffy controller plan STATCOM control in order to advance the voltage profile. The great strategies were not favored because of inalienable time delay. Fluffy controller especially went for renunciation because of its consistent and speedier outcome for change in voltage. The outline is accomplished utilizing hereditary calculation and is named as total, synchronous and consistent plan of control framework. Arun Bhaskar et al., [21] have demonstrated the displaying of FACTS gadgets, for example, SVC, TCSC and TCPST [22] and the way they improve voltage profile. Jizhong Zhu et al., [11] revealed the best approach to include composed SVC in the issue of ideal VAR dispatch and have broke down its impact in diminishment of misfortunes of framework and in change of voltage profile. Coordinated SVC is fit for controlling neighborhood and remote
gadgets at a similar moment. VAR control and voltage control are the two operational modes. A list of performance in order to acquire viability in VAR advancement alongside co-ordinated SVC over lessening of misfortunes and change of voltage was appeared. Bharat Thapa et al., [23] broke down the STATCOM impacts on the voltage profile, on dynamic – receptive energy of various transports when the event of the blame in the power framework.

VIII. TRADITIONAL APPROACH TO VOLTAGE CONTROL IN TRANSMISSION AND SUBTRANSMISSION AND CURRENT CHALLENGES

Voltage control and receptive power administration is a limited issue for which gadgets with for the most part neighborhood data are utilized. Responsive power assets could either be controlled consequently or physically. Cases of programmed control are programmed voltage controllers in generators, on-stack tap changers in transformers, line voltage controllers, and naturally exchanged capacitors. These gadgets more often than not respond to nearby voltage estimations contrasted and a reference setting. Then again, physically on/off controlled gadgets could be tap changers in transformers, capacitors, and the dedication (on/off) of synchronous compensators and generators with the essential capacity to give receptive power bolster. The settings for the programmed voltage control and requirement for manual exchanging can be characterized halfway. NERC Reliability Standards give prerequisites appropriate to transmission administrators [24] and generator administrators [25]. The guidelines in [24] cover prerequisites to transmission administrators to set up voltage plans, speak with neighboring transmission administrators, and characterize plans for responsive power assets, among different necessities. The principles in [25] expect generators to work in voltage/responsive power control modes demonstrated by transmission administrators, tell transmission administrators of changes of status and changes of receptive power ability, among different prerequisites. To meet the NERC necessities, transmission administrators depend on disconnected investigations to decide plans for setting and on/off responsibility of assets. Transmission administrators likewise depend on restricted programmed control that takes after predefined control settings. At the transmission and sub-transmission level, generator voltage references are normally planned at settled esteems and not changed amid task time allotment. When all is said in done, voltage reference plans for generators and exchanging timetables of tap chargers and capacitors are resolved utilizing data from yearly or regular arranging power-stream ponders. For most utilities on the planet, utility specialists physically plan voltage set point settings in generators and shunt-component exchanging in light of hourly, week by week, and regular examples of framework conditions, as per arranging thinks about, and in light of surely understood load designs. Concentrated checking and control, for example, coordinated volt/var control, have been executed in conveyance frameworks, normally additionally expecting surely understood power-stream examples and load qualities. The customary voltage control and receptive power administration approach is tested by the expansion of sunlight based disseminated age, which changes the typical net load examples and power-stream attributes. These progressions require new answers for responsive power administration and voltage control in both circulation and sub-transmission frameworks, when sun oriented dispersed age and plants are associated with the power framework.

IX. ADVANCED INDUSTRY APPLICATIONS

An automatic, hierarchical control to modify voltage set points for generators, in real time, has been studied and implemented in Europe, especially in France and Italy. This hierarchical control is known as secondary voltage regulation (SVR). SVR was implemented to solve voltage collapse problems and to increase power transfers. These schemes add automation at regional levels to the voltage control problem, which has been traditionally a manual process, as discussed in Section II. SVR measures voltage at specific voltage pilot buses that are representative of a particular area of the power system. With this measurement, SVR determines the reactive power level of the specific area. This forms part of a hierarchical structure that could have an upper, national, tertiary level of control. The SVR systems were developed in the 1980s and have continued to be improved since then. There has been a tendency for SVR schemes to include optimization with consideration of network topology through sensitivity matrices, and use of larger set of measurements. These optimization layers have been added to the upper parts of the hierarchy that cover larger geographical areas (regional or national levels) and are slower in time response (minutes). In general, progress in SVR has been made for the bulk transmission system with the focus on improving voltage stability and power transfer. The main focus in SVR has been to provide real-time voltage set points for generators. Operation of switching shunt reactors and capacitors has been mainly manual and performed by system operators. In a recent effort, a hierarchical two-level voltage controller has been proposed for application in California, USA. A substation localized layer controller is the main development. The substation controller decides transformer tap changer and capacitor switching settings based on a localized information. A central controller, running optimal reactive power flow, provides voltage schedules to substation controllers.

X. CONCLUSION

Customary ways to deal with voltage control and receptive power administration are tested by the expansion of sunlight based appropriated age, which changes the net load examples and power-stream attributes. This change requires new answers for receptive power administration and voltage control in both circulation and sub-transmission systems. Based on the audit it is watched that different procedures utilized are the strategies spreading in light of methods like Sensitivity examination. Secondary voltage control, assessment of Voltage soundness files in view of system auxiliary qualities and position of VAR compensators at appropriate areas. The audit of the paper has given an understanding of different issues being looked due to absence of voltage control in Power frameworks and their

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answers for a superior Voltage-VAR adjust for a solid activity of the framework.

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Study of Different Resistance Mechanisms in Stored-Product Insects: A Review

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Abstract- Stored grain pests have developed resistance against almost all kinds of pesticides and fumigants due to frequent and non-proper use of pesticides and fumigants. In postharvest ecosystems, the development of insecticide resistance among stored grain pests has threatened the global food security. Comprehensive detail of common mechanisms behind pesticide resistance in stored grain pests has been described in this review. The different resistance mechanisms stored grain pests usually developed to cope with pesticidal stress, include physiological mechanism, behavioral mechanism and biochemical mechanism. All the aspects of resistance mechanisms should be known in order to design effective strategy for the proper control of target pest.

I. INTRODUCTION

Global food production cannot be enhanced by only increasing the yield of food crops but also reducing all the elements which have adverse impact on food productivity. Major cause of post-harvest stored grain condiments losses are due to stored grain pests especially by insects estimated approximately 30% of 1800 million tons of stored grain. High rate of reproduction and short generation period usually make insects most ruinous pest of stored grain commodities as compared with pest. Although it is reported that 20 species of insects (excluding psocids) out of the 100 are evaluated as most destructive pests and are cosmopolitan by distribution (Haubruge et al., 1997; Andrew, 2004).

Among the stored grain insect pests, T. granarium, R. dominica, S. oryzae, Sitotroga cerealella and T. castaneum, are ruinous to great extent bringing about at least 5-10% loss over a year due to non-proper use of pesticides (Baloch et al., 1994; Tubiello et al., 2007).

Traditional strategies like use of plant extract, ginger, garlic lemon leaves typically are low-cost strategies of post-harvest handling of the crops but they have limited use because of many circumscriptions (Dakshinamurthy, 1988).

Mostly insect infestation of cultivated crops, plants and stored grain is controlled by chemical control methods with insecticides which are deployed mainly for the eradication target insect in specific area. Majority of insecticides are very noxious that is why specific pesticides with acceptable recommended doses for stored grains and possess no health concerns are mainly used. On the basis of chemical group present in insecticides are categorized as (OP) carbamates, organochlorines (OC), Organophosphates and pyrethroids among them organophosphate and pyrethroids are deployed on ample scale now days. Other pesticides deployed against insect pests are chlorpyrifos methyl, primiphos methyl, methyl parathion, lindane, piperonyl butoxide, diazinon dichlorvos, pyrethrins and malathion etc. (White et al., 1995; Lessard et al., 1998).

Fumigation is reasonable strategy by which a target pest can be killed by taking advantage from its respiration and plays very crucial part for the security of stored food products against rodents, insects and mites (UNEP, 2002). Commonly used fumigants for stored grain pests are, carbonyl sulphide (Desmarchelier 1998; Xianchang et al. 1999), ozone (Mason et al. 1999), hydrogen cyanide and ethyl formate (Haritos et al. 1999) and phosphine. However, phosphine is most advantageous for the proper management of stored grain pest due to cheap cost, safe appliance to a lot of stored food condiments, and it is also acknowledged as a buildup free treatment on a global scale (Schlipalius et al., 2002).

Although development of insect resistance among stored grain pests has become a universal phenomenon in recent years due to frequent and non-proper use of pesticides and fumigants. Insect resistance is described as the adaptation that target pests have developed in order to makes its survival possible at the recommended dose of an insecticide that could be toxic to rest of pests in a normal population (Subramanyam and Hagstrum, 1995; Gwinner et al., 1996).

There are numerous elements which contribute in conferring resistance to insect pest among stored grain pests such as biochemical, physiological and behavioral. Biochemical factors govern resistance by inducing enzyme which may cause activation and detoxification of insecticides thus ultimately makes target enzyme insensitive. Mutations induce overproduction enzymes of detoxification system of insects. Physiological mechanism confers insect resistance by penetration (inhibition of transport of insecticide), and insensitivity of nerves. Development of behavioral resistance in insects depends on the period of contact with insecticidal residue (Georgihiou, 1972).

This study focuses about resistance mechanisms and comprehensive information especially on biochemical, molecular and behavioral resistance mechanisms in stored grain insects.

Mechanism of development of resistance to insecticides

Ishaaya (2001) classified the insecticide resistance mechanism into three major groups that are generally found in

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insects included biochemical mechanism, physiological mechanism and behavioral mechanism. Although biochemical mechanism of insecticide resistance is divided into two types:  
1. Target site mechanism  
2. Detoxification mechanism

i. Voltage gated sodium channels  
Voltage-gated sodium channels (VGSC) regulate the electrical signaling in nerve cell membranes. It belongs to class of large trans-membrane spanning proteins. Such kinds of protein usually have one pore-forming α-subunit of about 260 kDa and up to four smaller α-subunits of about 30-40 kDa. The α-subunit is the main structural element and composed of only one trans membrane polypeptide chain with four internally repeating homologous domains (I to IV), each with six hydrophobic trans membrane segments (S1 to S6) connected by intracellular or extracellular loops. S5 and S6 helices form the central pore, whilst S1-S4 helices form the voltage sensing domains. Such kind of conformation makes the channel permeable to the sodium ion that is crucial for the normal transmission of nerve impulses (Catterall, 2000). Because it plays crucial role in electrical signaling, sodium channels are served as major target for several natural or synthetic neurotoxins, like pyrethroid insecticides. It is reported that pyrethroids, pyrethrins and DDT act on the VGSC and induce a changes in the gating kinetic, usually by reducing the rate of deactivation which lead to prolonged opening of the individual channel which cause repetitive discharges through the nerve and ultimately lead to the paralysis and the death of target insect pests (Davies et al., 2007; Soderlund, 2012).  

Several sort of target-site mutations in the sodium channel protein have been reported in numerous insect species. However few of them have been studied functionally by expressing mutant gene in Xenopus oocytes, and their role in reducing sodium channel sensitivity to pyrethroids have been ascertained; however, majority of them were not characterised (Rinkevich et al., 2013).  

In M. domestica non synonymous mutations were first reported and described as “knock-down resistance” as they govern resistance to the paralytic effect in resistant insect in response to (knock-down) pyrethroids and DDT (Busvine, 1951; Williamson et al., 1996).  

ii. Acetylcholinesterases  
Acetylcholinesterase (AChE) is the enzyme that catalysis the hydrolysis of the excitatory neurotransmitter acetylcholine (ACH) which is responsible for the nerve impulse transmission across the cholinergic synapses. It is reported that organophosphate (OP) and carbamate insecticides usually denature acetylcholinesterase by phosphorylating or carbamylating the critical serine residue in the active site of enzyme thus inhibition of AChE activity lead to the accumulation of ACh in the synapse causing a continuous stimulation and ultimately the death of the insect (Eldefrawi, 1985; Casida and Quistad, 2003). Modification in the primary structure of the AChE due to mutation makes it insensitive to OPs and carbamates and provides to the insect some levels of resistance (Fournier and Mutero, 1994). In resistant insect several point mutations have been reported especially in the region of AChE genes (ace) that code for the active site of the enzyme. Such kinds of mutations generally govern resistance of different degree due to this reason variable effects have been observed in response to different insecticide among insects (Fournier, 2005). Although, it is also reported that different insects have variable number of AChE gene but most of the insect species have two genes, ace-1 (paralogous to ace) and ace-2 (orthologous to ace) encoding for two different acetylcholinesterases, AChE1 and AChE2 while higher Diptera have only one gene (ace) for AChE (Fournier, 2005).  

iii. Nicotinic acetylcholine receptors  
Nicotinic acetylcholine receptors (nAChR) are mainly found in nervous system of insects.  

They are proteins by nature and contain at least two binding sites for neurotransmitter ACh. These binding sites should be bound by ACh to initiate the channel opening (Karlin, 2002). Nicotine and the neonicotinoid insecticides activate the receptor because they mimic the neurotransmitter ACh and subsequently induce the influx of sodium ions with the stimulation of action potentials. As it is described above those insecticides denature the AChE and thus prevent the destruction of neurotransmitter at synapses. Subsequently continuous generation of synaptic action potential leads to hyperexcitation, convulsion, paralysis and death of the insect (Jeske and Nauen, 2005). Although, modified nAChR and its correlation with respect to alteration in the sensitivity to the effect of the insecticides has been evaluated in several insect species (Nauen and Denholm, 2005; Crosthwait et al., 2014).  

iv. GABA receptors  
GABA gated-chloride channels receptors (GABAR) are class of membrane-bound proteins belongs to the superfamily of ligand-gated channels known as “Cys-loop” and have of receptors 5 subunits that form a central ion pore; each subunit has a long N-terminal domain that is a part of the GABA binding site. They are mainly found in the central nervous system and also at the peripheral neuromuscular junctions. GABA gated-chloride channels receptors are deactivated by Y-aminobutyric acid (GABA) and subsequently nerve impulse inhibition took place (Buckingham and Sattelle, 2005). Cyclodiene insecticides, usually bound to the GABA binding site, prevent the binding of GABA neurotransmitter at the same receptors and subsequently inhibit the impulse transmission (Blooomquist, 2001).  

Target site mutation in GABAR gene makes the binding site of receptor insensitive for the insecticide in resistant insect. Such kind of mutation has been analyzed in many insect pests for example gene called Rdl (Resistance to Dieldrin), have been studied from a field collected population of Drosophila.
melanogaster (fFrench-Constant et al., 1993; Buckingham and Sattelle, 2005).

v. Ryanodine receptors

Ryanodine receptors (RyR), which is also known as ryanodine-sensitive calcium release channels, belong to class of large tetrameric proteins mainly found in sarcoplasmic/endoplasmic reticulum membrane in muscles and nervous tissue. They have the same basic structure of the sodium channels, with 4 homologous domains arranged around a central ion pore. RyR is important for many physiological activities such as muscle contraction by calcium regulation because when these receptors are stimulated by their ligand cause withdrawal of calcium ion from intracellular stores (Hamilton, 2005). Efficacy of both flubendiamide and anthranilic diamides, have been recently determined against lepidopteran pest species. They target the RyR activators and adversely affect the calcium homeostasis release causing which disrupt the muscles contraction of target insects pests, which cause paralysis and death (Nauen, 2006). Although resistance to such insecticides (flubendiamide and anthranilic) with respect to target-site mutation in the membrane-spanning domain of the RyR has recently been evaluated in the diamondback moth Plutella xylostella, a global lepidopteran pest of cruciferous crop (Trocza et al., 2012).

2. Detoxification mechanism

Majority of the enzymes involved in the detoxification of xenobiotics are part of large multigene families generally known as mixed function oxidases, esterases and glutathione S-transferases (Van, 1962).

Generally xenobiotics such as insecticides and other toxicants in insects are detoxified by oxidation via mixed function oxidases (MFO) that is why such enzymes are very crucial. Mixed function oxidases (MFO) govern resistance to insect pests against xenobiotics because it is observed that resistant insects have high level of MFOs than in their susceptible member and such elevated level of MFOs is contributed by gene expression not amplification (Carino et al., 1994; Tomita et al., 1995). The mechanism of detoxification of xenobiotics has been correlated with MFOs after the discovery of multifunctional enzymes of cytochrome P-450 complex.

Although studies have also been revealed that different sorts of xenobiotics cause induction of several kinds of cytochrome P-450 capable of distinct catalytic properties (Cooney, 1967).

Approximately, 62 families of cytochrome P-450 have been identified in animals and plants and whereas four families (i.e. 4, 6, 9 and 18) have been studied among insects. It has also been found that cytochrome P-450 oxidases (occur in cluster of genes) which is a member of family 6 are mainly involve in detoxification of xenobiotics and hence give resistance to target insect pest. However, NADPH and oxygen are required for proper activity of MFOs (Gunsalus, 1972).

Whereas, alternations in activities of different esterases are also correlated with pesticide induced resistance among insects (Needam and Sawicki, 1971; Hughes and Devonshire, 1982). Esterases usually catalyze the hydrolytic reactions which involve the cleavage of halide esters, peptides, thioesters and amides so it is concluded that insecticides usually have esters of substituted carbamic, phosphoric or cyclopropane carboxylic acids that is why they are hydrolyzed by these esterases (Devonshire, 1991).

There are six families of esterases found in the form of gene cluster on same chromosome (Cygler et al., 1993; Russel et al., 1996; Cambell et al., 1997). Point mutation in just one member of gene cluster, transformed the esterases into insecticide hydrolase. It is also observed in resistant population of insects that elevated activity of esterase is responsible for the detoxification of insecticides (Openoorth and Van, 1960; Casida, 1973). Likewise, Carboxyl esterases, acetylcholine esterases, aryl esterase and choline esterase are also involved in the neutralization of neutralization of xenobiocides and govern resistance to insect (Ellman et al., 1961; Fournier and Mutero, 1994).

Glutathione S-transferases are usually crucial for the detoxification of cyclodienes organochlorines and organophosphates by resistant insect (Yu, 1996; Yu, 2002; Boyer et al., 2007; Fragoso et al., 2007). Many organisms possess several kinds GST; it is taken into account that that elevated catalytic activity of GSTs is correlated with resistance to insecticide. It is also proposed that GSTs may act as binding proteins or may elevate the activity of other detoxification enzymes like esterases (Grant and Matsumura, 1989; Kostaropoulos et al., 2001). Gene of GST are also found as cluster of genes that shuffled through recombination of genome, and so a member of multiple genes responsible (Grant et al., 1991; Ranson et al., 1997; Prapanthadara et al., 2000).

The role of GSTs has been demonstrated in insecticide resistance in the mite Varroa jacobsoni (Hillesheim et al., 1996), Helicoverpa armigera (Hubner) in German cockroach species (Wu et al., 1998) and in Plutella xylostella L. (Yu and Nguyen, 1996; Ali and Turner, 2001).

3. Behavioral resistance

Behavioral resistance developed in insects when they learn to repudiate pesticide. This phenomenon is required stimulus and resistant insects become able to identify the danger and simply avoid feeding or leave the treated area, walking or flying away. Usually such kinds of insects possess well developed receptors by which they can detect even lower concentrations of insecticide as compared with susceptible insects (Yu, 2008).

4. Physiological resistance

Physiological resistance involves the interactions of various metabolic factors. Mainly specific genes conferred physiological resistance to insecticide that is accomplished either by increased metabolism or reduced sensitivity of target sites that are usually acetyl cholinesterase, gamma-amino butyric acid and para-sodium ion channels (Miller, 1988).

5. Other resistance mechanisms

Main mechanisms of resistance among insects are target site and metabolic resistance. Although there are many other mechanisms of insect resistance that are given less important because they are considered to confer minor resistance to insecticides. However, they may be only modest role in insecticide resistance can be manipulated by conjoined with major mechanisms in the same insect.
1. **Pgp pumps**

P-glycoprotein (Pgp) transporters are integral membrane proteins and member of ATP binding cassette (ABC) superfamily. They translocate several kinds of metabolites and xenobiotics across cellular membranes with the expenditure of the energy derived from hydrolysis of ATP (Hollenstein et al., 2007). The role of Pgp pumps in the removal of variety of toxic compounds from cells have been demonstrated in term of mechanism of antibiotic resistance in bacteria and of fungicide resistance in fungi. Although its physiological role have not yet been properly understood in insects (Lage, 2003). However, role of ABC transporters have recently been studied in insects as a putative mechanism which govern resistance in insects by facilitating efflux transport of insecticides and their metabolites derived from phase I and II reactions (O’Donnell, 2008). The role of Pgp pumps in insecticide resistance has been evaluated in term of increased expression of genes encoding ABC transporters in many insect species (Porretta et al., 2008; Aurade et al., 2010; Bariami et al., 2012). Dermauw and Van Leeuwen (2014) has recently been reviewed many cases of survey which suggest the involvement of ABC transporters in insecticide resistance. ABC transporters govern resistance to insecticides by several kind of mechanisms based on the quantification of transcript or protein levels and by synergism studies using ABC inhibitors (Buss and Callaghan, 2008; Dermauw and Leeuwen, 2014). However, in different lepidopteran species a mutant allele has recently been recognized with respect to its role in conferring resistance against the pore-forming Cry1Ac toxin from *Bacillus thuringiensis* (Bt) by a mechanism that causes the the loss of Cry1Ac binding to membrane vesicles rather than toxin extrusion (Gahan et al., 2010; Heckel, 2012).

2. **Penetration resistance**

Penetration resistance is a sort of adaptation which prevents the insecticide to reach its target by penetrating through the cuticle of resistant insect. Penetration resistance develops due to physico-chemical alterations in the structure of cuticle that subsequently decrease the absorption of the chemicals thus the modest amount of the insecticide can pass through such physical barriers. Although, this mechanism govern small degree of resistance to insect despite of the fact that it protects insects from many kinds of xenobiotics. Rather, it exerts its impact through its combination with other resistance mechanism, intensify their effects. It is suggested that detained and low rate of penetration may provide more time for the detoxification of the xenobiotics (Oppenoorth and Welling, 1976; Scott, 1990).

Development of resistance in insect pests against insecticides

1. **Mechanism of resistance to organochlorines**

The organochlorines are primarily detoxified by dehydrochlorination and microsomal detoxification (Agosin et al., 1961). Dehydrochlorination is mainly catalyzed by enzyme dehydrochlorinase and it was first discovered in 1950 in housefly (Sternburg et al., 1950). After that it was also reported in other species. Such enzyme is considered under the control of Semi dominant gene (Deh) in housefly. Whereas, microsomal enzymes are also reported in various strains of European housefly and other taxa of insects and such enzymes are under the control of DDTmd gene which is a semi-dominant gene as well. This gene governs resistance to DDT and diazinon by microsomal detoxification. Although such findings showed coexistence of DDT and diazinon resistance in few strains of the housefly, while this gene is not common in this insect taxa. Substitution and alternation in kdr and super kdr gene is also correlated with resistance to organochlorines (Oppenoorth, 1965; Oppenoorth and Houx, 1968).

2. **Development of resistance to organophosphates and carbamates**

Acetylcholinesterase (AChE) is the target site for organophosphate and carbamate insecticides and mutation in this enzyme usually govern resistance against them (Fournier and Mutero, 1994). However, resistance to organophosphorus insecticides is also correlated associated with the depleted activity of carboxylesterase (CarE) in *Musca domestica* and *Drosophila melanogaster* species (Campbell et al., 1997).

3. **Development of resistance to pyrethroids**

It is observed that DDT and pyrethroids attack on the central nervous system of the insects, induce convulsions, paralysis and subsequent death, this phenomenon is called knockdown. Although, unlike DDT pyrethroids have not harmful concerns regarding environment, animal and human health that is why they have widespread use. Just like DDT single amino acid substitution in protein encode for the voltage gated sodium channel in the central nervous system, is considered as the main pyrethroid resistance mechanism (the knockdown resistance phenotype, kdr) (Martins, A.J. and Valle, D., 2012).

4. **Fumigants**

Fumigants kill insects by neurological, metabolically or oxidative stress. It has been observed fumigants toxicity is temperature dependent. Generally high temperature increases the respiration of insects thus more fumigant is inhaled whereas low temperature has inverse impact (Ahmdani, 2009).

a. **Mechanism of phosphine toxicity to stored product pests**

Mechanism of phosphine toxicity has not yet been clearly understood although physiological and biochemical alternations which occur as a consequence of phosphine exposure can be classified as neural, metabolic and redox related response (Nath et al., 2011).

Phosphine inflicts neural response via increasing acetylcholine neurotransmission by the denaturation of an enzyme acetylcholine esterase (Al-Azzawi et al., 1990; Potter et al., 1993). It also is proposed that activation of acetylcholine signaling by phosphine leads to increase in metabolic output and also raise the metabolic demand which subsequently result in hypersensitivity to phosphine (Valmas et al., 2008).

Phosphine toxicity is correlated with disturbance in energy production mechanism by mitochondria as well (Chefurka et al., 1976; Jian et al., 2000; Dua and Gill, 2004; Singh et al., 2006).

Phosphine hinders respiration by mitochondria as a result insufficient amount of energy is generated which causes mortality of insects. Though, there is a correlation between energy metabolism and phosphine toxicity. (Chefurka et al., 1976; Price and Dance, 1983; Schlipalius et al., 2006; Dua et al., 2010). It is considered that phosphine exerts its toxic effect either via increased rate of metabolism or energy depletion inflict
mortality of insect after phosphine exposure (Valmas et al., 2008).

It has been reported that phosphine brought oxidative damage to biological macromolecules (Chaudhry and Price, 1992) by cytochrome c inhibition. As a consequence reactive oxygen species (ROS) is generated which decreases energy metabolism, so this is evident to ascertain that insect may become resistant to phosphine by metabolic suppression.

The possible mechanism can be linked with uptake of phosphine is either availability of oxygen (Because when oxygen is absent phosphine is not absorbed and loses its insecticidal potential) or rate of respiration and metabolism i.e low rate of respiration and metabolism may be proposed as mechanism of resistance to phosphine in S. granarius (Bond and Monaco, 1967; Bond et al., 1969; Monro et al., 1972; Kashi, 1981; Pimentel et al., 2007).

II. CONCLUSIONS

The main objective was to give inclusive detail on the resistance mechanisms of stored-product insects. It is suggested that understanding of all elements of resistance mechanisms among stored grain pests are very important for the planning of effective strategy in order to combat resistant insect pest.

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Disaster Risk Reduction Management Services in the Municipality of Santa Cruz, Province of Laguna: Input to SUC’s Extension Program on DRRMS Education

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ABSTRACT

A research involving the Assessment of the Implementation of Disaster Risk Reduction Management (DRRM) functions and services provided by the council of Santa Cruz, Laguna is described in this paper.

The descriptive method of research was employed in this study to gather the necessary data and information on the disaster risk reduction management and services.

Input variables on the functions included are as follows: Research and Planning, Administration and Training, Operation and Warning. While on the service being offered by Local Government Units (LGU) was Early Warning System, Search and Rescue, Relief Operation, Evacuation, Health Services, Transportation Services, Security Services, Emergency Management, and Fire Protection.

The goal of the researcher that the determining disaster implementation and the level of perception of the community of Santa Cruz, Laguna on the functions and responsibilities of LGU are approaches that help to attain the goal and objectives indicated in R. A. 10121, and lead to the, 1.) Development of policies and plans of Provincial Disaster Risk Reduction and Management Office (PDRRMO) of Laguna. 2.) Creation of extension programs by the State University and Colleges that greatly help the community before, during and after disaster, since the role and importance of education and school in DRRM has already been identified. State Colleges and Universities involvement in DRRM aims to raised advocacy and public information, education and training, emergency health and medical services, and alternative learning to the victims after humanitarian crises by uplifting the morale and addressing the community issues and needs in holistic manner.

The community is the end-beneficiary of this assessment in as much as they are the recipients of possible extension program by the SUC. Furthermore, through this study, the community able to know what is currently being undertaken in their respective locality.

INTRODUCTION

The typhoons that hit the country in recent years have become stronger in intensity and caused far greater damages than past weather disturbances. Typhoon “Yolanda” last 2013 and “Glenda” which battered Luzon and Metro Manila last August 2014 brought heavy rains which submerged several cities, causing countless deaths and several hundred million pesos in damage to property (NDRRM, 2011).

The municipality of Santa Cruz is situated on the banks of Santa Cruz River which flows into the eastern part of Laguna de Bay in the North, by Lumban and Pagsanjan towns in the East. It is approximately 87 kilometers from Manila via Calamba and 105 kilometers via Pililla, in the province of Rizal. It is accessible by land from the nearby 28 municipalities and by water through Laguna de Bay from manila and some Rizal towns. According to 2010 census, it has a total population of 110,943 people. It is presently classified as a first class municipality in Laguna.

In year 2009, typhoon Santi brought casualties of one (1) death and damages of 4,288 houses while typhoon Ondoy brought casualties of one (1) injured and 3 deaths and damages of 4,137 houses wherein Santi and Ondoy brought damages to infrastructures with a total amount of P 72,000,000.00 and in agriculture amounting of P 16,100,000.00. So, with typhoon Glenda brought casualties of fourteen (14) injured and two (2) deaths and damages of 3,678 houses and in agriculture with a total cost of P 276,905,419.571. (PDRMO, Santa Cruz, Laguna).

Keywords
RESULTS AND FINDINGS

Perception on Disaster Risk Reduction and Management Council Functions

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research and Planning</td>
<td>3.795</td>
<td>0.643</td>
<td>Agree</td>
</tr>
<tr>
<td>Administration and Training</td>
<td>3.866</td>
<td>0.636</td>
<td>Agree</td>
</tr>
<tr>
<td>Operation and Warning</td>
<td>3.739</td>
<td>0.652</td>
<td>Agree</td>
</tr>
<tr>
<td>Overall Mean</td>
<td>3.800</td>
<td>0.637</td>
<td>Agree</td>
</tr>
</tbody>
</table>

The respondents’ perception on DRRM Council functions have an overall mean of 3.800 (SD=0.637) which indicates that DRRM Council was very good, as agreed by the respondents, in facilitating and implementing their functions in terms of research and planning, administration and training, as well as operation and warning.

According to Medury (2001), research and planning in view of risk reduction management involves a multi-disciplinary team expert or people knowledgeable about a diversity relating to disaster risk management. This require defining the boundaries of what they will strive to achieve, how they will function, clarification of their roles and responsibilities, logistical arrangements and resource needs, meeting procedures, and broader network and communication links for a better planning parameters.

Chatterjee, et.al. (2010) found out on their study that proper administration, training and coordination may influence a variety of external factors as well as those inherent to the coordination system such as governance structure, local capacities for response, funding, timeliness of coordination efforts, stakeholder partnership, composition of coordination mechanism and information management systems.

The activities that are commonly associated with disaster is operation and warning or preparedness which include developing and planning processes to ensure readiness, formulating disaster plans, stockpiling resources necessary for effective response, and developing skills and competencies to ensure effective performance of disaster related tasks.

According to McLuckie, (2008), operation and warning is one of the most important type of disaster communication, allowing the recipients to avoid the threat altogether or to significantly lessen its effect.

Extent of Implementation of DRRM Council Services

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Warning System</td>
<td>3.787</td>
<td>0.674</td>
<td>Implemented to a great extent</td>
</tr>
</tbody>
</table>

The extent of implementation of DRRM Council Services in terms of Early Warning System was 3.787 (SD=0.674); Search and Rescue 3.787 (SD=0.665); Relief Operation, 3.975 (SD=0.666); Evacuation 3.806 (SD=0.700); Health and Services 3.578 (SD=0.626); Transportation Services 3.474 (SD=0.640); Security Services 3.516 (SD=0.614); Emergency Management 3.517 (SD=0.652); and Fire Protection, 3.404 (SD=0.663).

The overall mean rating of 3.649 manifest respondents’ agreement that the extent of implementation of DRRM Services was found out to be in a great extent. The responses appear to be homogeneous as shown by the small values of standard deviations.

The findings confirm Balita (2012) in his study that the Bureau of Fire Protection responded to any form of disaster including earthquake-induced collapsed structure incidents. The level of expectations of the public that we serve however fall short because of the current situation and the predicament of the office in terms of quantity or manpower strength, quality of manpower in terms of training; the available tools and equipment, supplies and materials are inadequate.

Relationship of DRRM Functions to the Extent of Implementation of DRRM Council Services

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Research and Planning</th>
<th>Administration and Training</th>
<th>Operatio and Warning</th>
<th>Significanc e</th>
<th>Strength of Relationship</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Warning System</td>
<td>0.598**</td>
<td>0.648**</td>
<td>0.578**</td>
<td>0.000</td>
<td>moderate</td>
</tr>
<tr>
<td>Search and Rescue</td>
<td>0.682**</td>
<td>0.682**</td>
<td>0.548**</td>
<td>0.000</td>
<td>moderate</td>
</tr>
<tr>
<td>Relief Operation</td>
<td>0.613**</td>
<td>0.627**</td>
<td>0.514**</td>
<td>0.000</td>
<td>moderate</td>
</tr>
<tr>
<td>Evacuation</td>
<td>0.628**</td>
<td>0.581**</td>
<td>0.534**</td>
<td>0.000</td>
<td>moderate</td>
</tr>
<tr>
<td>Health and Services</td>
<td>0.594**</td>
<td>0.644**</td>
<td>0.551**</td>
<td>0.000</td>
<td>moderate</td>
</tr>
<tr>
<td>Transportation</td>
<td>0.575**</td>
<td>0.589**</td>
<td>0.508**</td>
<td>0.000</td>
<td>moderate</td>
</tr>
</tbody>
</table>
Research and Planning provides a moderate relationship on the extent of implementation of DRRM services as indicated by the r values: early warning system= 0.598, search and rescue= 0.682, relief operations= 0.627, evacuation = 0.628, health and services= 0.594, transportation services= 0.575, security services= 0.620, emergency management= 0.533 and fire protection= 0.566. They are all significant at 0.01 (Sig=0.000).

Administration and Planning provides a moderate direct relationship on the extent of implementation of DRRM services as indicated by r values: early warning system= 0.648, search and rescue= 0.682, relief operations= 0.514, evacuation = 0.534, health and services= 0.551, transportation services= 0.589, security services= 0.574, emergency management= 0.566, and fire protection= 0.608. They are all significant at 0.01 (Sig=0.000).

Operation and Warning also provides a moderate direct relationship on the extent of implementation of DRRM services as indicated by r values: early warning system= 0.578, search and rescue= 0.548, relief operations= 0.514, evacuation = 0.534, health and services= 0.551, transportation services= 0.508, security services= 0.506, emergency management= 0.509, and fire protection 0.557. They are all significant at 0.01 (Sig=0.000).

In regards to this, Abarquez (2011) stated that visioning as one of the participatory variable in research and planning, training and operation and warning, as function of the local officials and, by facilitating a community session on visioning. Team facilitators ask the community members to dream about the kind of “safe community “they want to attain in relation to disaster risk they identified. This is the time when the local authorities, community members and other stakeholders can have a thorough discussion on what they want to achieve in the disaster risk reduction process.

Test of Difference in the respondents rating along DRRM Functions

<table>
<thead>
<tr>
<th>Area</th>
<th>X1</th>
<th>X2</th>
<th>Mean Difference</th>
<th>t</th>
<th>Sig.</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research and Planning</td>
<td>3.922</td>
<td>3.304</td>
<td>7.618</td>
<td>-5.691</td>
<td>0.000</td>
<td>Significant</td>
</tr>
<tr>
<td>Administration and Training</td>
<td>3.850</td>
<td>3.292</td>
<td>7.558</td>
<td>-5.151</td>
<td>0.000</td>
<td>Significant</td>
</tr>
</tbody>
</table>

It appears that the DRRM Functions along with the three (3) areas namely: Research and Planning, Administration and Training, and Operation and Warning differ significantly as perceived by both respondents from the Local Government Unit (LGU) and the community as indicated by the computed t-value as follows: Research and Planning, t=-5.691(Sig.=0.000), Administration and Training, t=-5.151(Sig.=0.000) and Operation and Warning, t=-4.324 (Sig.=0.000).

This further explains that respondents perceived differently on the DRRM function along research and planning try develop and their strengthen mechanisms for partnership or net working with private sector, NGO and volunteer groups.

According to Gaviola (2010), differences really appeared on the study of the communities responses when it comes to DRRM functions because of the different local expertise, experiences, and knowledge that should be the starting point when conducting planning. The study showed that needs and vulnerabilities are the main focus in the local government units’ research and planning procedure and strategies.

Seemingly, Green (2011), asserted a bottom-up approach to program design will involve the community themselves in planning and implementation of DRRM activities and projects. This involves further that when the local people take part in the activities, the better results of the implementation may achieved.

Test of Difference on the respondents rating along DRMM Services

<table>
<thead>
<tr>
<th>Area</th>
<th>X1</th>
<th>X2</th>
<th>Mean Difference</th>
<th>t</th>
<th>Sig.</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early warning System</td>
<td>3.689</td>
<td>3.331</td>
<td>7.358</td>
<td>-3.029</td>
<td>0.000</td>
<td>Significant</td>
</tr>
<tr>
<td>Search and Rescue</td>
<td>3.833</td>
<td>3.267</td>
<td>7.566</td>
<td>-4.978</td>
<td>0.000</td>
<td>Significant</td>
</tr>
<tr>
<td>Relief Operation</td>
<td>3.800</td>
<td>3.254</td>
<td>7.546</td>
<td>-4.537</td>
<td>0.000</td>
<td>Significant</td>
</tr>
<tr>
<td>Evacuation</td>
<td>3.833</td>
<td>3.252</td>
<td>7.531</td>
<td>-5.464</td>
<td>0.000</td>
<td>Significant</td>
</tr>
<tr>
<td>Health Services</td>
<td>3.783</td>
<td>3.258</td>
<td>7.525</td>
<td>-4.704</td>
<td>0.000</td>
<td>Significant</td>
</tr>
<tr>
<td>Transportation Services</td>
<td>3.800</td>
<td>3.326</td>
<td>7.474</td>
<td>-4.490</td>
<td>0.000</td>
<td>Significant</td>
</tr>
<tr>
<td>Security Services</td>
<td>3.600</td>
<td>3.317</td>
<td>7.283</td>
<td>-2.473</td>
<td>0.000</td>
<td>Significant</td>
</tr>
<tr>
<td>Emergency Management</td>
<td>3.772</td>
<td>3.245</td>
<td>7.527</td>
<td>-4.635</td>
<td>0.000</td>
<td>Significant</td>
</tr>
<tr>
<td>Fire Protection</td>
<td>3.756</td>
<td>3.212</td>
<td>7.544</td>
<td>-4.773</td>
<td>0.000</td>
<td>Significant</td>
</tr>
</tbody>
</table>
It appears that the DRRM Services along the nine (9) areas namely: Early Warning System, Search and Rescue, Relief Operation, Evacuation, Health Services, Transportation Services, Security Services, Emergency Management and Fire Protection differ significantly as perceived by both respondents from the Local Government Unit (LGU) and the community as indicated by the T-value as follows: Early warning System, t=-3.029 (Sig.0.000), Search and Rescue, t=-4.978 (Sig.0.000), Relief Operation, t=-4.537 (Sig.0.000), Evacuation, t=-5.464 (Sig.0.000) Health Services, t=-4.794 (Sig.0.000), Transportation Services, t=-4.490 (Sig.0.000), Security Services, t=-2.473 (Sig.0.000), Emergency Management, t=-4.635 (Sig.0.000) and Fire Protection, t=-4.773 (Sig.0.000).

It further explains that the DRRM Services such as manage to give adequate and prompt assessment of needs and damages at all levels. Integrate and coordinate search, rescue and retrieval or in the same sense, coordinated and integrated system for early recovery implemented of the disaster victims were delivered as implemented differently as perceived by the two groups of respondents. The difference may be explained by the fact that both came from social units.

Hagman (2010), recommended that community should know the meaning of actions to be taken when disaster hits the place. Or recommended action should be specific like: pack-up things, proceed to pick-up point or proceed to evacuation site. In these cases, the community can help themselves as well as the Local Government Unit lessen burden when before and after the disaster happens to the place.

Petal (2012), pointed out that the effectiveness of DRRM Services in one area is highly depends on peoples’ perception of coming danger, level of understanding and hazard type acceptance of warning issued to them. Equally important is the credibility of the agency, whose reliability in alerting the public is measured according to its track record in prediction and warning.

CONCLUSION

On the basis of findings and analysis of the study, the following conclusions were drawn:

1. The respondents’ perception on DRRM Council functions concluded that DRRM Council was very good, as agreed by the respondents, in facilitating and implementing their functions in terms of research and planning, administration and training, as well as operation and warning.

2. The extent of implementation of DRRM Council Services in terms of Early Warning System, Search and Rescue, Relief Operation, Evacuation, Health and Services, Transportation Services, Security Service, Emergency Management, and Fire Protection concluded to be implemented into a great extent as perceived by the respondents.

3. The respondents’ perception has significant relationship to the functions and services of DRRM Council in terms of Early warning System, Search and Rescue, Relief Operation, Evacuation, Health Services, Transportation Services, Security Services, Emergency Management and Fire Protection.

4. There is a significant difference on the respondents’ rating along the independent variable namely: DRRM council functions and DRRM council services.

5. The proposed plan for Risk Reduction Management Services in Santa Cruz, Laguna, serves as guide in identifying the different key area thrusts of SUC’s extension program.

REFERENCES


A Study on Consumer’s attitude towards online shopping of Smartphone: with Special Reference to Kochi city, Kerala

Lovely Joseph Pullokaran

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Abstract- The purpose of the study is to know the attitude of consumer’s towards online shopping of Smartphone in recent period. This study aimed at highlighting the behavior of consumers in Kochi city, Kerala. Consumers are very much interested and aware about the online stores as they can visit web stores from the comfort of their homes. Online stores allow the customer to go through various reviews about the product before actually heading for purchases. These online websites also have daily deals for the customers looking for discounts and store offerings. Primary data was collected through the questionnaire survey. The questionnaire was prepared after analyzing the various aspects of the topic. Price, convenience and time saving were identified as important factors which influence the consumer behavior for online shopping. Online shopping has become a way of life for a number of Indians and the total number of online shoppers is estimated to grow 3.5 times to touch 175 million by 2020. In 2017, estimated 1.66 billion people worldwide purchased goods online. During the same year, global e-retail sales amounted to 2.3 trillion U.S dollars.

Index Terms- Consumer behavior, E-retail, Online stores, Smartphone, Store offerings.

I. INTRODUCTION

Online shopping or e-shopping is a form of electronic commerce, which allows consumers to purchase goods and services directly from the seller through internet using a web browser. The Electronic commerce or e-Commerce as is known today evolved as businesses (end to end process) started to shift from real time market to digital market. Over the last two decades, rising internet and mobile phone penetration has changed the way we communicate and do business. E-commerce is relatively a novel concept. It is, at present, heavily leaning on the internet and mobile phone revolution to fundamentally alter the way businesses reach their customers. Online shopping is gaining currency in India too. It is seen that online shopping has steadily increased in the northern, southern and western parts of India, namely Delhi, Chennai, Kochi Mumbai etc. Kerala has always been a state which stands in the forefront of consumption. Kerala has been considered as a consumption power house by business firms. The year 1991 noted a new chapter in the history of the online world where e-commerce became a hot choice amongst the commercial use of internet. At that time nobody would have even thought that buying and selling online or say the online trading will become a trend in the world and India will also share a good proportion of this success. Since e-commerce is considered as the cheapest medium to reach new market and most important part of sales strategy, it opens a great way for development of digital market in future. Also it is a huge platform which maximizes its reach to every potential customer by providing convenience and satisfaction towards their shopping experience.

II. RESEARCH OBJECTIVES

- To study the attitude of consumers towards online shopping of Smartphone.
- To identify the various advantageous and disadvantageous of online shopping for smart phones
- To study the factors which influence the consumers for online shopping of Smartphone
- To examine the popularity of online shopping of Smartphone

III. SCOPE OF RESEARCH

This research was focused on the investigation of consumer’s attitude on online shopping of Smartphone in Kochi city, Kerala. The theoretical scope of the study includes the popularity of online shopping of Smartphone, customer’s behavior pattern, pros and cons of e-commerce etc.
Online shopping can be a smart consumer’s best friend, with the ability to easily comparison shop, searches for discounts and make purchases with a few mouse clicks. Online shopping websites supports the sales process, also helps the customers by providing necessary information. We all know that south India is the hub of information technology (IT) business in India. Bangalore, Coimbatore, Chennai, Thiruvananthapuram, Kochi and Hyderabad are amongst the main IT hubs in the southern part. The literacy rates in the southern states are higher than other Indian states. These facts clearly indicate that the majority of people in south India are well-educated and tech-friendly. So as southern India has a higher percentage of educated folks, for this reason, educated folks are faster in trying out and adopting latest technologies. Online shopping has become increasingly popular over the years but the practice of buying or selling products and services online is very common in south India. A large majority of south Indian people prefer to shop online rather than spending time and shopping from retail stores. And while making payment majority of the customers prefer cash on delivery.

E-commerce stands for electronic commerce and pertains to trading in goods and services through the electronic medium, i.e. the Internet or phone. On the Internet, it pertains to a website, which sells products or services directly from the site using a shopping cart or shopping basket system and allows credit card payments. It involves conducting business with the help of the electronic media, making use of the information technology such as Electronic Data Interchange (EDI). In general connotation, E-Commerce involves paperless transactions and usage of EDI (Electronic Data Interchange), electronic mail, bulletin boards, fax transmissions, and electronic fund transfers. It refers to the process of trading goods and services through an electronic medium such as the internet. With advancements in technology, there have been changes in the methodology for business transactions. India, being a rapid adaptor of technology is apace with the current scenario of electronic data exchanges and has taken to e-Commerce. E-commerce is being used for purchase and sale of multiple products and there are multiple players using various portals and websites for this purpose. However, there exists no standard definition for the term and different organizations have defined it in different manner. E-commerce is understood to mean the production, distribution, marketing, sale or delivery of goods and services by electronic means-commerce is not a single technology but a combination of sophisticated technologies. Mainly there are five models to conduct e-commerce:-

- Business to Business (B2B)
- Business to Consumers (B2C)
- Consumer to Consumer (C2C)
- Peer to –Peer (P2P)
- Mobile commerce (M-Commerce)

Business to Business form does not involve individual customers. In this form a manufacturer supplies goods to a retailer or a wholesaler. Business to Consumer is the most common form of e-commerce where a company sells directly to individual customers. Consumer to Consumer form of e-commerce involves business transaction between two individuals, while Peer to Peer form of e-commerce supports people to share their their files and resources without the help of a central web server, and both the ends requires a software to facilitate communication- commerce is another type of e-commerce in which transactions can be done with the help of mobile phones.

Diagram showing E-Commerce Activities

Advantages of Online Shopping

- Time saving
- Removing mediators
- Product cost saving
All time processing
Better service
Fast delivery

**Important factors for the growth of online shopping in India**

- Timely services provided by the seller.
- Price comparison and product reviews.
- Replacement guarantee to the customers.
- Various ways of payment options.
- Mobile capable sites.
- Low shipment cost.
- Cash on delivery option to the customer.
- Quality of the product should be same as shown in the website.
- Clear and realistic terms and conditions.

**Online payment methods:**
An online payment method is a payment instrument that generates a financial transaction between a buyer and a seller, whereby the selection of the payment instrument is made over the Internet in direct sequence with the purchase, and whereby the payment instrument is either represented by a payment brand, a solution brand or general payment term (e.g. cash-on-delivery).

**Payment instruments:**
- Card payments
- Bank transfer payments
- Direct debit payments
- Cash payments
- Wallet payments (e.g. PayPal) etc.

**Research Methodology**

**Methods of data collection:** Combination of interview and questionnaire method is used to collect data from the respondents

**Sample Design:** Under sample design the method of random sampling is used to collect data from the respondents.

**Sample size:** Size of 60 respondents are taken for the collection of data.

**Statistical tool used:** Percentage Method

\[
\text{Percentage of respondent} = \frac{\text{Number of respondent}}{\text{Total number of respondents}} \times 100
\]

V. **DATA ANALYSIS AND INTERPRETATION**

1. **Sex ratio of the respondents.**

<table>
<thead>
<tr>
<th>Opinion</th>
<th>No. Respondents</th>
<th>Percentage of the Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>42</td>
<td>70%</td>
</tr>
<tr>
<td>Female</td>
<td>18</td>
<td>30%</td>
</tr>
</tbody>
</table>

**Table: 1**

**Chart: 1**

The graphical representation of the table shows that out of the 60 Respondents, 42 were male and 18 were female.
2. Age

Table: 2

<table>
<thead>
<tr>
<th>Opinion</th>
<th>No. of Respondents</th>
<th>Percentage of the Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-25</td>
<td>14</td>
<td>23.33</td>
</tr>
<tr>
<td>26-35</td>
<td>28</td>
<td>46.66</td>
</tr>
<tr>
<td>36-45</td>
<td>8</td>
<td>13.33</td>
</tr>
<tr>
<td>46-60</td>
<td>4</td>
<td>6.66</td>
</tr>
</tbody>
</table>

Interpretation:
The graphical representation shows that most of the respondents come under the age group of 26-35.

3. Educational Qualification

Table: 3

<table>
<thead>
<tr>
<th>Opinion</th>
<th>No. of Respondents</th>
<th>Percentage of the Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master’s Degree</td>
<td>18</td>
<td>30</td>
</tr>
<tr>
<td>Bachelor’s Degree</td>
<td>28</td>
<td>46.66</td>
</tr>
<tr>
<td>Matriculation</td>
<td>8</td>
<td>13.33</td>
</tr>
<tr>
<td>Any other</td>
<td>4</td>
<td>6.66</td>
</tr>
</tbody>
</table>

Interpretation:
The graphical representation shows that out of 60 respondents, 18 are graduates, 28 respondents are undergraduate and 8 of them are passed the matriculation and four of them are of other qualification.

4. Do you like to shop online?

Table: 4

<table>
<thead>
<tr>
<th>Opinion</th>
<th>No. of Respondents</th>
<th>Percentage of the Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>54</td>
<td>90</td>
</tr>
<tr>
<td>No</td>
<td>6</td>
<td>10</td>
</tr>
</tbody>
</table>

Interpretation:
Out of 60 respondent 90% of them commented that they like online shopping and 10% of them don’t like online shopping.
5. If Yes, how often do you make online purchase?

Table: 5

<table>
<thead>
<tr>
<th>Opinion</th>
<th>No. of Respondents</th>
<th>Percentage of the Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weekly</td>
<td>8</td>
<td>13.33</td>
</tr>
<tr>
<td>Monthly</td>
<td>38</td>
<td>63.33</td>
</tr>
<tr>
<td>Once in every year</td>
<td>10</td>
<td>16.66</td>
</tr>
<tr>
<td>Twice in a year</td>
<td>4</td>
<td>6.66</td>
</tr>
</tbody>
</table>

Interpretation:
Out of 60 respondents above 60% of them were make online purchase on monthly basis, above 16% once in a year, above 13% weekly basis and above 6% twice in a year respectively.

6. If No, what is the main reason which keeps you away from online shopping?

Table: 6

<table>
<thead>
<tr>
<th>Opinion</th>
<th>No. of Respondents</th>
<th>Percentage of the Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk of identity theft</td>
<td>2</td>
<td>3.33</td>
</tr>
<tr>
<td>Risk of getting what you paid for</td>
<td>4</td>
<td>6.66</td>
</tr>
<tr>
<td>Lack of trustworthiness if Vendor</td>
<td>2</td>
<td>3.33</td>
</tr>
<tr>
<td>Difficulty in returning product</td>
<td>1</td>
<td>1.66</td>
</tr>
<tr>
<td>Not being able to touch and see the product</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>others</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Interpretation:
This graphical representation shows that above 6% commented on risk of getting what they paid, above 3% risk of identity theft, 5% on not being able to touch and see, and above 1% on difficulty in returning products.

7. Generally when do you prefer to make online shopping of Smartphone?

Table: 7

<table>
<thead>
<tr>
<th>Opinion</th>
<th>No. of Respondents</th>
<th>Percentage of the Respondents</th>
</tr>
</thead>
</table>

Chart: 7
Interpretation: Out of 60 respondents above 40% make online shopping during heavy discount period (at the time of online shopping festival), above 30% purchases at the time when they required it, above 20% purchases on festive season.

8. Do you go to retail shop first before making your final purchase?

Table: 8

<table>
<thead>
<tr>
<th>Opinion</th>
<th>No. of Respondents</th>
<th>Percentage of the Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>26</td>
<td>43.33</td>
</tr>
<tr>
<td>No</td>
<td>34</td>
<td>56.66</td>
</tr>
</tbody>
</table>

Interpretation: Out of 60 respondents above 56% of them commented that they won’t go to retail shop before making online shopping and 43% go to retail shop before online purchasing.

9. Approximately how many times did you shop Smartphone through online during the last year?

Table: 9

<table>
<thead>
<tr>
<th>Opinion</th>
<th>No. of Respondents</th>
<th>Percentage of the Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>At least once</td>
<td>30</td>
<td>50</td>
</tr>
<tr>
<td>Twice</td>
<td>8</td>
<td>13.33</td>
</tr>
<tr>
<td>3 to 5 Times</td>
<td>14</td>
<td>23.33</td>
</tr>
<tr>
<td>More than 5 times</td>
<td>8</td>
<td>13.33</td>
</tr>
</tbody>
</table>

Interpretation: This graphical representation shows that 50% of the respondents did the online shopping of Smartphone last year at least once, above 22% purchased 3 to 5 times, 13% of them purchased twice and 13% more than 5 times.
10. How did you get the idea of buying specific brand of Smartphone through online?

Table: 10

<table>
<thead>
<tr>
<th>Opinion</th>
<th>No. of Respondents</th>
<th>Percentage of the Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Referred by friends/family</td>
<td>42</td>
<td>70</td>
</tr>
<tr>
<td>Offline advertisement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Online advertisement</td>
<td>14</td>
<td>23.33</td>
</tr>
<tr>
<td>Others</td>
<td>4</td>
<td>6.66</td>
</tr>
</tbody>
</table>

Interpretation:
This graphical representation shows that 70% commented that they get the idea of buying specific brand of Smartphone from their friends/family, 23% of them from online advertisement and above 6% from other sources.

11. How do you find the specific Smartphone to your own need?

Table: 11

<table>
<thead>
<tr>
<th>Opinion</th>
<th>No. of Respondents</th>
<th>Percentage of the Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product rating</td>
<td>13</td>
<td>21.66</td>
</tr>
<tr>
<td>Product review</td>
<td>20</td>
<td>33.33</td>
</tr>
<tr>
<td>Compare description and prices</td>
<td>16</td>
<td>26.66</td>
</tr>
<tr>
<td>Referred by colleague/friend/family</td>
<td>11</td>
<td>18.33</td>
</tr>
</tbody>
</table>

Interpretation:
For buying Smart phone through online above 30% rely upon the product review, above 20% compare the product description and price, above 18% ask for the opinion of colleagues, friends and family.
12. How many online Smartphone stores do you visit before online shopping?

<table>
<thead>
<tr>
<th>Opinion</th>
<th>No. of Respondents</th>
<th>Percentage of the Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 3 stores</td>
<td>24</td>
<td>40</td>
</tr>
<tr>
<td>3 to 4 stores</td>
<td>17</td>
<td>28.33</td>
</tr>
<tr>
<td>More than 5 stores</td>
<td>19</td>
<td>31.66</td>
</tr>
</tbody>
</table>

Interpretation:
40% of the respondents visits 1 to 3 online stores before online shopping, above 31% visits more than 5 online stores and above 28% visits 3 to 4 online stores.

13. How do you make payment mostly when you purchase online?

<table>
<thead>
<tr>
<th>Opinion</th>
<th>No. of Respondents</th>
<th>Percentage of the Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Debit card</td>
<td>18</td>
<td>30</td>
</tr>
<tr>
<td>Credit card</td>
<td>24</td>
<td>40</td>
</tr>
<tr>
<td>Cash on delivery</td>
<td>16</td>
<td>26.66</td>
</tr>
<tr>
<td>others</td>
<td>2</td>
<td>3.33</td>
</tr>
</tbody>
</table>

Interpretation:
40% of respondents do their online shopping payment credit card, 30% uses debit card , above 25% opt for cash on delivery.

14. After receiving the Smartphone you will………………

<table>
<thead>
<tr>
<th>Opinion</th>
<th>No. of Respondents</th>
<th>Percentage of the Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discuss with friend/family about the Smartphone</td>
<td>28</td>
<td>46.66</td>
</tr>
<tr>
<td>Contact the seller for further guidance if needed.</td>
<td>8</td>
<td>13.33</td>
</tr>
<tr>
<td>Write a review about the phone</td>
<td>16</td>
<td>26.66</td>
</tr>
<tr>
<td>Others</td>
<td>8</td>
<td>13.33</td>
</tr>
</tbody>
</table>

Interpretation:
This graphical representation shows that after receiving the Smartphone, out of 60 respondents above 46% will discuss with their friends and family members about the Smartphone, above 26% will write a review about the Smartphone, above 13% contact the seller for further guidance and above 13% go for other option.

15. Does cash on delivery option influences you to go for online shopping?

<table>
<thead>
<tr>
<th>Opinion</th>
<th>No. of Respondents</th>
<th>Percentage of the Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>28</td>
<td>46.66</td>
</tr>
<tr>
<td>No</td>
<td>32</td>
<td>53.33</td>
</tr>
</tbody>
</table>

**Interpretation:**
This graphical representation shows that 46% of respondents are influenced by cash on delivery option and above 53% are not influenced by cash on delivery option.

16. Does “free shipping” option motives you for online shopping?

<table>
<thead>
<tr>
<th>Opinion</th>
<th>No. of Respondents</th>
<th>Percentage of the Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>48</td>
<td>80</td>
</tr>
<tr>
<td>No</td>
<td>12</td>
<td>20</td>
</tr>
</tbody>
</table>

**Interpretation:**
80% of the respondents are motivated by free shipping option on online shopping and 20% of respondents are not motivated by “free shipping” option.

17. Do you search for complete information about the Smartphone on internet before making online purchase?

<table>
<thead>
<tr>
<th>Opinion</th>
<th>No. of Respondents</th>
<th>Percentage of the Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>56</td>
<td>93.33</td>
</tr>
<tr>
<td>No</td>
<td>4</td>
<td>6.66</td>
</tr>
</tbody>
</table>
Interpretation:
Above 92% of respondents commented that they search for complete information about the Smartphone before making online purchase and 7% not.

VI. RESEARCH FINDINGS

- Majority of the respondents prefer online shopping.
- Respondents who prefer online shopping do their shopping monthly and some of the respondents are not go for online shopping due to risk of getting what they paid for, lack of trustworthiness of vendor, risk of identity theft, not being able to see the product etc.
- Majority of the respondents select their Smartphone’s brands after seeing the product review, product rating etc.
- Majority of the respondents do their online shopping of Smartphone during heavy discount period. Respondents are also motivated by “free shipping” option on online shopping and others are influenced by “cash on delivery” option too
- Most of the respondents are highly aware about each and every details about online shopping of Smartphone

VII. CONCLUSION

From the above discussion the online shopping industry in India is fast catching on, not just in the larger metros but also in the smaller cities. For convenience and time saving consumers are get attracted towards online shopping. Variety of products are now available in online stores, also purchasing of Smartphone through online is increasing day by day. At present the market is estimated at Rs 46,000 crore. India has more than 100 million Internet users, out of which around half opt for online purchases and the number is growing every year. The Indian Institute of e-commerce states that by 2020, India is expected to generate $100 billion online retail revenue out of which $35 billion will be through fashion e-commerce. Online apparel sales are set to grow four times in coming years.

REFERENCES


AUTHORS

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Role of Cognitive Drill Therapy in Treatment of Evaluation Anxiety: A Case Study

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Abstract- Fear of public speaking is a highly prevalent condition that can adversely affect the social and occupational life of an individual. Cognitive Drill Therapy (CDT) is a new approach to the treatment of stimulus bound anxiety. CDT utilizes the basic tenets of classical conditioning, operant conditioning, cognitive appraisal and linguistics. This case demonstrates the role of cognitive drill therapy in the treatment of fear of public speaking. The planned application of CDT resulted in significant reduction in the fear of public speaking. Pre and post intervention scores showed a marked difference in the anxiety experienced by the subject. Based on the theories of Emotional Processing and Inhibitory learning, CDT is a highly potential candidate to be added to Exposure therapies

Index Terms- evaluation anxiety, fear of public speaking, cognitive drill therapy

I. INTRODUCTION

Watson and Friend (1969) first defined fear of negative evaluation (FNE) as “apprehension about other’s evaluations, distress over their negative evaluations, and the expectation that others would evaluate oneself negatively (p.449).” FNE is characterized by anxiety, submissiveness, and social avoidance in situations where the individual feels scrutinized by an audience. Subjects high on FNE are also more sensitive to situational factors. Speaking in public is a situation which has a high potential to trigger FNE.

Most people feel uncomfortable when they speak, eat or drink in public. It is also not uncommon to feel uncomfortable while interacting with strangers, people of the opposite sex, and authorities, and being the center of attention and/or the target of criticism (APA, 1994; Crippa et al., 2007) where one feels observed and fears evaluation. Social anxiety is characterized by a constant fear and worry in various social situations, especially those which involve performance in front of others.

Anxiety is experienced when behaviour and/or achievements are evaluated. The evaluations may be formal or informal. The core belief is that during evaluation they will be found deficient or inadequate by others (Donaldson, Gooler & Scriven, 2002). People suffering from high evaluation anxiety may imagine devastating interpersonal consequences with very little or no correlation with what actually happens. These imaginations generally have very poor predictive value (Leitenberg, 1990) but might result in severe anxiety even in anticipation of being in such a situation.

Evaluation anxiety, or anxiety resulting from fear of evaluation or from a specific stimulus can be treated through cognitive and exposure therapies. Cognitive drill therapy (CDT) is a new approach to the treatment of stimulus bound anxiety (Kumar et al. 2012). The therapy is based on the theories of conditioning, cognitive appraisal and linguistics. Cognitive drill therapy is fast relieving and time efficient that makes the person independent to face the specific situation. The therapy is useful in patients who have stimulus bound anxiety, specifically when exposure of the anxiety related cues in imagination elicits an anxiety response. CDT has given promising results in phobias (Verma, Arya, Kundhari & Kumar, 2018), OCD (Arya, Verma & Kumar, 2017) and agoraphobia and panic disorder (Dwivedi & Kumar, 2015). The current case study illustrates the effectiveness of cognitive drill therapy in a case of evaluation anxiety.

Exposure and response prevention therapies have been successfully used in the treatment of irrational fears. An individual with irrational fears is exposed to the feared stimuli in imagination and/or in vivo along with prevention of avoidance response. Cognitive drill therapy is novel approach to the treatment of stimulus bound anxiety developed by Rakesh Kumar (Arya, Verma & Kumar, 2017). CDT is based on the principles of verbal exposure to the stimulus. When the stimulus is presented verbally, the subject imagines the stimulus and experiences a surge of anxiety response which gradually declines. CDT conceptualizes fear as having four components: O- Objects of fear. B- Body Mind Reactions. S- Safety Behaviours. D- Danger Perceptions.

The object of fear (speaking in public), causes physiological and psychological responses (trembling, nervousness, butterflies in the stomach, irritability, lack of concentration). Subject copes by avoiding the situation (choosing not to speak) as he thinks that the situation is dangerous due to various reasons (people will make fun, self image, etc.) The fear is understood as a two layer structure. The subject is overwhelmed by the top layer (O and B) and is stuck in it due to
which rarely thinks about the real cause of fear embedded in the bottom layer (S and D).

In CDT, the patients are required to repeat the underlying feared cognition of future orientation by converting it into past or present framework. The repetitive verbalizations in this manner lead to typical anxiety curve (bell shaped curve) of rising and declining pattern of anxiety. The drill of feared consequences leads to faster extinction; dissociation of the functional links between anxiety provoking stimuli and anxiety response.

II. CASE SUMMARY

The case is of RM, a 21 year old female from middle socio economic status. She was attending a private college with no history of psychiatric disorder. She reported having extreme fear of public speaking. At the age of 14 years she was singing in a group. She had the mike in front of her and made a mistake for which the teacher slapped her. After that she became extremely nervous and avoided any such situation due to which she lost a lot of opportunities and faced failure many times. She desperately wanted to participate in debates and other forms of public speaking but experienced severe anxiety on any such instance. Due to this she lacked confidence and suffered from negative self image. RM sought help to overcome this fear of public speaking.

Assessment

The Liebowitz Social Anxiety Scale (LSAS; Liebowitz, 1987) is a 24-item measure. It is used to assess both fear and avoidance of social (e.g., going to a party, meeting strangers) and performance situations (e.g., taking a test, giving a report to a group) occurring in the last week. Items are rated on a five point scale from 0-4, with high scores representing more fear and/or avoidance. Due to the simplicity of the self-report version of the scale it can be effectively used as a screening tool for social anxiety disorder (Rytwinski et al. 2009). RM scored 39(Fear) and 29 (Avoidance) = 68(Marked Social Anxiety)

Case formulation:

The cognitive model of social phobia was used to formulate the case. The model explains the occurrence and maintenance of the fear of public speaking.

Her anxiety was conceptualized as respondent behavior elicited by a range of external cues such as facing a group of people (known or strangers), people in authority and internal cues like fast heart rate, dryness in throat, tremors in left body, sweating, words and thoughts related to failure, disapproval, ignored, and criticism.

She avoided anxiety provoking situations which resulted in negative reinforcement and maintained her avoidance of external situations which could potentially activate feeling of rejected by others. Besides, avoidance at overt level, she also had avoidance at cognitive level. She avoided considering encounters with potentially anxiety provoking situations even at covert level.

The external and internal cues elicited anxiety response (classical conditioning) and avoidance of such anxiety provoking situations at cognitive and behavioral level resulted in anxiety reduction which served to maintain the anxiety response (operant conditioning).

During anxiety, a person holds a future perspective at cognitive level which gets reflected in the language of the patients which consists of frequent use of future tense. For instance, I will make mistakes, I will not live up to the expectations of others, people will ignore me, etc.

It is hypothesized that this future perspective may have its specific neurobiological correlates (Kumar, 2017). When a person turns towards this future orientation, the related neurobiological process get activated which maintain the anxiety response.

She was seeking help for getting rid of fear of public speaking as she thought that she lost many opportunities because of that fear. She followed 4 sessions and showed improvement on it.

Application of Cognitive Drill Therapy

Psycho-education:

Psycho-education regarding illness is the core foundation of the application of CDT. RM was explained that she is having evaluation anxiety. The symptoms of these conditions were enumerated and explained. She was told that she was trying to manage her anxiety by avoiding the anxiety arousing situations. The avoidance resulted in temporary relief which acted as reinforcement instead of improvement. Instead of avoidance, she required to expose herself to anxiety provoking situations. This exposure would initially boost the anxiety response and in the process would get reduced. She was also explained the concept of cognitive exposure. The concept of excessive use of future perspective during anxiety activation was also explained. She was told that she would be trained to expose herself to anxiety provoking situations at cognitive level and integrated the tweak of future perspective into past or present perspective. Appropriate examples were used to clarify the concepts and applications of CDT. She was asked to continue her drilling.

OBSD Analysis:

Objects (O) or anxiety arousing situations were identified by RM. All situations where she was watched and felt evaluated aroused anxiety. Specifically the following situations were identified: speaking in front of an audience, singing in front of an audience.

Body-Mind Reactions (B): RM experienced severe physiological and psychological reactions at the thought of speaking in public. Her body reactions were characterized by shivering, tremors, accelerated breathing rate, throat dryness on even the thought of being in above reported situations.

Safety-Behaviors (S) Complete avoidance of any such situation is the safety behavior adopted by her.

Danger Perception (D) or feared consequences were identified as follows:

1. She might make a mistake
She will be ridiculed by people
She will make a fool of herself
People will make fun of her
People will reject her
She will look foolish
Seniors will disapprove of her
Drill Statements: Corresponding to her thoughts of danger perception, the drill statements were formulated by converting the future tense orientation of such thoughts to past or present.

1. I am on stage and have made a mistake
   People are criticizing me and trying to push me off the stage
   People are thinking that I am a fool

   Execution of Cognitive Drill: Psycho education helped RM to develop an insight into the nature of anxiety. To execute the drill, RM was asked to imagine the object of fear (O) and keep on repeating the drill statements one by one. For each object the drill was performed and the BMR was monitored. If BMR reached a high level the drill was paused. When she became comfortable with one drill statement, she was moved on to the next one.

   Drill was done at verbal, auditory and visual levels. It was useful for the purpose of therapy, economic in terms of pain experienced during live exposure like cognitive and verbal exposure and quite faster in resolution of anxiety. Cognitive drill uses principles of exposure therapy. Exposure at cognitive and verbal level causes extinction and habituation of acquired anxiety response (Watson & Rayner, 1920; Lovibond, 2004). The words and images of anxiety cues elicited anxiety in her, and when exposed repeatedly to those words and images at cognitive and verbal level it led to extinction and habituation. The cognitive drill is also likely to enhance self efficacy and other faulty cognitions which are also observed in this patient.

   III. DISCUSSION

   The application of cognitive drill therapy over 7 sessions produced substantial and clinically significant changes in her social anxiety, body sensations and these were maintained on follow ups. She also showed meaningful improvement in her social relations, self efficacy, and engagement in gathering, initiated the conversation and sometime led too.

   Cognitive drill uses principles of exposure therapy. Exposure at cognitive and verbal level causes extinction and habituation of acquired anxiety response (Watson & Rayner, 1920; Lovibond, 2004). The words and images of anxiety cues elicited anxiety in her, and when exposed repeatedly to those words and images at cognitive and verbal level it led to extinction and habituation. The cognitive drill is also likely to enhance self efficacy and other faulty cognitions which are also observed in this patient.

   IV. CONCLUSION

   The case study shows the cognitive drill therapy is intensive and time efficient that can be applied on such types of clients. A clinically significant improvement could be achieved in the relatively short time of four weeks and the gains of therapy were maintained on further follow up.

   REFERENCES


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AUTHORS

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A Feasibility Study on the Sustainable Development and Energy Consumption Patterns in the Kotuli Village of Almora District, Uttarakhand, India

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Abstract - Some of the villages in the hilly, high altitude regions of Uttarakhand, India have uneven energy consumption patterns. One such village is the village of Kotuli in the Almora district of Uttarakhand, India. The following paper describes the various energy consumption details of the village which are monitored and reviewed in order to make the village sustainable and energy efficient in the long run. Electricity consumption is the most important energy pattern that has been observed and a detail analysis of other energy consumption patterns other than electricity (like water, firewood) has also been put forward. Sustainability is one of the most important factors which is required for continuous survival of villages and human settlements in the hilly terrains of Uttarakhand. Thus, in order to make the village a sustainable one, in the later part of this paper, some of the energy conservation measures have been suggested after a thorough analysis of their energy consumption details. A complete energy optimisation and feasibility has been found out for this village of Kotuli by altering some of the basic energy consumption patterns in such a way that the recommended energy conservation measures can be implemented in the village to make it sustainable and energy efficient in the near future.

Index Terms - sustainability; energy conservation; energy efficiency; electricity consumption; load curves

Table 1.1: Particulars of the Village

<table>
<thead>
<tr>
<th>Village Name</th>
<th>Kotuli</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nearest City/Town</td>
<td>Hawalbag</td>
</tr>
<tr>
<td>Tehsil</td>
<td>Hawalbag</td>
</tr>
<tr>
<td>District</td>
<td>Almora</td>
</tr>
<tr>
<td>State</td>
<td>Uttarakhand</td>
</tr>
<tr>
<td>Gram Panchayat</td>
<td>Kotuli</td>
</tr>
<tr>
<td>Climate</td>
<td>Warm and Temperate</td>
</tr>
<tr>
<td>Average Annual Temperature</td>
<td>6.6 °C to 38.1°C</td>
</tr>
<tr>
<td>Annual Precipitation Fall</td>
<td>1367 mm</td>
</tr>
<tr>
<td>Location Code</td>
<td>052964</td>
</tr>
<tr>
<td>Available Area Measured</td>
<td>124.39 hectares</td>
</tr>
<tr>
<td>Latitude</td>
<td>29°39’54.75” N</td>
</tr>
<tr>
<td>Longitude</td>
<td>79°35’26.6” E</td>
</tr>
<tr>
<td>Elevation</td>
<td>4396 feet</td>
</tr>
<tr>
<td>Total Population</td>
<td>120</td>
</tr>
</tbody>
</table>

Table 1.2: Population of the Village

<table>
<thead>
<tr>
<th>Total Population (numbers)</th>
<th>Male Population (numbers)</th>
<th>Female Population (numbers)</th>
</tr>
</thead>
<tbody>
<tr>
<td>120</td>
<td>61</td>
<td>59</td>
</tr>
</tbody>
</table>

I. INTRODUCTION

The Kotuli is a village in Hawalbag Block in Almora District of Uttarakhand State, India. It is located 13 KM towards North from District headquarters Almora, 6 KM from Hawalbag and 192 KM from the State capital of Dehradun. Kotuli’s local Language is Hindi. Kotuli Village Total population is 120 and number of houses are 25. Female Population is 49.17%. Village literacy rate is 65.4% and the Female Literacy rate is 31.8%. There is no railway station near to Kotuli for more than 10 km. However, Kathgodam Railway Station is major railway station 51 KM near to Kotuli. Almora, Nainital, Haldwani, Ramnagar are the nearby cities to Kotuli.
Fig. 1.2: Access to the location

Fig. 1.3: Annual temperature profile

**NOTE:** With an average of 19.8 °C, June is the warmest month of the year. At 6.6 °C on an average, January is the coldest month of the year.

**ANALYSIS OF ENERGY UTILIZATION IN THE VILLAGE**

**ANALYSIS OF THE ELECTRICAL DISTRIBUTION SYSTEM**

- A detailed electrical audit has been conducted of 23 houses in the village Kothuli and a systematic distribution of loads (such as fans, LEDs etc.) of each house has been enlisted.
- The houses were distributed unevenly with 5 houses at the base of the hill, near the road at an altitude of 4080 feet while the remaining 18 houses were located at the top of the hill at an altitude of 4500 feet.
- The daily load consumption of the 18 houses at the top of the house is 7.213 Kilowatt while the daily load...
consumption of the 5 houses at the bottom of the hill is 6.706 Kilowatt.

- A single 3-phase 11KV/ 433 V distribution transformer of 25 KVA is located at an altitude of 4088 feet from which two phases provide supply to the five houses at the bottom of the hill and the other single phase is taken to the top of the hill to provide supply to the remaining 18 houses at the top of the hill.

- The 433V conductor on the secondary side and the 11KV feeder to the primary is an Aluminum Conductor Steel Reinforced rabbit conductor of the following specification:
  - Overall diameter: 10.05mm
  - Total area: 61.7 mm²
  - Total weight: 214 kg/km
  - Calculated breaking load: 18.4 kN
  - Maximum resistance at 20 degree celsius: 0.5426 Ω/km

- The length of the single distribution conductor from the secondary of the transformer to the top of the village is 625m.

- The 11KV conductor on the primary side of the proposed transformer will also be an Aluminum Conductor Steel Reinforced Recon conductor of the given same specifications.
  - Overall diameter: 12.3 mm
  - Total area: 92.4 mm²
  - Total weight: 320 kg/km
  - Calculated breaking load: 27.2 kN
  - Maximum resistance at 20 degree celsius: 0.3623 Ω/km

- The overall power factor of the village is 0.90

- Rated Current of 25kVA Transformer

\[ I = \frac{25}{1.73 \times 0.433} = 33.56 \text{ A} \]

- Average Power injected in single phase supply per month = 9834.905 KWH
- Average Power injected in Two Phase Supply per month = 9102.519 KWH
- Resistance of ACSR Rabbit conductor per kilometer at 20 degree celsius = 0.5426 Ω/km
- Resistance at 35 degree celsius, \( R = \frac{(273+35/273+20) \times 0.5426}{\Omega/km} \)
- Current in the phase going uphill to the village = 7.213/230×0.94 = 33.383 A

- % Loading of the Transformer = 30.68%
- No Load Losses of the Transformer = 100 W (From the nameplate of the transformer)
- Full Load Losses of the Transformer = 685 W (From the nameplate of the transformer)
- Total Distribution Loss (Uphill), \( TDL_1 = I^2R + \text{Transformer Losses} \)

\[ \text{Since, only 1 phase is going uphill to the village,} \]
\[ TDL_1 = 2 \times (33.33)^2 \times 0.3564 + \{100 + (0.3068)} \times 685\} \; \text{Watts} \]
\[ TDL_1 = 956.31 \text{ Watts} \]

- Current in the phase going downhill to the remaining houses = 6.706/230×0.87 = 33.51A
- % Loading of the Transformer = 30.83%
- No Load Losses of the Transformer = 100 W
- Full Load Losses of the Transformer = 685 W
- Total Distribution Loss (Downhill), \( TDL_2 = 3 \times I^2R + \text{Transformer Losses} \)

\[ \text{(No load losses aren't to be considered)} \]
\[ (\text{Since, 2 phases are going downhill to the village),} \]
\[ TDL_2 = 3 \times (33.51)^2 \times 0.3564 + \{0.3083)} \times 685\} \; \text{Watts} \]
\[ TDL_2 = 1265.10 \text{ watts} \]

\[ TDL_2 = 1.265 \text{ KW} \]

- Total Distribution Loss in the village = 2.221 KW
- Annual losses = (2.221× 8760) KWH = 19455.96 KWH
- Cost per KWH of energy = 3.5 INR
- Annual Losses in terms of cost = (19455.96× 3.5) INR

\[ = 68095.86 \text{ INR} \]

- Kilowatt consumption at the top of the hill (of 18 houses) = 7.213KW
- For a power factor of 0.94 (since no inductive loads were found in the 18 houses of the village), the apparent power required = (7.213/ 0.94) KVA = 7.67 KVA
- Kilowatt consumption at bottom of the hill (of 5 houses) = 6.706 KW
- For a power factor of 0.87 (since few of the loads of the 5 houses comprised of printers, fridge, etc.), the apparent power required = (6.706/0.87) KVA = 7.708 KVA
- Replacing the existing transformer with two 1-phase, 11 KVA, 6.5 KV/220V transformers
- Primary current along 11KV side, \( I = \frac{11}{6.5} \; \text{A} \)
- I = 1.69 A
- Resistance of ACSR rabbit conductor per kilometer at 20 degree celsius, \( R = \frac{(273+35/273+20) \times 0.5426}{\Omega/km} \)
- Resistance at 35 degree celsius, \( R = \frac{(273+35/273+20) \times 0.5426}{\Omega/km} \)

\[ = 0.5703 \Omega/km \]

- Resistance for the entire length of 625 metres, \( R = (0.625\times 0.5703) \; \Omega \)
- R = 0.3564Ω
- Current in the phase going uphill to the village = 7.213/230×0.94 = 33.383 A
- Daily Loss reduction (in KW) = (2.221- 0.002) KW

\[ = 2.119 \text{ KW} \]
• Annual Loss reduction (in KWH) = (19455.96 - 17.8266) KWH = 19438.13 KWH
• Annual Loss reduction (in INR) = (68095.86 – 62.39) = 68033.47 INR
• New Transformer and Installation Costs = 38,000 INR (Including Government Service Tax and copper winding costs) (Company: United Transformers, Haridwar)
• Total cost of two transformers = 76,000 INR
• Weight per kilometer of rabbit conductor needed = 214 kg
• Amount of rabbit conductor needed for 625metres = (214× 0.625) kg = 133.75 kg

II. ANALYSIS OF THE ANNUAL HOUSEHOLD ENERGY CONSUMPTION AND ANNUAL STREET LIGHT CONSUMPTION IN THE VILLAGE

Table 1.4: Streetlight Scenario in the Village

<table>
<thead>
<tr>
<th>No. of street lights</th>
<th>Type of fixture</th>
<th>Rating</th>
<th>Total Wattage(in kW)</th>
<th>Annual kWh Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>LED</td>
<td>9 W</td>
<td>0.018</td>
<td>77.76</td>
</tr>
</tbody>
</table>

Table 1.5: Inventory of electrical appliances in each household

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Type Of Load</th>
<th>Wattage (Watts)</th>
<th>Number</th>
<th>Total Wattage (Kilo Watts)</th>
<th>Operating Hours (Hr)</th>
<th>Annual Energy Consumption (Kilo Watt hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CFL Bulbs</td>
<td>15</td>
<td>26</td>
<td>0.39</td>
<td>1750</td>
<td>682.50</td>
</tr>
<tr>
<td>2</td>
<td>LED</td>
<td>7</td>
<td>141</td>
<td>0.987</td>
<td>2081</td>
<td>2053.947</td>
</tr>
<tr>
<td>3</td>
<td>CFL Tubelight</td>
<td>28</td>
<td>1</td>
<td>0.028</td>
<td>2081</td>
<td>58.268</td>
</tr>
<tr>
<td>4</td>
<td>Fan</td>
<td>60</td>
<td>16</td>
<td>0.96</td>
<td>2193</td>
<td>2105.28</td>
</tr>
<tr>
<td>5</td>
<td>Fridge</td>
<td>700</td>
<td>8</td>
<td>5.6</td>
<td>8760</td>
<td>49056</td>
</tr>
<tr>
<td>6</td>
<td>Mobile Charger</td>
<td>4</td>
<td>37</td>
<td>0.148</td>
<td>728</td>
<td>107.744</td>
</tr>
<tr>
<td>7</td>
<td>Television</td>
<td>80</td>
<td>18</td>
<td>1.44</td>
<td>1980</td>
<td>2851.20</td>
</tr>
<tr>
<td>8</td>
<td>Electric Iron</td>
<td>1000</td>
<td>11</td>
<td>11</td>
<td>65</td>
<td>715</td>
</tr>
<tr>
<td>9</td>
<td>Heating Rod</td>
<td>3000</td>
<td>2</td>
<td>6</td>
<td>211</td>
<td>1266</td>
</tr>
<tr>
<td>10</td>
<td>Washing Machine</td>
<td>700</td>
<td>1</td>
<td>0.7</td>
<td>376</td>
<td>263.20</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5594</strong></td>
<td><strong>261</strong></td>
<td><strong>27.253</strong></td>
<td><strong>20225</strong></td>
<td><strong>59159.14</strong></td>
<td></td>
</tr>
</tbody>
</table>
ANALYTICAL OBSERVATIONS AND INFERENCES MADE

- Representative data is being utilized for generation of monthly energy consumption pattern of the village.

**Fig 1.5: Electricity consumption of the village**

**Fig 1.6: Monthly variation of electricity charges of the village**

- Per Capita Energy Consumption of Kotuli Village is: 59.448 kWh
- It has been observed that 19 more solar street light installations can be installed in the village

**Table 1.6: Installation of solar streetlight**

<table>
<thead>
<tr>
<th>Details</th>
<th>Value/Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total No. of solar installations</td>
<td>19</td>
</tr>
<tr>
<td>Total wattage of the installations</td>
<td>760 (40W each)</td>
</tr>
<tr>
<td>Annual operating hours</td>
<td>4,320 (12 hours each day)</td>
</tr>
<tr>
<td>Annual Energy saving (kWh)</td>
<td>3283.20</td>
</tr>
<tr>
<td>Per unit energy charges (INR)</td>
<td>3.5</td>
</tr>
<tr>
<td>Annual monetary savings (INR)</td>
<td>11491.20</td>
</tr>
<tr>
<td>Investment (INR)</td>
<td>1,14,000 (6000 INR/installation)</td>
</tr>
<tr>
<td>Payback (Years)</td>
<td>9.92</td>
</tr>
<tr>
<td>Annual tons of CO₂ Emission reduction</td>
<td>1.15 Tons</td>
</tr>
<tr>
<td>Total savings in TOE</td>
<td>0.28 Ton</td>
</tr>
</tbody>
</table>

- If the CFL bulbs, incandescent bulbs and CFL tube lights are replaced by LEDs, a significant savings in terms of both energy and cost is being observed
Table 1.7: Total Energy Savings after replacement with LEDs

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Type Of Load</th>
<th>Wattage (Watts)</th>
<th>Number</th>
<th>Total Wattage (Kilo Watt)</th>
<th>Operating Hours (Hr)</th>
<th>Annual Energy Consumption kWh</th>
<th>Replacement by LED Wattage</th>
<th>Total Wattage kWh</th>
<th>Operating Hours (Kilo Watts)</th>
<th>Annual Energy Consumption kWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CFL Bulbs</td>
<td>15</td>
<td>2</td>
<td>0.390</td>
<td>17.5</td>
<td>1103.76</td>
<td>15</td>
<td>9</td>
<td>0.13</td>
<td>236.25</td>
</tr>
<tr>
<td>2</td>
<td>Incandescent Bulb</td>
<td>40</td>
<td>1</td>
<td>0.480</td>
<td>17.5</td>
<td>840.00</td>
<td>40</td>
<td>9</td>
<td>0.36</td>
<td>630</td>
</tr>
<tr>
<td>3</td>
<td>CFL Tube Lights</td>
<td>28</td>
<td>1</td>
<td>0.028</td>
<td>17.5</td>
<td>49</td>
<td>1</td>
<td>9</td>
<td>0.00</td>
<td>15.75</td>
</tr>
</tbody>
</table>

| Total  | 39            | 0.898           | 1992.76 | 0.50                    | 4                     | 882                           |

- The total energy consumption by the lights (CFL, Incandescent bulbs and Tube Lights) of the village is 1992.76kWh.
- After replacing 39 bulbs by LED of 9 watts, the energy consumption of the village becomes 882 kWh.
- The total annual savings in the consumed energy becomes 1110.76 kWh.

Table 1.8: Total savings

<table>
<thead>
<tr>
<th>Total savings in KWH</th>
<th>1110.76 kWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total savings in Rs(3.5/KWH)</td>
<td>3887.66</td>
</tr>
<tr>
<td>Total investment Rs90/LED</td>
<td>3510</td>
</tr>
<tr>
<td>Payback(Years)</td>
<td>0.902856731</td>
</tr>
</tbody>
</table>

- It has also been observed that replacing the already existing household fans with energy efficient fans can yield a significant energy and cost savings.
- The total annual energy consumption by the fans of 60W, 75W and 80W of the village is 2,368.44 kWh
- After replacing the fans by 50 W energy efficient fans, the energy consumption becomes 1,754.40 kWh.
- The total annual energy savings are 614.40 kWh.
III. ANALYSIS OF THE WATER CONSUMPTION PATTERNS THE VILLAGE

There are three options for drinking water in the village.
Government supply, natural water resources and the river water.
A tank of 1000L capacity has been installed to store the water coming from government supply and natural water resources. The water from the tank reaches to the consumer of the village through pipelines by using gravity. Table 1.11 shows water consumption per capita per year and the observed facilities of drinking water available in the village.

Table 1.11: Annual Water Consumption of Water

<table>
<thead>
<tr>
<th>Sr. no.</th>
<th>Wattage of fans (Watt)</th>
<th>Number of fans</th>
<th>Total wattage (kilo Watt)</th>
<th>Operating hours (hrs)</th>
<th>Annual energy consumption (kWh)</th>
<th>Total wattage (KW)</th>
<th>Annual Energy</th>
<th>Savings (KWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>60</td>
<td>9</td>
<td>0.5</td>
<td>1.184</td>
<td>50</td>
<td>0.450</td>
<td>21</td>
<td>986.8</td>
</tr>
<tr>
<td>2</td>
<td>75</td>
<td>4</td>
<td>0.3</td>
<td>2.19</td>
<td>50</td>
<td>0.200</td>
<td>21</td>
<td>438.6</td>
</tr>
<tr>
<td>3</td>
<td>80</td>
<td>3</td>
<td>0.2</td>
<td>2.19</td>
<td>50</td>
<td>0.150</td>
<td>21</td>
<td>328.9</td>
</tr>
</tbody>
</table>

Total 16 1.0 0.80 2.368 0.80 6.57 1.754

<table>
<thead>
<tr>
<th>Total population of the village</th>
<th>Annual water consumption of the village (L)</th>
<th>Annual water consumption per capita (L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>120</td>
<td>2190000</td>
<td>18250</td>
</tr>
</tbody>
</table>

- **ANALYTICAL OBSERVATIONS AND INFERENCES MADE**
  - The water supplies from these resources are being decreased specially in summers.
  - The villagers have to travel to the base of the cliff (at 780 m) for getting water from river.
  - A solar based water pump can be a good option to draw the water from river to village.
  - A sump (head of 30 ft depth) will be constructed at river bank, and a submersible pump can be used to lift water.
  - Table 1.12 shows the requirement of solar water pump to draw the water from river to village.
Table 1.12: Energy Conservation Method by installation of Solar Water Pump

<table>
<thead>
<tr>
<th>Water flow rate</th>
<th>Total Head</th>
<th>Pump size</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>34 LPM</td>
<td>150 m</td>
<td>1.5 HP</td>
<td>1</td>
</tr>
</tbody>
</table>

- Majority of the farmers are dependent on rain water to irrigate their crop fields.
- There is no other source of irrigation available in the village.
- A crop field can be irrigated by using sprinkler method. In this technique field will be divided into grid and four points will be identified to mount sprinklers.
- 1 acre field has been divided into grid and four points have been identified for sprinkler. Selection of sprinklers and their positions should be such that it can cover the entire land area i.e. spacing between two sprinklers must be equivalent to radius of a single sprinkler.

**Fig 1.7 shows the required components to irrigate a land of 1 acre through sprinkling technique.**

![Sprinkler System](image)

**Fig. 1.7: Sprinkler System**

Following specifications are required to irrigate an 1 acre land

Table 1.13: Specifications required to irrigate an 1 acre land

<table>
<thead>
<tr>
<th>Components</th>
<th>Specification required</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sprinkler</td>
<td>Sprinkling Radius= 61-116 ft, Pressure= 1.7-6.9 Bar, Flow rate= 3.88 - 29 m³/hr</td>
<td>4</td>
</tr>
<tr>
<td>Pump</td>
<td>25 HP</td>
<td>1</td>
</tr>
<tr>
<td>HDPE Pipes</td>
<td>Depending upon pump outlet</td>
<td>485 ft + distance from source</td>
</tr>
</tbody>
</table>
IV. ANALYSIS OF OTHER ENERGY CONSUMPTION PATTERNS THE VILLAGE

Table 1.14: Details of Energy Consumption other than electricity

<table>
<thead>
<tr>
<th>Total Number of Houses</th>
<th>LPG Consumption (kg)</th>
<th>LPG Consumption (kCal)</th>
<th>Wood Consumption (kg)</th>
<th>Wood Consumption (kCal)</th>
<th>Cow Dung (kg)</th>
<th>Cow Dung (kCal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>2286</td>
<td>25031700</td>
<td>319800</td>
<td>79950000</td>
<td>53040</td>
<td>111384000</td>
</tr>
</tbody>
</table>

Household Electricity Consumption/annum: 6067031 kCal.
- LPG Consumption/annum: 25031700 kCal.
- Firewood Consumption/annum: 79950000 kCal.
- Cow Dung Utilization: 111384000 kCal.

- ANALYTICAL OBSERVATIONS AND INFERENCES MADE

Table 1.15: Share of various energy forms/fuel in the whole village

<table>
<thead>
<tr>
<th>Electricity</th>
<th>LPG (kg/yea r)</th>
<th>Wood (kg/y ear)</th>
<th>Cowdung (kg/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Street Light (kWh/yea r)</td>
<td>Household Load (kWh/yea r)</td>
<td>Total Load (kWh/yea r)</td>
<td></td>
</tr>
<tr>
<td>77.76</td>
<td>7,056</td>
<td>7,133.76</td>
<td>2,286</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3,19,800</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>53,040</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Electricity</th>
<th>LPG (kCal/yea r)</th>
<th>Wood (kCal/yea r)</th>
<th>Cowdung (kCal/yea r)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Street Light (kCal/yea r)</td>
<td>Household Load (kCal/yea r)</td>
<td>Total Load (kCal/yea r)</td>
<td></td>
</tr>
<tr>
<td>66,861.16</td>
<td>60,6703.1</td>
<td>61,33,892.16</td>
<td>2,50,31,700</td>
</tr>
<tr>
<td></td>
<td>79,95,000</td>
<td>11,13,84,000</td>
<td></td>
</tr>
</tbody>
</table>

- Per capita energy consumption of Kotuli Village:
- Electricity: 59.448 kWh or 51,115.768 kCal
- LPG: 19.05 kg or 2,08,597.50 kCal
- Wood: 2665 kg or 66,62,500 kCal
- Cow Dung: 442 kg or 9,28,200 kCal
V. CONCLUSION AND RECOMMENDATION

Energy efficiency and sustainability are two pillars of the modern era. Adapting to measures that are low on cost and smart on energy is an excellent sustainable solution for any community. The energy conserving solutions can be implemented at the village level in order to make the entire village a sustainable one. This village of Kotuli, Almora is high on resources and the energy conservation measures observed and suggested can be of prime importance keeping in mind the cost and sustainability of the measures recommended. Table 1.16 shows the details of the various energy consumption patterns of each household of the village, Kotuli, Almora.

The dependency on significant energy sources for consumption can be summarized above and the following conclusions can be drawn in order to make the village sustainable and self dependent in the coming days to come:

- Distribution losses can be reduced significantly by replacing the 25KVA, 11KV/433V, 3-phase transformer by two 6.5KVA, 11KV/220V 1-phase transformers. The savings made in terms of energy and payback is of the order of 14 months. The amount of 68,033 INR after the completion of the payback period can be invested by the villagers in improving the living standard of the village like opening of recreational, commercial and community agro based business centers.
- Installation of solar street lights can put an end to the already persisting problem of unavailability of street lights at such a high altitude for living of the people of the village. The investments made have a payback to 10 years.
- The household CFLs and incandescent lamps can be replaced with LEDs of same luminance but less wattage so that the consumption can be as low as possible.
- The already existing fans can be replaced with energy efficient fans with a healthy savings in terms of energy and cost. The payback for this particular case is 3.2 years.
- A solar water pump of 1.5HP can be installed to feed water to the village from the river flowing beneath it thereby ending the dependency of the villagers on irregular government water supply and natural sources.
- An annual cow dung production of 11,13,84,000 Kcal can be an excellent potential for the village to set up its own subsidized biogas plant which can be put in a grid for supply purposes in the village to sustain their very own cooking needs.
- 10.107 tons of carbondioxide can be reduced annually by the implementation of the above energy conservation measures.
- 2.19 tons of oil equivalents can be saved annually also if the following measures are put in practice to make the village a sustainable one.

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Table 1.16: Recommended Energy Saving Measures

<table>
<thead>
<tr>
<th>S. No</th>
<th>Accepted Energy Saving Measures</th>
<th>Annual Energy Savings (kWh)</th>
<th>Investment Cost Rs. lakh</th>
<th>Monetary Savings (Rs. Lakh / year)</th>
<th>Simple Payback (Years)</th>
<th>Reduction in emission (tCO₂ eqv.)</th>
<th>Eq. Energy Savings (TOE/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Installation of energy efficient transformer by replacing the old one</td>
<td>19438.13</td>
<td>84406.25</td>
<td>68033.47</td>
<td>1.24</td>
<td>6.83</td>
<td>1.67</td>
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<tr>
<td>2</td>
<td>Installation of new solar street lights</td>
<td>3283.20</td>
<td>1,14,000</td>
<td>11491.20</td>
<td>9.92</td>
<td>1.15</td>
<td>0.28</td>
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<tr>
<td>3</td>
<td>Replacement by LEDs</td>
<td>1110.76</td>
<td>3510</td>
<td>3887.66</td>
<td>0.90</td>
<td>0.827</td>
<td>0.09</td>
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<tr>
<td>4</td>
<td>Replacement with energy efficient fans</td>
<td>1754.40</td>
<td>19984</td>
<td>6140.4</td>
<td>3.2</td>
<td>1.3</td>
<td>0.15</td>
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<td></td>
<td>25586.49</td>
<td>221900.25</td>
<td>89552.73</td>
<td>15.26</td>
<td>10.107</td>
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<tr>
<td>Sr. No</td>
<td>Name of the Head of House</td>
<td>Electricity kWh</td>
<td>LPG kCal</td>
<td>Wood Kg</td>
<td>Cow Dung kCal</td>
<td>Total Energy (kCal)</td>
<td></td>
</tr>
<tr>
<td>--------</td>
<td>--------------------------</td>
<td>----------------</td>
<td>----------</td>
<td>---------</td>
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<td>-------------------</td>
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<td>1865880</td>
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<td>4242771.1</td>
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<td>56.76</td>
<td>621522</td>
<td>1598702.1</td>
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<td>House 4</td>
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<td>House 5</td>
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<td>300</td>
<td>257952</td>
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<td>11</td>
<td>House 11</td>
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<td>299224</td>
<td>42.6</td>
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<td>12</td>
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<td>276</td>
<td>237316</td>
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<td>3421825.3</td>
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<td>6104643.9</td>
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<td>185725</td>
<td>85.2</td>
<td>932940</td>
<td>6414266.5</td>
<td></td>
</tr>
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<td>House 18</td>
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<td>1996057.4</td>
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<td>1915993.8</td>
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<td>1853937.9</td>
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<td>House 23</td>
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<td></td>
</tr>
<tr>
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<td>932940</td>
<td>7319402.9</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>7056</td>
<td>6067031</td>
<td></td>
<td>25031700</td>
<td>111384000</td>
<td></td>
</tr>
</tbody>
</table>

Table 1.17: Household energy consumption details
Analysis of the Contribution of Partnership Strategy to the Economic Development in Rwanda

Aimé Muyombano I. PhD Scholar*; Prof. Maurice M. SAKWA, PhD**, Dr. Jared DEYA, PhD ***; Prof. Eugene Ndabaga, PhD****

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Abstract- The aim of the study was to analyses contribution of Rwanda Partnership Strategy to its Economic Development, from 2000 up to 2015; The study was guided by the following specific objectives: to demonstrate the contribution of Technical partnership on economic development in Rwanda; to assess the contribution of Financial partnership on economic development and lastly to determine the contribution of common market partnership on economic development in Rwanda. Both qualitative and quantitative research approaches were used. Data were collected by means of interviews, observational schedules, and documentary analysis procedures. The number of questionnaires, administered to all the respondents was 82. A total of 81 questionnaires were properly filled and returned from the Institutions employees. This represented an overall successful response rate of 98.8%. The study found that majority of respondents (49.4% strongly agreed, 48.1% agreed) supported the idea that Technical and Financial Partnership with different countries in terms of investing in infrastructures and services (Financial services, Banks & Insurances) raise the access of Rwandan exports to foreign markets. The findings also revealed that majority of respondents have affirmed that Technical& financial partnership (assistance, Aid tourism) contribute to the wealth creation. Among 81 respondents, 78 or 96.3% (53.1% strongly agreed and 43.2% agreed) agreed that it contribute on wealth creation. The findings showed that from 80 responses 77 or 96.25% supported the idea (38 strongly agree and 39 agree) that Common market through free movement of goods, services, People, capital, residence is increasing GDP per capita and Balance of Trade by allow foreigners in the Regional invest in Country and vice-versa.

Index Terms- Technical Partnership; Financial Partnership and common market

I. INTRODUCTION

Historical perspective, Partnerships have a long history, they were already in use in Medieval times in Europe and in the Middle East; In Europe, the partnerships contributed to the Commercial Revolution which started in the 13th century, Laiou, E. (2008). In the 15th, century the cities member of the Hanseatic League, would mutually strengthen each other; a ship from Hamburg to Danzig, would not only carry its own cargo but was also commissioned to transport freight for other members of the league that the practice was not only saved time and money; but also constituted a first step toward partnership. This capacity to join forces in reciprocal services became a distinctive feature, and a long lasting success factor, of the hanseatic team spirit, (ibid 2008)

According to Coispeau, O. (2015). A close examination of medieval trade in Europe shows that numerous significant credit based trades were not bearing interest. Hence, pragmatism and common sense called for a fair compensation for the risk of lending money, and a compensation for the opportunity cost of lending money without using it for other fruitful purposes. In the Middle East, the Qirad and Mudarabas institutions developed when trade with the Levant, namely the Ottoman Empire and the Muslim Near East, flourished and when early trading companies, contracts, bills of exchange and long-distance international trade were established.

At the Continental, regional historical and theoretical perspective of African states was awash with the phenomenon of seeking political independence for the purpose of achieving all socio-economic development of the continent; the initiative is anchored on the determination of Africans to extricate themselves and the continent from the malaise of underdevelopment and exclusion in a globalizing world; it is a call for a new relationship of partnership between Africa and the international community to overcome the development chasm, Cyril I. Obi (2001).

According to Chukwuka E. et al. (2013), the historical trajectory of Pan African programs for African states’ development is as tenuous, as the socio-economic realities of the continent itself. As early as 1963, the leaders of the new independent state of African engaged in the formation of a continental framework that condensed all the differing ideological platforms that even involved the African Arab constellations in the partnership strategy that were used.

This partnership framework in the name of Organization of African Unity (OAU) had three major objectives, among which, is the OAU charter on socio-economic development of Africa,
which specifically recommended establishment of African regional integration which currently targeting to achieve the socio-economic development of Africa through African Union umbrella, (ibid, 2013).

For Diana C. et al. (2007) demonstrated how the East African Community as region started with Kenya, Tanzania, and Uganda by applied the partnership each other since the early 20th century; The customs union between Kenya and Uganda in 1917, which Tanganyika joined in 1927, followed by the East African High Commission (EAHC) from 1948 to 1961, the East African Common Services Organization (EACSO) from 1961 to 1967, and the 1967 to 1977 EAC. Burundi and Rwanda joined the EAC on 6 July 2009 and now South Sudan.

The East African Community established a customs union in 2005 which was fully fledged with zero internal tariffs as in were made in action in 2010. In 2013 East African Community members signed a protocol on the monetary union, (Ombeni N. 2015) these advantages provide them with a unique framework for regional co-operation and integration. Within this situation, the EAC offers many benefits to its Partner States including: increased trade, expanded markets, attraction of Foreign Direct Investment (FDI), increased bargaining power, strengthened security and conflict resolution in the region, and the free movement of people across the region.

Supachai P. et al. (2012), Rwanda has come from far over the past 18 years. It has established a stable government, secured peace and safety in its territory, made great strides in restoring and reforming the economy and in 2010 was named by the World Bank as the world’s top reformer because of good partnership established with rest of the world affairs; It has also articulated an inspiring vision of its future (Vision 2020) that sees the country reaching middle-income status over the next eight years and positioning itself as a high quality hub for an increasingly integrated region, the East African community (EAC). Rwanda has shown that it has the will power and determination to reach this. While still a poor country, it has come a very long way in just over a decade, (ibid, 2012).

Her technical &financial partnership as a country is based on mutual cooperation supporting technical, financial partnership with others and Common market partnership under regional partnership which has evolved through a period of economic prosperity and macroeconomic stability in the past two decades; Real GDP grew by an average of 8% annually during the period 2000 to 2013, which is among the highest average growth rates in East Africa and currently is one of few countries anywhere in the world that has managed fast economic growth, robust reductions in poverty, and a narrowing of inequality based on the mutual partnership with the rest of the world, (Ombeni N. 2015) A number of studies including one by the, (2015), demonstrates that Rwanda’s foreign policy strategies such as strengthening her partnership, Regional & global relations and wealth creation don’t have a lot of influence on the growth of national economic development even though, imports have risen sharply since 2004, largely as result of the cumulate the costs of importing different products fuel and energy included.

A number of studies including one by Minicofin, (2006), demonstrates that the Government of Rwanda receives a large volume of technical &financial assistance (partnerships), much of it in the form of experts appointed on both short- and long-term contracts which normally are supposed to build the national capacity. Really, it became a criticised for failing to transfer those technical &financial partnership capacity.

Founding on this enthusiastic perception specified by Rwandan Government on which her technical &financial assistance (partnerships) should improve her economic development. The researcher found that there is still a critical gaps on demonstrating the contribution of Rwanda’ Foreign policy strategies which one the researcher’ supposition opinion settled that only 30% of the population can describe the huge contribution is conveying by the Rwanda’s foreign policy strategies on the economic development in Rwanda which is totally different to the assumption provided by the researcher on the what community think is the contribution. Through this gaps exemplified, the researcher decided to carry out a study with title “Analyse the contribution of Foreign policy strategies on Economic Development in Rwanda”, Ministry of Foreign Affairs, Cooperation and East Africa Community.

II. Literature Reviews

This study is built on the underpinning theories and models, including the Technical Partnership theory by Rornald W. Mc Quaid (2000); Mastering Finance Business Partnering model by KPMG et al, (2011) and common market, the political economy of international factor mobility in a multi–country setting Giovanni Facchini: (2002)

2.1 Theoretical and empirical framework

2.1.1 Theoretical Framework

2.1.1.1 Technical Partnership theory by Rornald W. Mc Quaid (2000),

The technical partnerships theory developed by Rornald W. Mc Quaid (2000), with the purpose of promote cooperation between Industrialized Countries or developed Sphere and developing countries or regeneration that should increase their National economic development. There are a number of assumptions underlying design the technical partnership component.

Rornald W. Mc Quaid, explain more that technical Partnership involves co-operation, i.e. “to work or act together” and in a public policy can be defined as co-operation between people, organizations or Countries in the public or private sector for mutual benefit (Holland, 1984). Sets out a similar general definition of ‘private-public partnership’ as “any action which relies on the agreement of actors in the public and private sectors and which also contributes in some way to improving the urban economy and the quality of life”.
2.1.1.1 Data-Driven Partnership through Open States model

Figure 2.1: Data-Driven Partnership through Open States

Martha, B. et al. (2010) demonstrates that Strengthening bilateral, trilateral and multilateral partnership is one of the strategies that should assist the cooperation between countries in term of International trade and investment for one hand but also technical and financial support which back the economic development of those countries by increasing the community’ GDP per capita, household income, Infrastructure and so on.

This model illustrates how government should determine in advance, if a relationship is one that will result in competitive advantage and is worthy of the time and resources needed to fully develop into a partnership. Further, all partnerships are not the same. How does government or management knows what type of partnership would provide the best pay-off? These questions may be answered by using The Partnership Model.
2.1.1.2 The Sustainability of Community Coalitions technical Partnership Model.

![Diagram]

Figure 2.2: Developing a Conceptual Framework to Assess the Sustainability of Community Coalitions, (2008)

Post-Federal Funding. USA HH&NORC, (2008) Take look on the National economic development perspective, Sellgren, (1990) describes partnership as a scheme with involvement or funding from more than one agency, he adds that the joint objectives of the bodies and states partnership as co-operation between actors where they agree to work together towards a specified economic development objective and draw the key distinction between generalized policy communities that develop a broad National or local vision for the area or local economy and the specific networks (or partnerships) that are necessary to support individual projects.


According to KPMG et al, (2011), the recent economic turmoil left most companies exposed to heightened commercial and financial risks. This ‘wrong-footed’ many finance teams, leading them to re-evaluate their role. At the same time, tough economic conditions, volatile markets and intense competitive pressures provide a real opportunity for finance teams to step up their influence, bringing benefits to the whole business. The 2009 ‘Thriving Not Just Surviving’ survey found 82% of CFOs were working to improve how their team challenges and supports the business twice the number who gave this response in 2006.

There is a link between strong company performance and the way Finance works with the rest of the organisation. In ‘Thriving Not Just Surviving’, when we asked CFOs about their team’s influence, a greater proportion of high-performing than lower-performing organisations reported high levels of influence in all functional areas of the business. ‘Finance Business Partnering’ is increasingly viewed as the most effective way for in-house finance teams to add value. Some high performing firms already fully embrace business partnering - in finance, HR and other functional areas - and some elements of partnering are seen in many companies.

2.1.1.2.1 How finance functions are transforming to drive business results
Technology has been changing finance. Cloud, robotics process automation, and analytics are all now widely used as part of a company’s digital transformation.

But technology alone won’t get you the transformation you need. Not without a plan for how it should also change your organization and the demands on your people. Finance leaders are facing this challenge now as they shift their organizations from transactional processing and toward business partnering. In our seventh finance benchmarking report, we mine the practices of the world’s finance functions and draw on in-depth benchmarking studies we have performed for nearly 600 finance organizations around the globe so you can learn from the best of them.

2.1.1.3. Common market, the political economy of international factor mobility in a multi country setting

Giovanni Facchini: (2002)

Understanding the workings of Preferential Trading Arrangements (PTA’s) has become increasingly important, since a very large proportion of the world’s more than 200 nations has undertaken economic integration projects, and a vast literature has emerged. Both normative questions like “under which conditions is a preferential trading arrangement welfare improving?”

- As well as positive questions like “Under which conditions will a Free Trade Area emerge as a result of a given political process?”
- Have been addressed, and attention has also been dedicated to the potential effects of regional trading arrangements on the multilateral trading system.
- So far the research effort has been focused on analysing free trade areas or customs unions, but the recent experience of the most successful PTA, the European Union, calls for new research on the way the integration process deepens, moving beyond commercial liberalization. In particular, surprisingly little has been said on what is behind the decision of a group of countries to bilaterally liberalize factor flows, and this paper represents a first attempt at answering this question.

2.1.1.3.1 Common Market Model for creating Wealth
The model demonstrates the importance of the wealth creation on Economic development of a community in terms of Building wealth with goal which is also very broad. When planned to work with a wealth manager initiate, there should drill down and examine the end game on a granular level. With the model, there is recognized the Transformation and Education way that can be used to create wealth in a determine community by considering the national savings which increase the national investment and offer as a result to the economic growth normally which attract the Foreign Direct Investment (FDI).

2.1.2 Empirical review
Different Knowledge and results derived from investigation, observation, experimentation, or experience done by different researches on similar work with partnership strategy (Technical partnership, financial partnership, common market partnership) as opposed to theoretical knowledge based on logical or mathematical assumptions were based on which push the researcher to provide his addition.

2.1.2.1 The contribution of technical partnership on economic development in Rwanda
In terms of the number of technical partnership, the patterns have remained largely similar to those observed in the 2014/15 fiscal year. A large number of projects have been registered by the UN system represented by 7 agencies reported to DAD-Rwanda, including One UN Fund, IFAD and GEF. The US has been traditionally reporting at the program level hence a small number have been recorded under the category “number of projects”.

IMF (2008), demonstrates that technical partnership Rwanda has experienced strong trade performance with exports growing at an average of 12.5% per year since 2001 (Appendix Figure 2). Rwanda’s exports reached an estimated US$152 million in 2006, more than twice the receipts generated in 2002. Coffee, tourism and tea have fuelled this growth, accounting for 60% of the 2005 export numbers. Besides private Sector mobilisation, an important driver of export growth has been the restructuring of front agencies (OCIR-Café, OCIR-Thé, ORTPN), RIEPA (Rwanda Investment and Export Promotion Agency) and BRD. While this performance is short of desired targets, it provides evidence that Rwanda can generate growth when informed choices and timely action are made on specific export industries.

Minicofin (2017), demonstrates how technical partnership contributes to the implementation of an inclusive poverty-reducing growth model of the country, which has yielded, inter alia, a stable average economic growth rate of 8-9% on average, reduced the poverty rate from 60.4% in 2011 to 39.1% in 2014 (1). Additionally, improved governance, better management of public finances, a strengthened private sector and an enhanced investment climate has led to the continuous growth of foreign private investments over the past decade, complementing public resources for development.

Rwanda’s first Poverty Reduction Strategy Poverty ’PRSP’ (2002-2005) and was very much in line to achieve the Vision 2020; through stakeholder consultations and partnership strategy that different portion are supporting the growth of national economic development constructed on public investment programme aimed at systematically reducing the operational costs of Business, increasing national capacities to innovate and strengthen the financial sector; Various measures to “release the productive capacity of the poor in rural areas ,” such as Public works, promotion of cooperatives, credit packages of direct support, (UNDP Rwanda, 2009). Looking at the table from the World Bank consideration, the Rwanda economy was growing more and more from the years of 2000 until now.
2.1.2.2 The contribution of financial partnership on economic development in Rwanda.

Minicofin (2017), the development finance to Rwanda was also supplemented by flows originated from non-public entities and private philanthropic foundations, which disbursed US$ 10.1 million in 2015/16 fiscal year. Considering the above, the total amount of external development finance flown to Rwanda in 2015/16 fiscal year was US$ 1,479.6 million, of which US$ 984.9 million from public sources (ODA and NTA) and US$ 494.7 million from private sources, including FDIs, overseas remittances, non-public organizations. The share of ODA in total development resource has decreased, while private flows FDI and overseas remittances have significantly increased in the past decade, reaching 22.0% and 11.0% of the total respectively, as opposed to less than 6% each in 2006. Flows from non-traditional sources, originated primarily from Arab Development Funds, China and India made up 3.5% of the total development finance provided to Rwanda in 2015. In a nutshell, the ODA currently makes up 63%, and beyond-ODA flows 37% of total external development finance, the latter largely represented by private capital. Compared to 2006, when the proportion was 89% vs 11%, this undoubtedly depicts a distinctive change in the external development finance landscape.

UNDP (2015), Rwanda met most of the Millennium Development Goals (MDGs) by the end of 2015. Strong economic growth was accompanied by substantial improvements in living standards, with a two-thirds drop in child mortality and near-universal primary school enrolment. A strong focus on homegrown policies and initiatives has contributed to significant improvement in access to services and human development indicators. The poverty rate dropped from 44% in 2011 to 39% in 2014, while inequality measured by the Gini coefficient fell from 0.49 to 0.45.

The Government of Rwanda was determined her partnership strategy which assisted on the increasing of 23% of her Gross Domestic Product: This amounted as an addition of $55 per capita, compared with an average that use to have in Sub-Saharan Africa of approximately $25 per capita in 2008; and assistance accounts for more than half of the Government of Rwanda’s annual budgets and aid’ shaped by principles defined in Millennium Development Goals (MDGs), Sustainable Development Goals (SDGs), the Monterrey Consensus, the Rome Declaration on Harmonization and the Paris Declaration on Aid Effectiveness, Ownership, Harmonisation, Alignment, Results and Mutual Accountability.

ODA inflows to Rwanda have been on steady rise from 2006 to 2011, exceeding US$ 1 billion in 2011, reduced notably in the following 2 years and restored to pre-2012 level in 2014. The researcher thinks that the underlying elite bargain is robust and more inclusive than many believe, maintaining it against the natural tendencies that associate with ‘limited access orders’ produces casualties of various kinds, Frederick, G. et al. (2013), the benefits of regional and global relation economic integration strategy should depend on the level of economic integration and the deeper the integration, the greater the benefits to the participating of the Partner States.

As for Ombeni, N.M.(2010), the measures taken to ease border crossing for East Africans include issuance of inter-state passes which commenced on 2003; a single immigration Departure/Entry card which has been adopted by the partner states; harmonization of the procedures of work permits and the classification process which has been finalized; and the studies on the harmonization of Labour Laws and Employment Policies which were identified as the main tools which increased a lot on Rwanda economic development as element of partnership; These include the Lake Victoria Development Programme, the East African Road Network Project, East African Power Master Plan and other high profile infrastructure projects that are at various stages of implementation, (Ombeni, N., M.2010).

The stronger integration with regional economies has been taken into consideration as a vital for further growth and expanding markets for potential investors and turned Rwanda from the “land-locked” into “land-linked” in the interests of competitiveness. For Richard N., et al (2013), a comprehensive and well-functioning system of results based management assisted on ranking Rwanda among the best in the low income
world that some lessons was used to support regional and global relation strategy to be achieved.

Generally, Rwanda’s increasing profile in its foreign relations implies that the nation has regained its role as a leading player in multilateral politics and diplomacy. It can be said therefore that during the period (covering 2006-2015) Rwanda’s foreign policy has improved over time with creation of wealth in the domestic economic environment.

![Figure 2. 4 Increasing of Rwanda GDP](image)

**Source:** World Investment Report, 2016

**Investor nationality: Policy challenges 2016**

![Figure 2. 5 GDP per capita comparison](image)

**Source:** Mineacom report. 2015

Rwanda’s exports to the world affairs such as United States of America, German, United Kingdom and other that have been growing steadily over the past 10 years, with an annual average growth rate of 21% and he total trade of Rwanda at the global affairs amounted to $60 million in 2015, with exports to the USA valued at around $46 million, while imports were only $14 million down from $21 million in 2014, (Mineacom report. 2015).

The value of services exports in the same year was $144 million and that of imports $277 million, which represented 4 per cent and 8 per cent of Gross Domestic Product respectively, leading to a $133 million deficit in services trade. The trade deficit has been increasing drastically and shows no signs of slowing down. The government indicates that the widening trade deficit as a percentage of Gross Domestic Product grew from 8 per cent in 2001 to 12 per cent in 2006. Services exports’ share in global services exports was 0.005 per cent while services imports’ share in global trade was 0.009 per cent.

The largest export was coffee at over $23 million. Others were minerals ($17.8 million), pyrethrum ($2.1 million) and a range of smaller value exports, (ibid, 2015).

The largest export was coffee at over $23 million. Others were minerals ($17.8 million), pyrethrum ($2.1 million) and a range of smaller value exports, (ibid, 2015).

2.1.2.3 The contribution of Common market on economic Development in Rwanda

According to The Ministry of Public Service policy (2007), in 2003, the real Gross Domestic Product growth rate was 0.9% compared to 9.4% for 2002 and estimated at 4% for 2004. After exceeding 10% before 2000, the investment rate by providing the wealth creation started declining until it was less than 10% in the same period of before 2000. One of the explanations for this situation is the persistence of negative levels of domestic savings and the reduction of the flow of foreign aid, considering that investment is greatly dependent on foreign aid.

The value of services exports in the same year was $144 million and that of imports $277 million, which represented 4 per cent and 8 per cent of Gross Domestic Product respectively, leading to a $133 million deficit in services trade. The trade deficit has been increasing drastically and shows no signs of slowing down. The government indicates that the widening trade deficit as a percentage of Gross Domestic Product grew from 8 per cent in 2001 to 12 per cent in 2006. Services exports’ share in global services exports was 0.005 per cent while services imports’ share in global trade was 0.009 per cent. By encouraging foreign direct investors on wealth creation, Rwandan Economy sustained high growth: average year-on year real Gross Domestic Product Growth rate from 2007-2011; stable inflation and exchange rate well managed; 3 years Gross Domestic Product growth rate was one of the highest among major African economies and neighboring countries, (ICES SC-RDB Report. 2014)
Table 2.0.1: East Africa community comparison table

<table>
<thead>
<tr>
<th>No</th>
<th>EAC countries</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>Mean in 4 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Rwanda</td>
<td>7.9</td>
<td>8.8</td>
<td>4.7</td>
<td>28.4/4=7.1</td>
</tr>
<tr>
<td>02</td>
<td>Kenya</td>
<td>6.1</td>
<td>4.6</td>
<td>5.7</td>
<td>21.7/4=5.4</td>
</tr>
<tr>
<td>03</td>
<td>Uganda</td>
<td>9.7</td>
<td>4.4</td>
<td>3.3</td>
<td>22.2/4=5.6</td>
</tr>
<tr>
<td>04</td>
<td>Tanzania</td>
<td>7.9</td>
<td>5.1</td>
<td>7.3</td>
<td>27.3/4=6.8</td>
</tr>
<tr>
<td>05</td>
<td>Burundi</td>
<td>4.2</td>
<td>4.0</td>
<td>4.6</td>
<td>17.5/4=4.4</td>
</tr>
<tr>
<td>06</td>
<td>South Sudan</td>
<td>-4.6</td>
<td>-46.1</td>
<td>13.1</td>
<td>-37.7/4=-9.4</td>
</tr>
</tbody>
</table>

Source: East Africa community comparison, 2015

With Global Competitiveness Report (2012), Investor friendly climate in Rwanda was characterized by official ranking given to Rwanda according to the effort country is using which affect it as 2nd best global reformer 2012; most competitive place to do business in east Africa countries and 3rd in Africa. As the Global Competitiveness Report (2012) continue mentioning, Rwanda was ranked as a 2nd most reformed country in the world; 3rd most competitive place to do business in Africa; 1st Most competitive place to do business in East African Community region; 8th easiest place to start a business; 6hrs to register business; 19th easiest place to pay taxes worldwide.

A market assessment that was conducted revealed the demand for extending the network to a total number of 7,300 Public and Private Institutions in all administrative sectors of Rwanda that would be connected to the broadband backbone network (government offices, schools, hospitals, churches, International Development and no-governmental organization, Embassies to an accredited with residence in Rwanda as well as Multinational, transnational and Regional Corporations).

The Rwandan foreign policy has been developed in response to Rwanda’s rise in 
international competitiveness. According to National bank of Rwanda Report (2015), with strengthening and broadening the participation and involvement of Rwanda Foreign policy, the Gross Fixed Capital Formation in Rwanda decreased to 342 Billion RwF in 2015 from 343 Billion in 2014. This Gross Fixed Capital Formation in Rwanda decrease had had an average of 316.69 Billion RwF from 1999 until 2015, reaching an all-time high of 804 Billion RwF in 2010 and a record low of 128 Billion RwF in 1999.

2.2 Models on the best practices
2.2.1 Conceptual framework
2.2.1.1 Derivation of Conceptual Framework

A lot of empirical evidence can be found in the literature that foreign policy strategies contributes on economic development in Rwanda by rising different strategies such as technical Partnership; Financial Partnership and Common market partnership which should support on the implementation to achieve the economic development in Rwanda. The conceptual framework illustrates that foreign policy strategies indeed affect economic development of a country.

![Conceptual Framework](image)

The conceptual framework gives an overview of the types of the research variables that play a role in the research. the independent variables which is Foreign Policy Strategies are also referred to as manipulation variables deal with all theories and practices related to Foreign Policy strategies such as technical Partnership; Financial Partnership and Common market partnership which affect direct the dependent variables (economic development in Rwanda) with tangible economic development such as GDP per capita, Balance of trade and Foreign Direct Investment.

For the overall view of the study, the research will identify how these variables interact to each other and how they contribute on the economic development in Rwanda.

2.2.2 Regression Model
This model was used several times by Robert M. Solow (2009), demonstrated how the Economic Growth proceeded from the effects of exporter sector performance and was added by saying that using the function of aggregate production as a starting point should increase a lot on the measures of the sources of Economic Development.

These models were modified and specified as follow:

$$\text{GDP} = f(\text{BOT},\text{FDI})$$

$$Y = \alpha_0 + \alpha_1 \text{BOT} + \alpha_2 \text{FDI}$$

Where:

i. $$Y$$: Gross Domestic Product per capita (GDP)

ii. $$\{\alpha_i; i=1,2,\}$$ = The coefficients for the various independent variables

iii. $$\text{BOT}$$: Balance of Trade

iv. $$\text{FDI}$$: Foreign direct investment

III. MATERIALS AND METHODS

The ethnicity variable in this study was based on the sample of the population working in Public and Private Institutions with daily activities in foreign policy. The study also had a sample of Single Institutions. The participation in the study was voluntary and anonymous; The research designs of this study was applied Qualitative research paradigm as a systematic subject approach used to describe the Profitability, Capital adequacy, Asset quality, Liquidity and Risk management through specific approach which was a Case study that described in-depth the experience of one or more than one Public and Private Institutions with method of direct observation and interaction on the subject.

In the findings it was established that Partnership strategy, Regional and Global relations strategy and Wealth creation strategy can have a significant contribution on economic development in Rwanda. Different Data have been obtained from officials of the Public and Private Institutions from 16 from 30 Cooperatives, 11 from MINICOM, 13 from MINICOFIN, 7 from Internationals NGOs, 10 from Rwanda Local NGOs, 3 from Rwanda Civil Society Platform, 6 from Multinational and Transnational Corporate (investors), and 16 from 30 District Mayors which given 82.

In practice different tools have been used to support gears component with the following activities such as Selection of sample techniques, Develop research instruments questionnaires, Collection of data (the research has been used both primary and secondary data), data was Processed (using SPSS software which assisted on process) and analysis, interpretation and recommendations have been determined by the researcher.

3.1 Research approach

3.1.1 Qualitative versus quantitative research approach

of 462 from 30 Rwanda Cooperatives, Ministry of Trade, Industry, Ministry of Finance and Planning, Internationals NGOs, Rwanda Local NGOs, Rwanda Civil Society Platform Multinational and Transnational Corporate (investors) and 30 District Mayors

Table 3.2: Stratum sample size

Stratified random sampling is a method of sampling that involves the division of a population into smaller groups known as strata. In stratified random sampling, the strata are formed based on members’ shared attributes or characteristics. A random sample from each stratum is taken in a number proportional to the stratum’s size when compared to the population. These subsets of the strata are then pooled to form a random sample. Where $$n$$ is the sample size, $$N$$ is the population size, and $$e$$ is the level of precision 10% for our study.

Thus,

$$n = \frac{\frac{462}{1+462(0.1)^2}}{1} \approx 82$$

Source: Secondary data, 2017

3.1.2 Proportional stratified sample size:

The proportional stratified sample size means that, the number of sampling units drawn from each stratum is in the proportion to the relative population size of that stratum.

A sample size of 82 was used on this study after a simplified formula calculated the said sample sizes according to Yamane (1967) which provided a simplified formula as its bellow.

$$n = \frac{N}{1 + N(e^2)}$$

<table>
<thead>
<tr>
<th>N</th>
<th>Stratum composition</th>
<th>Nh(the population size for stratum h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30 Cooperatives</td>
<td>90</td>
</tr>
<tr>
<td>2</td>
<td>MINICOM</td>
<td>63</td>
</tr>
<tr>
<td>3</td>
<td>MINICOFIN</td>
<td>74</td>
</tr>
<tr>
<td>4</td>
<td>Internations NGOs</td>
<td>40</td>
</tr>
<tr>
<td>5</td>
<td>Rwanda Local NGOs</td>
<td>55</td>
</tr>
<tr>
<td>6</td>
<td>Rwanda Civil Society Platform</td>
<td>15</td>
</tr>
<tr>
<td>7</td>
<td>Multinational and Transnational Corporate (investors)</td>
<td>35</td>
</tr>
<tr>
<td>8</td>
<td>30 District</td>
<td>90</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>462</strong></td>
</tr>
</tbody>
</table>

Source: Secondary data, 2017
As Yamane (1967) added, The proportional stratified sample size means that, the number of sampling units drawn from each stratum is in the proportion to the relative population size of that stratum.

**Table 3.3 Proportional stratified sample size is determined by the following formula:**

<table>
<thead>
<tr>
<th>( N )</th>
<th>Stratum composition</th>
<th>( N_h ) (the population size for stratum ( h ))</th>
<th>( n_h ) (sample size of the stratum ( h ))</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30 Cooperatives</td>
<td>90</td>
<td>16</td>
</tr>
<tr>
<td>2</td>
<td>MINICOM</td>
<td>63</td>
<td>11</td>
</tr>
<tr>
<td>3</td>
<td>MINICOFIN</td>
<td>74</td>
<td>13</td>
</tr>
<tr>
<td>4</td>
<td>Internationals NGOs</td>
<td>40</td>
<td>7</td>
</tr>
<tr>
<td>5</td>
<td>Rwanda Local NGOs</td>
<td>55</td>
<td>10</td>
</tr>
<tr>
<td>6</td>
<td>Rwanda Civil Society Platform</td>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>Multinational and Transnational Corporate (investors)</td>
<td>35</td>
<td>6</td>
</tr>
<tr>
<td>8</td>
<td>30 District Mayors</td>
<td>90</td>
<td>16</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>462</td>
<td>82</td>
</tr>
</tbody>
</table>

**Source:** Secondary data, 2017

A sampling frame facilitates formation of a sampling unit that refers to one member of a set of entities being studied, which is the material source of the random variable (Bailey, R. A. 2008). Common examples of a unit would be a single person, animal, plant, or manufactured item that belongs to a larger collection of such entities being studied. For the purpose of this study, the sampling frame for the target population should be all 81 selected officials from 30 Cooperatives, MINICOM, MINICOFIN, Internationals NGOs, Rwanda Local NGOs, Rwanda Civil Society Platform, Multinational and Transnational Corporate (investors) and 30 District.

A Stratified random sampling methodology was employed since 82 Official individuals from different Institution working in the Country was selected using Yamane (1967) formula at the research that will be conducted on the impact of economic analysis on project implementation selected from total of 413 population working in different Public-Private Institutions.

### 3.1.3 Data Collection Instruments

The researcher collected primary and secondary data. Primary data was collected using structured questionnaires designed to find answers from respondents and are comprising closed and open questions to seek specific answers on the variables under study. While secondary data was collected through consultation of different documents as registration book, monitoring books, Reports and Experts status books all from Public-Private Institutions.

#### 3.1.3.1 Data Validity

In order for a questionnaire to be useful, the data it produces must be truthful, a researcher must know that the results are meaningful and can be applied more generally than to just the sample tested. Proving the credibility of the questionnaire and ensuring that the resulting data reflect the “truth”. For validation of data during this research, questionnaire will be consulted by experts and professors who understanding well the topic, their opinions was taken into considerations and collections was made until their satisfactory level before questionnaires are distributed to the site.

Use the following formula, using the total number of experts (N) and the number who rated the object as essential (E):

\[
CVT = \left(\frac{E - (N / 2)}{N / 2}\right)
\]

### 3.1.3.2 Data Reliability

A researcher confirmed the reliability of data collected using a test/retest technics meaning that repeatability of measurement where a person's score on the same test given twice is similar. Conclusion validity was used to confirm if there is connection between the Foreign Policies strategies and Rwandan economic development. The inter-rater reliability coefficient is often calculated as a Kappa statistic. The formula for inter-rater reliability Kappa is this:

\[
K = \frac{P_{observed} - P_{chance}}{1 - P_{chance}}
\]

In this formula, \( P_{observed} \) is the observed percentage of agreement.

### 3.1.4 Data Processing and Analysis

According to Zikmund G.W., et al. (2010), data analysis refers to the application of reasoning to understand the data that will be gathering with the aim of determine the consistent patterns and summarizing the relevant details revealed in the investigation. To determine the patterns revealed in the data that was collected regarding the selected variables, data analysis will be guided by the objectives of the research and the measurement of the data collected. Information will sort, code and input into the statistical package for social sciences (SPSS) for production of graphs, tables, descriptive statistics and inferential statistics.
The above model was helped the Researcher to tests the causal relationship between Gross Domestic Product and independents variables such as: Balance of trade, balance of payment, total foreign aid, foreign direct investment, Human Development Index for Rwanda and movements of people.

IV. RESULTS, ARGUMENT, CONCLUSION AND RECOMMENDATIONS

The Facts and critical analysis done after collection of data by scholars on cases well identified with the purpose of provide the clarification on the objectives determined either by the scholars or any one from the private or public and come up with findings to be based on any measurement resolution

4.1 Results and Arguments

4.1.1 Response Rate

The number of questionnaires, administered to all the respondents, was 82. A total of 81 questionnaires were properly filled and returned from the Institutions employees.

Table 4.4: Response Rate

<table>
<thead>
<tr>
<th>h</th>
<th>Stratum composition</th>
<th>Distributed</th>
<th>Returned</th>
<th>Returned rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30 Cooperatives</td>
<td>16</td>
<td>16</td>
<td>100%</td>
</tr>
<tr>
<td>2</td>
<td>MINICOM</td>
<td>11</td>
<td>11</td>
<td>100%</td>
</tr>
<tr>
<td>3</td>
<td>MINICOFIN</td>
<td>13</td>
<td>13</td>
<td>100%</td>
</tr>
<tr>
<td>4</td>
<td>Internationals NGOs</td>
<td>7</td>
<td>7</td>
<td>100%</td>
</tr>
<tr>
<td>5</td>
<td>Rwanda Local NGOs</td>
<td>10</td>
<td>9</td>
<td>90%</td>
</tr>
<tr>
<td>6</td>
<td>Rwanda Civil Society Platform</td>
<td>3</td>
<td>3</td>
<td>100%</td>
</tr>
<tr>
<td>7</td>
<td>Multinational and Transnational Corporate (investors)</td>
<td>6</td>
<td>6</td>
<td>100%</td>
</tr>
<tr>
<td>8</td>
<td>30 District Mayors</td>
<td>16</td>
<td>16</td>
<td>100%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>82</td>
<td>81</td>
<td>98.8%</td>
</tr>
</tbody>
</table>

Source: Primary data, 2017

This represented an overall successful response rate of 98.8%. According to Mugenda (2003), a response rate of 50% or more is adequate. Babbie (2004) also asserted that return rates of 50% are acceptable to analyse and publish, 60% is good and 70% is very good.

4.2 Demographic information

This section presents the demographic characteristics such as gender, level of education, year worked in the Organizations or Institutions size of the organization and years of Institutions and organization’ existence consult

4.2.1 Gender of the Respondents

A sample of 82 respondents was given a questionnaire on their gender in Rwanda. The 81 respondents who returned the questionnaire, 39 or 48.1% were males; while the majority (42 or 51.9%) was females. This implies that females are majority of our respondents, which force their participation in Rwandan economy and its development.
4.2.2 Level of Education
Respondents’ qualifications varied greatly. Although most employees had University level qualifications, 32 (39.5%), the study recorded 27 postgraduate level respondents (33.3%), 12 respondents with college level (or 14.8%) and 10 respondents with secondary level (or 12.3%).

Figure 4.3 indicates that the majority of respondents had reached university level that could contribute to accurate responses.

4.2.3 Years Worked in the Institution or Organization
The researcher to present experience/duration distribution categories of the respondents used frequency tabulation. Table 4.4 below presents the results:
The study sought to find out the years the respondents had worked in the organization. The figure 4.3 shows that 40.70% of respondents indicated that they had worked for less than 2 years while 37% indicated between 3 to 5 years and 22.2% indicated over 5 years. The findings imply that the respondents had worked.

This implies that majority of respondents at least are experienced with at least three or more years in institution (37%+22.2%=59.3%). Those with low experience estimated to two years or less were not ignored (40.7%).

### 4.2.4 Years of working experience

During the research, we were interested in working experience to view if the responses were valid and could contribute to the research objectives. The following table gives us the picture.

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 2</td>
<td>33</td>
<td>40.7</td>
<td>40.7</td>
</tr>
<tr>
<td>3 to 5 years</td>
<td>30</td>
<td>37.0</td>
<td>77.8</td>
</tr>
<tr>
<td>Over 5 years</td>
<td>18</td>
<td>22.2</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>81</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

*Source: Primary data, 2017*

From table 4.2 above, 40% of the respondents have less than 2 years of working experience, 37% have 3 to 5 years, 22.2% have over 5 years. This implies that majority of respondents are less experienced in their institutions or organization.

### Table 4.6 Type of Institution

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid public</td>
<td>51</td>
<td>63.0</td>
<td>63.0</td>
</tr>
<tr>
<td>Private</td>
<td>28</td>
<td>34.6</td>
<td>97.5</td>
</tr>
<tr>
<td>NGOs</td>
<td>1</td>
<td>1.2</td>
<td>98.8</td>
</tr>
<tr>
<td>Both public-Private</td>
<td>1</td>
<td>1.2</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>81</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

*Source: Primary data, 2017*

From table 4.3 above, 63.0% of respondents were from public institution, 34.6% were from private sector, and 1.2% were from NGOs and Both public-Private institutions separately.

### Table 4.7 Life of institutions

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 5 years</td>
<td>19</td>
<td>23.5</td>
<td>23.5</td>
</tr>
<tr>
<td>6 to 10 years</td>
<td>17</td>
<td>21.0</td>
<td>44.4</td>
</tr>
<tr>
<td>11 to 15 years</td>
<td>8</td>
<td>9.9</td>
<td>54.3</td>
</tr>
<tr>
<td>Over 15 years</td>
<td>37</td>
<td>45.7</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>81</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

*Source: Primary data, 2017*
The results from table 4.4 indicates that 45.7% of respondents approved that their organization or institutions have been in operation over 15 years, 23.5% between 1 to 5 years, 21% between 6 to 10 years and 9.9% between 11 to 15 years.

4.2.5 Institution’ contribution to the Rwanda’s Partnership strategy

The researcher wanted to know the respondents views to the contribution of their working institution in the Partnership strategy implementation. This shows also the dispersion of the sector and different knowledge from different sources.

Table 4.8 Does your Organisation or Institution works with one of these strategies of Rwanda’s Foreign Policy which are technical partnership, Technical partnership, and common market partnership?

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>6</td>
<td>7.4</td>
<td>7.5</td>
</tr>
<tr>
<td>Yes</td>
<td>74</td>
<td>91.4</td>
<td>92.5</td>
</tr>
<tr>
<td>Total</td>
<td>80</td>
<td>98.8</td>
<td>100.0</td>
</tr>
<tr>
<td>Missing</td>
<td>System</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>Total</td>
<td>81</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Source: Primary data, 2017

The findings from table 4.5 show that 91.4% of Respondents said that their institutions work closely with the Rwanda’s foreign policy, and only 7.4% said their Institutions are not contribute to the implementation of the foreign policy while only one respondents did not say nothing. This gives the researcher, a picture that the majority of respondents consider the contribution of their respective institutions in the implementation of the Foreign Policy.

Table 4.9 If yes how your institution contribute on the economic development of Rwanda

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attracting foreign investors</td>
<td>26</td>
<td>32.1</td>
<td>32.1</td>
</tr>
<tr>
<td>Promote Bilateral and multilateral cooperation</td>
<td>6</td>
<td>7.4</td>
<td>7.4</td>
</tr>
<tr>
<td>Facilitating trade</td>
<td>21</td>
<td>25.9</td>
<td>25.9</td>
</tr>
<tr>
<td>Equipping students with relevant skills</td>
<td>4</td>
<td>4.9</td>
<td>4.9</td>
</tr>
<tr>
<td>Improving export promotion</td>
<td>24</td>
<td>29.6</td>
<td>29.6</td>
</tr>
<tr>
<td>Total</td>
<td>81</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Source: Primary data, 2017

The results from table 4.6 reveal that 26 from 81 respondents equivalent to 32.1% confirmed that their institution contribute on the economic development of Rwanda through Attracting foreign investors, 24 equivalent to 29.6% through Improving export promotion, 21 respondents equivalent to 25.9% through Facilitating trade, 7.4% through promoting Bilateral and multilateral cooperation, and 4.9% through equipping students with relevant skills.

4.2.6 Perceptions and attitudes towards the contribution of technical partnership between Rwanda and the rest of the world

This section aim to establish the views of respondents to the contribution of partnership strategy on increasing the economic development of Rwanda. The tables below show the respondents perspectives to the strategy.

4.2.6.1 Contribution of Rwanda foreign strategy to her economy

Respondents were asked whether Rwandan foreign strategy was contributed to her economy.

4.2.6.2 Technical partnership
As illustrated in the table below, respondents have shown their perception of Rwanda foreign strategy contribution to the technical and financial contribution to the economy. All respondents support that Rwanda foreign strategy contributes to the financial and technical cooperation between countries and international organs.

**Table 4.10 The Technical, Financial bilateral and multilateral cooperation between Rwanda and world have a positive influence on Rwanda GDP**

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly agree</td>
<td>43</td>
<td>53.1</td>
<td>53.1</td>
<td>53.1</td>
</tr>
<tr>
<td>Agree</td>
<td>38</td>
<td>46.9</td>
<td>46.9</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>81</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

*Source: Primary data, 2017*

Among 81 respondents, 53.1% strongly supported and 46.9% supported the idea of technical and financial cooperation between countries and organs. There was any disagree in the responses.

**4.2.7 Investments contribution to raise Rwanda exports partnership**

For the case of rising Rwanda exports partnership from the investments interviewers were shown their views regarding the contribution of foreign strategy to the exports growth.

**Table 4.11 Partnership with countries in terms of trade and investment raise the access of Rwandan exports to foreign markets**

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly agree</td>
<td>40</td>
<td>49.4</td>
<td>49.4</td>
<td>49.4</td>
</tr>
<tr>
<td>Agree</td>
<td>39</td>
<td>48.1</td>
<td>48.1</td>
<td>97.5</td>
</tr>
<tr>
<td>Disagree</td>
<td>2</td>
<td>2.5</td>
<td>2.5</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>81</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

*Source: Primary data, 2017*

From the table above, 79/81 of respondents agreed that this strategy contribute to the export growth of Rwanda and only two respondents challenges the foreign strategy to do not contribute to the export growth. Those two respondents said that it is not contributing because Rwanda still importing more than what it is exporting abroad.

**4.2.8 Perception on the Rwandan development vis a vis the foreign strategy**

Respondents perception to the Rwandan development vis a vis the bilateral and multilateral partnership were to classify their views on the issue. Their responses were summarized in the table below.

**Table 4.12 Development through bilateral and multilateral affect positively the economic development of Rwanda community by providing necessary**

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly agree</td>
<td>33</td>
<td>40.7</td>
<td>40.7</td>
<td>40.7</td>
</tr>
<tr>
<td>Agree</td>
<td>43</td>
<td>53.1</td>
<td>53.1</td>
<td>93.8</td>
</tr>
<tr>
<td>Disagree</td>
<td>5</td>
<td>6.2</td>
<td>6.2</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>81</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

*Source: Primary data, 2017*
93.8% of all respondents agreed (strongly agree and agree) that bilateral and multilateral cooperation contributed to one of the sources of economic development of the country. While other 6.2% disagreed that the cooperation did not contribute to the Rwandan development. The 6.2%’s perception was that collaborating with neighboring countries like DRC and Burundi could not develop a country.

4.2.8 Perception on the Rwandan unemployment status vis a vis the foreign strategy

Respondents’ perception to the Rwandan unemployment status vis a vis the bilateral and multilateral partnership were to classify their views on the issue. Their responses were summarized in the table below.

<table>
<thead>
<tr>
<th>Table 4.13</th>
<th>Partnerships decrease number of unemployment and opened a free movement system</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
</tr>
<tr>
<td>Valid</td>
<td></td>
</tr>
<tr>
<td>Strongly agree</td>
<td>36</td>
</tr>
<tr>
<td>Agree</td>
<td>37</td>
</tr>
<tr>
<td>Disagree</td>
<td>6</td>
</tr>
<tr>
<td>Strongly disagree</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>81</td>
</tr>
</tbody>
</table>

Source: Primary data, 2017

Among 81 respondents, 80 responds and one not respond. In addition, from the respondents 73 or agreed (Strongly agree were 36 and agree were 37) and 7 disagreed (6 disagree and 1 strongly disagree). This shows that majority of respondents supported that partnership helps in decrease of number of unemployment and opened movement system where Rwandans should move with their capital, their goods and services even working abroad by importing and exporting and business experiences that affect passively the economic development of Rwanda.

4.2.9 Other factors of partnership strategy contributively on Rwanda economy

During the research, respondents have given some factors, which could contribute on the economic development of a country. Some of them have grouped in seven main economic sectors:

<table>
<thead>
<tr>
<th>Table 4.14</th>
<th>Factors of partnership used by institution that contribute to Rwanda development</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
</tr>
<tr>
<td>Valid</td>
<td></td>
</tr>
<tr>
<td>Regional and global cooperation</td>
<td>16</td>
</tr>
<tr>
<td>Facilitating trade</td>
<td>13</td>
</tr>
<tr>
<td>Facilitating foreign investors</td>
<td>11</td>
</tr>
<tr>
<td>Free movement promotion</td>
<td>9</td>
</tr>
<tr>
<td>Made in Rwanda promotion</td>
<td>12</td>
</tr>
<tr>
<td>Increase investment in infrastructure</td>
<td>10</td>
</tr>
<tr>
<td>Peace keeping</td>
<td>6</td>
</tr>
<tr>
<td>Skills transfers</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>81</td>
</tr>
</tbody>
</table>

Source: Primary data, 2017

The results from table 4.11 indicates that 19.8% of respondents confirmed that factor of partnership used by institution that contribute to Rwanda development regional and global cooperation, 16% is facilitating trade, 14.8% in made in Rwanda promotion, 13.6% is facilitating trade, 12.3% is increasing investment in infrastructure, 11.1% free movement promotion, 7.4% is peace keeping and 4.9% is skills transfers.
4.2.10 Perceptions and attitudes towards the contribution of collaborating with Financial partnership to the economic development in Rwanda

This section focuses on the results of the research on the contribution of regional and global relations strategy on the economic development of Rwanda. Respondents have shown their views on the importance of Rwanda for being a member on the international or regional organs.

4.2.10.1 Trust to the international view

Rwanda to be a dignity country, trusted and capable to govern and develop its economic is the main social scene, which shows the performance of a country economy. Effort to make peace through direct negotiations, to collaborate in tripartite trade and being respective country has been shows to enhance the economic growth. The respondents given their views on the view of international trust of Rwanda.

Table 4.15 Being a member encourage international community to trust Rwanda

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly agree</td>
<td>40</td>
<td>49.4</td>
<td>49.4</td>
</tr>
<tr>
<td>Agree</td>
<td>38</td>
<td>46.9</td>
<td>46.9</td>
</tr>
<tr>
<td>Disagree</td>
<td>3</td>
<td>3.7</td>
<td>3.7</td>
</tr>
<tr>
<td>Total</td>
<td>81</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: Primary data, 2017

Table 4.12. Shows the factor that respondents view the trust of international and regional organs to Rwanda to which it could and is important player in multilateral system. Among 81 respondents 78 or 96.3% (strongly agree 49.4% and agree 46.9%) agreed that being a member in different organs bring trust to the country being categorized as an important player in multilateral system. Other 3 or 3.7% disagree that being member in different international or regional organs could bring trust to the country.

4.2.10.2 Relationship with financial partnership increase the economic development in Rwanda

This question in brought to check the perception of respondents to the importance of being part in regional and international organs.

Table 4.16 Financial partnership values support free movement of goods, services, people, capital, residence is increasing GDP, life expectancy, literacy and level of employment

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly agree</td>
<td>38</td>
<td>46.9</td>
<td>46.9</td>
</tr>
<tr>
<td>Agree</td>
<td>39</td>
<td>48.1</td>
<td>48.1</td>
</tr>
<tr>
<td>Disagree</td>
<td>3</td>
<td>3.7</td>
<td>3.7</td>
</tr>
<tr>
<td>Total</td>
<td>81</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: Primary data, 2017

Among 81 respondents, 80 have given their views and one not say anything. From 80 responses 77 or 96.25% supported, the idea (strongly agree 38 and agree 39). While 3 or 3.75% of them disagree that being part of regional or global organs could increase the wealth of Rwandan. This shows that Rwanda growth from 2000 until now is growing. And for sure the partnership strategy has play a big role.

4.2.10.3 being a member of financial group to Rwanda extend trade territory

Rwandan trade has been mainly unbalanced where the imports dominate the exports of the country. According to the trade statistics information of Rwanda, trade balance has increased during the years. During this research, we wanted to know the respondents view to the being a member of some regional blocs of Rwanda and its extend to trade in territory.
Table 4.17 Regional bloc active membership enables Rwanda to extend trade territory

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td>2</td>
<td>2.5</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>34</td>
<td>42.0</td>
<td>42.0</td>
<td>44.4</td>
</tr>
<tr>
<td>Agree</td>
<td>44</td>
<td>54.3</td>
<td>54.3</td>
<td>98.8</td>
</tr>
<tr>
<td>Strongly disagree</td>
<td>1</td>
<td>1.2</td>
<td>1.2</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>81</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

*Source: Primary data, 2017*

Viewing the data presented in the table above, among 81 respondents, only 79 respond to the question and two did not. 77 or 97.5% (Strongly agree 34 and 44 agree) agreed that adherence of Rwanda in regional block extend trade territory and has increase the Rwanda trade and two respondents did not recognize its impact on Rwanda trade.

This shows that the adherence of Rwanda to the regional blocs was significantly extend our trade and then has contribute on the economic growth of the country.

4.2.10.4 Rwanda partnership with peace, security and stability

Partnership is crucial for maintaining and promotion of peace and sustainable development. This can be only achieved through collective efforts. As we are all aware, our world has never been free from crises arising from multiple causes. During this research, we wanted to check the perception of our respondents on their view for being member of Rwanda in different organs on the issue of security and stability. Table below summarize their view.

Table 4.18 Rwanda adherence on common market is very crucial on promoting peace, security and stability

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td>2</td>
<td>2.5</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>37</td>
<td>45.7</td>
<td>45.7</td>
<td>48.1</td>
</tr>
<tr>
<td>Agree</td>
<td>40</td>
<td>49.4</td>
<td>49.4</td>
<td>97.5</td>
</tr>
<tr>
<td>Disagree</td>
<td>2</td>
<td>2.5</td>
<td>2.5</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>81</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

*Source: Primary data, 2017*

Among 81 respondents, 79 respond to the question and two did not. From those 77 or 97.5% (37 strongly agree and 40 agree) agreed that Rwanda adherence on regional/global organs had promoted peace, security and stability while other two responds or 2.5% disagreed that it did. Drawing on the data Respondents had recognized the impact of being part in regional and international organs to the peace, security and stability of a country.

4.2.10.5 Impact of common market organs to the Rwanda economic growth

Regional integration is a complicated progress. Economic growth rates that are not large enough to counteract the negative effects of global economic meltdowns leave many developing countries greatly exposed and this can result to great suffering for a majority people. For economies that are heavily reliant on a few commodity exports of homogeneous nature, the need to come up with long term macroeconomic policies aimed at diversification of their exports through development frameworks that pay close attention to increase investment and new technologies cannot be overemphasized. From this concept, the researcher wanted to see the views of respondents to the impact of those regional/global organs to the Rwandan economic growth.

Table 4.19 Is common market contribute to Rwanda economic development?

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td>Yes</td>
<td>80</td>
<td>98.8</td>
<td>100.0</td>
</tr>
<tr>
<td>Missing</td>
<td>System</td>
<td>1</td>
<td>1.2</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>81</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

*Source: Primary data, 2017*
From the table above, among 81 questioned, 80 respond and only one did not. All respondents 80 or 100% affirmed that being a member in different organs had contribute to the Rwanda economic growth.

4.2.10.6 Investment of foreign partners in achieving Rwanda visions

Rwanda’s long-term development goals are defined in vision 2020 a strategy that seeks to transform the country from a low-income agriculture based economy to a knowledge based, service oriented and economy with middle-income country status by 2020. In order to achieve this, the private sector has to play a bigger role in ensuring economic growth. Investment relies heavily on foreign and domestic parts.

Table 4.20 Vision 2020 can be achieved through increasing in investment with foreign partners

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td>1</td>
<td>1.2</td>
<td>1.2</td>
<td>1.2</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>46</td>
<td>56.8</td>
<td>56.8</td>
<td>58.0</td>
</tr>
<tr>
<td>Agree</td>
<td>33</td>
<td>40.7</td>
<td>40.7</td>
<td>98.8</td>
</tr>
<tr>
<td>Disagree</td>
<td>1</td>
<td>1.2</td>
<td>1.2</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>81</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Source: Primary data, 2017

Among 81 respondents, 80 respond to the question and one did not. From those, 79 or 98.75% (46 strongly agree and 33 agree) agreed that Rwanda could achieve the vision by increasing investments from foreign partners other one respond or 1.25 % disagreed that it did. This shows that even Rwanda development players’ institutions recognize the role of foreign partners in the development of a country like Rwanda.

4.2.10.7 Free movement to common market

Developing countries today compete to motivate free movement to common market to their local economic area. Rwanda government has created an environment conducive to investment, to attract both local and foreign investment finance. The investment and tourism sector have been the main investment area that Rwanda has shown to be invested in. The respondents asked to give us their opinions to their views on their promotion to the wealth creation in Rwanda.

Table 4.21 Free movement of goods, services, capital and residences supported by the strategy of integration under common market

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly agree</td>
<td>43</td>
<td>53.1</td>
<td>53.1</td>
<td>53.1</td>
</tr>
<tr>
<td>Agree</td>
<td>35</td>
<td>43.2</td>
<td>43.2</td>
<td>96.3</td>
</tr>
<tr>
<td>Disagree</td>
<td>3</td>
<td>3.7</td>
<td>3.7</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>81</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Source: Primary data, 2017

The table above shows that the majority of respondents have affirmed that FDI and tourism contribute to the wealth creation. Among 81 respondents, 78 or 96.3% (53.1% strongly agreed and 43.2% agreed) agreed that it contribute while other three or 3.7% disagreed their impacts on wealth creation.

According to the analysis performed, it was found that FDI did accelerate growth in Rwanda. The initial human capital increase, some social development and institutional parameters do represent positive influence of FDI on economic growth. The influence of FDI on wealth creation depends on which sector (manufacturing, agriculture etc.) FDI flows are directed. In general, positive influence of FDI is explained by “technological diffusion” originating from firms accepting foreign capital and spreading to related companies in a form of technical support of suppliers (customers) and business environment. Technological diffusion is associated with positive external effect of FDI.
Table 4.22 The transfer of knowledge, skills and talent improve domestic productions and its innovation in the regional

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly agree</td>
<td>49</td>
<td>60.5</td>
<td>60.5</td>
</tr>
<tr>
<td>Agree</td>
<td>32</td>
<td>39.5</td>
<td>39.5</td>
</tr>
<tr>
<td>Total</td>
<td>81</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: Primary data, 2017

The results from table indicates that 60.5% of respondents strongly agreed that the transfer of knowledge, skills and talent improve domestic productions and its innovation, 39.5 agreed.

Table 4.23 Factors common market has to increase for the economic development

<table>
<thead>
<tr>
<th>Economic Sector</th>
<th>Selected frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goods</td>
<td>63</td>
</tr>
<tr>
<td>services</td>
<td>74</td>
</tr>
<tr>
<td>capital</td>
<td>80</td>
</tr>
<tr>
<td>migratory</td>
<td>78</td>
</tr>
<tr>
<td>residence</td>
<td>52</td>
</tr>
<tr>
<td>Health</td>
<td>41</td>
</tr>
<tr>
<td>Education</td>
<td>59</td>
</tr>
</tbody>
</table>

Source: Primary data, 2017

The Rwandan party leadership has to look at the several sector of economic to attract partnership involve in. Our respondents choose to shows the area that mainly need partnership to be developed. In the table above, respondents choose mainly industry (80 votes), capital (78 votes), residence (74 votes), goods (63 votes), education (59 votes), Services (52 votes) and health (41 votes) to be enforced in development of our country.

<table>
<thead>
<tr>
<th></th>
<th>GDP Per Capita</th>
<th>Balance of Trade</th>
<th>Foreign Investment</th>
<th>Direct</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP Per Capita</td>
<td>Pearson Correlation 1 .199 .870**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sig. (1-tailed) .230 .000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>N 16 16 16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Balance of Trade</td>
<td>Pearson Correlation .199 1 .139</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sig. (1-tailed) .230 .304</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>N 16 16 16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foreign Investment</td>
<td>Pearson Correlation .870** .139 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sig. (1-tailed) .000 .304</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>N 16 16 16</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Survey data, 2017

From the above SPSS correlation matrix results, it can be seen that the correlation coefficient r=0.87 which indicates a high positive relationship between GDP Per Capita and Foreign Direct Investment. There is also a weak positive relationship between GDP
Per Capita and Balance of Trade $r=0.199$. We therefore conclude that for each of the 16 year considered there is evidence that GDP per capita are related to FDI inflows with ($r=0.87$). The number -0.139 reveals that, there is no multicollinearity between Balance of Trade and foreign Direct Investment.

<table>
<thead>
<tr>
<th>Table 4.24</th>
<th>Model Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>R</td>
</tr>
<tr>
<td>1</td>
<td>.874a</td>
</tr>
</tbody>
</table>

**Source:** Secondary data, 2017

After identifying the positive relationship from correlation analysis, comes the analysis of the strength of the relationship. With $(R^2=0.727)$ implies that the variations in the GDP per capita are explained by the variations in the FDI inflows and BOT by 73% and the remaining 27% variations in GDP per capita are explained by other factors than the FDI and BOT, thus, a positive relationship. The adjusted R Square indicates that we have a good model.

<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>303.283</td>
<td>36.275</td>
<td></td>
<td>8.361</td>
</tr>
<tr>
<td>Balance of Trade</td>
<td>.046</td>
<td>.078</td>
<td>.080</td>
<td>.585</td>
</tr>
<tr>
<td>Foreign Investment</td>
<td>1.034</td>
<td>.164</td>
<td>.859</td>
<td>6.305</td>
</tr>
</tbody>
</table>

**Source:** Survey data, 2017

The regression equation to describe the data is as follows:

$$Y=303.283+0.046\text{BOT}+1.034\text{FDI}$$

The results from table 4.23 show that as Balance of Trade increases 1 unit GDP per Capita will increase 0.046 US and as Foreign Direct Investment increases 1 unit GDP per Capita will increase 1.034US. The number 303.283 indicates the value of $Y$ when Balance of Trade and Foreign Direct Investment are assumed to be zero.

V. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

**5.1 Summary of the Findings**

The general objective of the study was to assess the contribution of Foreign Policy strategies on economic development in Rwanda. One of the key findings was that different institutions were concerned with economic development of Rwanda. The contribution proved by the extent of agreement with the statements in the questionnaire. The findings indicated that majority of respondents agreed that partnership with countries in terms of trade and investment raise the access of Rwandan exports to foreign markets.

**5.1.1 Contribution of partnership strategy on Rwandan economic development**

The first objective of the study was to demonstrate the contribution of partnership strategy on Rwandan economic development. The Results showed that Partnership with different countries in terms of trade and investment raise the access of Rwandan exports to foreign markets by removing barriers to trade and providing necessary infrastructure and finance which motivate Rwandans to increase their production and importing abroad vis versa that increase the individuals Gross Domestic Product per capita, life expectancy, Literacy and levels of employment, Infrastructure, Personal dignity and Freedom of association. The results from 4.23 showed that, the increase of balance of trade to one unit would increase GDP per Capita 0.046 US. It is clear that balance of trade has an insignificant relationship with GDP per Capita because $P$-value$=0.569>0.05$.

**5.1.2. Contribution of regional and global relations strategy on Rwandan economic development**

The second objective of the study was to assess the contribution of regional and global relations strategy on Rwandan economic development. The Results indicate that Being member of Regional Integration, Intra-Africa cooperation and multilateral organization which Rwanda is actively contributing and making her as an important player in multilateral system which encourage the International community (UN, AU, EU, EAC, ECCAS, ICGLR, AIMS, TWAS…) to trust Rwanda as peaceful, secure and stable for hosting International occasions and is affecting positively her economic development. 100% of respondents affirmed that being a member in different organs had contributed to the Rwanda economic growth.

**5.1.3 Contribution of wealth creation strategy on Rwanda economic development**

The third objective of the study was to determine the contribution of wealth creation strategy on Rwandan economic...
development. The findings of this paper confirm the strong and positive relationship between foreign direct investments (FDI) and the GDP per capita in Rwanda, which in turn yields a positive impact on economic growth. It demonstrates that FDI influence GDP per capita significantly because P-value=0.00<0.05. Along the years, the FDI inflows have been increasing, therefore resulting in an increase of GDP per capita. This is explained by the reforms undertaken by the government of Rwanda in making the country a favorable place for investments through the stability of macroeconomic and political environment.

5.2 Conclusions

Based on the objectives and the findings of the study the following conclusion can be made;

5.2.1 Partnership strategy on Rwandan economic development

Partnership strategy was found to have an effect on Rwandan economic development through attracting foreign investors, improving export promotion, facilitating trade, promoting Bilateral and multilateral cooperation and equipping students with relevant skills. The findings indicated that Partnership with countries in terms of trade and investment raise the access of Rwandan exports to foreign markets as confirmed by majority of respondents. The results also confirmed insignificant relationship between balance of trade and GDP per capita.

5.3.2 Regional and global relations strategy on Rwandan economic development

Results also led to the conclusion that factors of Regional and global relations strategies which contributed on Rwandan economic development were regional and global cooperation, facilitating trade, made in Rwanda promotion, increasing investment in infrastructure, free movement promotion, peace keeping and skills transfers. The agreements percentage of respondents on questionnaire has also approved that regional and global relations strategy contribute on Rwandan economic development.

5.3.3 Wealth creation strategy on Rwandan economic development

Foreign Direct Investment had a positive effect on GDP per Capita. The increase of FDI reflects high confidence of foreign investors in Rwanda and the country’s capacity of foreign investment attraction. This is a response to continuously improving business environment and proof of existence of investment opportunities within the country which in return impact on the country’s development.

5.4 Recommendations

Based on the results, findings and conclusions the following recommendations have been deciphered. The study recommends to Ministry of Foreign Affairs to increase Rwanda’s integration into the international community and the world economy, to attract foreign investors because their contribution has found to be positive and statistically significant in increasing GDP per Capita. The Ministry should maintain international cooperation and continue work to enter multilateral conventions and bilateral agreements in the field of education, science and culture, and implementation of common research and development projects. There is a need to increase Rwanda’s integration into the international community and the world economy.

The study recommends to the Ministry of trade to encourage export by promoting made in Rwanda, facilitating trade and increasing investment in infrastructure because the results have proved a positive but statistically insignificant relationship between balance of trade and GDP per Capita. The study recommends To develops economic and trade diplomacy, provides diplomatic means to promote and protect Rwanda’s governmental interests and its citizens, creates favorable conditions for the expansion of Rwanda's business and export products to global markets.

The study recommends also to the Ministry of Finance and Planning to ensure participation of the country in international economic organizations and financial institutions and promotes Rwanda’s national interests.

5.5 Areas for Further Research

A replica of this study can be carried out with a further scope to include other state corporations and see whether the findings hold true. Future studies should apply different research instruments like interview guide, focus group discussions to involve respondents in discussions in order to generate detailed information which demonstrate how Rwanda’ Foreign policy strategies contribute on Rwandan economic development

REFERENCES

Analysis of the Contribution of Foreign Policy Strategies to the Economic Development in Rwanda

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Abstract- To analyse the contribution of Rwandan Foreign Policy Strategies and its Economic Development is pertinent to understand how Rwanda’s diplomacy has contributed to socioeconomic development of the nation. This study is important to various stakeholders in particular the Government of Rwanda, academicians, professionals and researchers. In this paper, researcher aimed at developing the notion conceptually. Specifically he built on the work of Nath, (2013), Kim. (2012), whom their works were based on the contribution of Strategic Partnership, regional, global to economic development. The target population was 214 from Public&Private Institutions. Primary data was collected using structured questionnaires. Secondary data was collected by reading and analysing relevant books and journals. Data was analysed using descriptive and inferential statistics. In particular, regression analysis was carried out to investigate the relationship between hypothesized variables. The study found out that foreign policy strategy has a statistically significant effect on economic development in Rwanda (F=9.757, R² = 0.783, Sig=0.004<0.05). With a p-value of 0.002 < 0.05, it can be concluded that wealth creation strategy has a statistically significant effect on economic development of Rwanda (F=9.757, R² = 0.783 Sig=0.004 at α=0.05). With a p-value of 0.003 < 0.05, it can be concluded that regional and global relationship strategy has a statistically significant effect on economic development of Rwanda (F=9.757, R² = 0.783, Sig=0.004 at α=0.05). With p-value of 0.002<0.05, it can be concluded that partnership strategy has a statistically significant effect on economic development in Rwanda (F=9.757, R² = 0.783, Sig=0.004 at α=0.05). The study established a positive contribution between foreign policy strategies and Economic Development in Rwanda. Therefore, the study recommends that partnership strategy should go hand in hand with economic diplomacy in order to attract foreign investors and enable strong trade negotiation for improving import and export promotion.

Index Terms- Partnership; Regional & Global and Wealth creation strategy

I. INTRODUCTION

At the Global historical and theoretical perspective, Foreign policy strategies goes back to primitive times where the immeasurable desires of the human being used to be based on collaboration with others to create a tactful cooperation. Then established foreign policies were built on a compromise between them that the most of these relations were carried out by word of mouth and left little direct archaeological evidence, (Nancy, et al., 2009).

According to the Gavin, (2013), illustrates that partnership; Regional, global relations and wealth creation strategies between States started to become more serious after the 2nd world war especially during the cold war when United States of America and western Europe countries were initiated in 1953 during the sent to the European Coal and Steel Community with American support the technical and financial cooperation between them; The partnership, regional, global relations and wealth creation of these two biggest economies in the world were focusing on the areas of economy, education, trade and investment.

For EU, (2013), the total investment of the United States of America in the European Union was three times higher than in all of Asia. To this date, the same report reveals that the European Union investment in United States of Americas is around eight times the amount of European Union investment in India and China together. European Union and United States of America investments are the real drivers of the transatlantic relationship that is contributing to the growth and jobs creation on both sides of the Atlantic block. The transatlantic relationship of the European Union or the United States of America is the largest trade and investment in the world, (Vandinika, et al., 2015).

Indeed, much of the debates surrounding the successors to the different International policies and accomplishments such as Millennium Development Goals (MDGs) in 2000; sustainable Development Goals (SDGs) in 2015; Group of 77 at the United Nations that has loose coalition of developing nations, designed to promote its members’ collective economic interests and create an enhanced joint negotiating capacity in the United Nations.
started as 77 founding members of the organization, (Zukang. 2008).

Bruce, (2006), demonstrates how concepts of economic development were being based on traditional economics, which explain the efficient allocation of scarce resources of the country, and political economics. However, the social development and political process of development of the nation shows the role of values, attitudes and institutions in the process of development. Contrary to Bruce’s assumptions, Partnership strategy, regional and global relations strategy as well as wealth creation strategy seem to be effective in promoting socioeconomic developing of nations.

At the Continental, regional perspective; the given small size of most African economies and state borders that pay little heed to the distribution of natural endowments, regional economic integration is commonly seen as essential for Africa (Jaime de Melo, et al., 2014). The economies of many African countries have grown more rapidly over the past decade, significantly reducing extreme poverty for the first time in about half a century, and the continent has carved out a greater voice in global institutions, Jaime de Melo, et al., (2014).

The African integration arrangements was divided into two broad groups. Those that fit into the Lagos Plan of Action (LPA) adopted in April 1980, and those that were either in existence or came about outside the LPA which currently are collected by the Arab Maghreb Union (AMU/UMA), Economic Community of West African States (ECOWAS), East African Community, Intergovernmental Authority on Development (IGAD), Southern African Development Community (SADC), Common Market for Eastern and Southern Africa (COMESA), Economic Community of Central African States (ECCAS) and Community of Sahel-Saharan States (CENSAD) by encouraging Partnership. International governance fosters Diplomacy & International engagements; Regional & Global relations and Wealth creation values that shall continue to achieving the economic development of the said states, (UN report (2009).

The East Africa Community (EAC) has within a relatively short time since its establishment realized tremendous progress in regional cooperation and development, which is also supporting the economic development. In real economic terms, the region’s combined Gross Domestic Product has risen to $ 75 billion, from 20 billion in 1999. Following the enlargement of the EAC in 2007, the region’ combined population grew up combination of 130 million of people from Kenya, Uganda, Tanzania, Rwanda and Burundi, (Eric, 2013).

The Kenya and Tanzania Partnership under the regional economic integration and partnership was the oldest and operative in many areas by emphasizing on their economic development (Frederick. 2013). In 2014, Tanzania became the largest partner export destination of Kenyan goods within East Africa. Kenya's total exports to Tanzania in 2011 were valued at 488 million U.S. dollars as compared to 390 million dollars in 2010.

For many years, Uganda was the largest export destination for Kenyan goods. However, due to the lifting of trade restrictions within the EAC, Tanzania has become a major export destination, outstanding Uganda in 2014. In 2013, Kenya exported goods worth Ksh. 67 billion (Eur. 632 million) to Uganda. This made Uganda the second largest export destination for Kenyan goods after the European Union; Uganda exported goods worth Ksh. 15 billion (Eur. 144 million) to Kenya. Bilateral trade was worth Ksh. 214.3 billion (Eur. 776 million) making Uganda the 7th largest trade partner in Kenya, Many Kenyan firms have operations in Uganda some Kenya's 7th largest trade partner; Many Kenyan firms have operations in Uganda, some of which are Kenya Commercial Bank, Equity Bank, and Nakumatt. As of 2014, Kenya is the largest investor in the East African Community (EAC), (Ssekika, 2014).

At national perspective, Rwanda has over the years been comparatively successful in supporting the national leadership, ministries and other state agencies to promote Rwanda’s international interests, to project a positive image of the country based on its size and location mean that stronger integration within regional economies which was vital for further growth and this was reaping the benefits from the East African Community regional integration by having joined the block in 2007, Which is translating in improved economic, political and social prospects. Rwanda has also benefited from EAC stronger market and challenges have been addressed together as a region. Rwanda has been better in the last seven years as it has been able to benefit in several areas, (UNDP, 2011).

Through partnership, regional & global relations and wealth creation strategies, Rwanda gained a lot on projects of the NCP, including the construction of the standard gauge railway, regional power trade, the strengthening of a single customs territory and collaboration of infrastructure technology including regional mobile financial services, one single tourism visa, regional tourism agenda, African Growth, and Opportunity Act (AGOA), Imani development policy, Cross-border trade (CBT), Non-tariff barriers (NTB), SWG on trade, industry and investment, Common External Trade Policy (CEPT), and the implementation of the one area network, (Berger, 2011).

Rwanda is focusing on second-generation economic reforms of export diversification, structural transformation, regional integration and financial sector as main elements of partnership, regional & global relations and wealth creation strategies which are contributing to the acceleration of socio-economic development and boost incomes of the poorest so that Rwandans can advance in their journey to prosperity, (Minaffet. 2006).

Rwanda at Work shows that the country has maintained 6.9% of her economic growth rate and macroeconomic stability for the first three-quarters of 2015 and projects a growth rate of 6.8% in 2016 (WB. 2015). By maintaining the partnerships, Regional and global and wealth creation strategies through efficient of development cooperation such as foreign direct investment and tourism promotion, acquisition and transfer of knowledge and technology, equitable world trade and regional integration, Intra-Africa cooperation and United Nations multilateral system; Rwanda should achieve its goals of medium income by increasing its economic development, (Ibid, 2015).

Since 2006, Rwanda harmonized its foreign policy by adopting different strategies such as Partnership, Regional, global relations and Wealth creation strategies with the rest of the world. The country has set out its aim to become a middle-income country by 2020 and has encouraged the government to use extra efforts that later translated in Rwanda being ranked by
several International bodies. The country was celebrated for its green investment, Peace and Security component, clean and doing business; and that is why Rwanda should continue to maintain the mutual cooperation with Africa and the world as whole, (Minaffet,2006).

A number of studies including one by Arne et al., (2004), demonstrated that Rwanda’s foreign policy strategies including strengthening partnership, Regional & global relations and wealth creation strategy, do not have a lot of influence on the growth of national economic development even though, imports have risen sharply since 2004, largely as result of the cumulative costs of importing different products such as fuel and energy.

Based on studies done in the past by different researchers as well as reports released by the Rwandan Government about what Foreign Policy strategies should continue to improve the contribution on economic development plan; the researcher believes that there is still a critical gap at demonstrating the contribution of Rwanda’s Foreign policy strategies on economic development. Sticking at this exemplified gap, the researcher decided to carry out a study, which titled “Analysis of the contribution of Foreign Policy strategies on Economic Development in Rwanda”. The study assist the Rwandan community in particular and the global community in general to understand the level of the contribution foreign policy to national economic development and bring to light the reliable findings on the assumption.

II. LITERATURE REVIEWS

This study is built on the underpinning theories and models, including the Partnership strategies theory by Ronald, (2000); The Theory and Practice of Global and Regional governance cooperation strategy: Accommodating American Exceptionalism and European Pluralism by Richard, (2005) and A Wealth Creation Approach model to Economic Development by Mallory, (2014)

2.1 Theoretical and empirical framework

2.1.1 Theoretical Framework


2.1.1 Partnership strategies theory by Ronald W. Mc Quaid (2000),

The partnerships theory developed by Mc Quaid (2000), with the purpose of promote cooperation between Industrialized Countries or developed Sphere and developing countries or regeneration that should increase their National economic development. There are a number of assumptions underlying design the partnership component.

Firstly, the potential for synergy of some form, so ‘the sum is greater than the parts’. Secondly, the partnership involves both development and delivery of a strategy or a set of projects or operations; although each actor may not be equally involved in all stages. Thirdly, in public-private partnerships the public sector is not pursuing purely commercial goals. So a criteria of partnership is the presence of social partnership (so excluding purely commercial transactions)

Ronald W. Mc Quaid, explain more that Partnership involves co-operation, i.e. “to work or act together” and in a public policy can be defined as co-operation between people, organizations or Countries in the public or private sector for mutual benefit (Holland, 1984). Sets out a similar general definition of ‘private-public partnership’ as “any action which relies on the agreement of actors in the public and private sectors and which also contributes in some way to improving the urban economy and the quality of life”. Although the author argues that, this has limited conceptual value. Partnerships approaches have received widespread support from across the political spectrum, including policy makers, officials and local communities.

2.2.1.1 India’s Partnerships Strategy using Analytic Hierarchy Process model

A strategic partnership is a long-term interaction between two or more countries based on political, economic, social and historical factors. Such a partnership manifests itself in a variety of relationships.

India has signed “strategic partnerships” with more than 30 countries. Are these countries equally important for India? Or do they have their own hierarchy? For instance, India has strategic partnerships with the United States, Russia, China, Japan, UK, France and others. It is obvious that not all strategic partnerships are equally important. Some have a dominant political element, while others have a prominent economic dimension. In some cases, the security dimension may be the most important.
Arvind et al. (2011) Gupta Analytic Hierarchy Process (AHP) is one of the multi-criteria decision-making methods based on relative priorities assigned to each criterion in achieving the stated objective. This technique exploits the powerful idea of evaluation and selection of options based on a consistency test, goes with the subjective judgment of experts. Furthermore, the actual process carried out the analysis, which helped to the decision maker to prioritize the parameters in a manner that otherwise, might not be possible.

This model illustrates how government should determine in advance, if a relationship is one that will result in competitive advantage and is worthy of the time and resources needed to fully develop into a partnership. Further, all partnerships are not the same. How does government or management knows what type of partnership would provide the best pay-off? These questions may be answered by using The Partnership Model.


According to Richard, (2005), theorising about global governance cooperation strategy that should not be confused with international relations has only become fashionable in the post-Cold War era, which he separated also to the ‘era of globalisation. Notwithstanding coordination problems that have arisen in a number of major policy domains in the European Union in the early years of the 21st century, the European Union is still the most institutionalised regional policy community exhibiting a complex system of governance and cooperation beyond the territorial state (Rosamond, 2000); But research on multi-level regional governance cooperation strategy in western countries is often detached from the wider analytical questions of an extra-European nature in the contemporary theory and practice of global and regional governance and cooperation strategy.

Richard Higgott added that the Globalisation and Regional strategy theories have exacerbated the need for new understandings (both normative and analytical) of governance and cooperation strategy to cope with the challenges it brings up; The key problem generated by globalisation is the disjunction that exists between market structures and governance, cooperation structures which has noted ‘interdependence and the lack of governance, when combined, make a deadly mixture’.

Regional strategy model by SGS, 2010

The Western Melbourne Regional Development Committee and Lead West released a report by Shadow Government Statistics (SGS) Economics and Planning. It is important to develop an environment/culture that will foster innovation.

A framework to support innovation includes integrating it into the business objectives by: Taking a holistic approach to innovation; establishing strong channels of communication and fostering a culture of innovation. According to Dodgson et al. (2008), global surveys show that innovation occurs where leaders encourage, protect it executives actively manage and drive innovation where talk about innovation but do nothing about it, innovation is inhibited for an innovation strategy to be effective, it needs to be integrated into senior leaders’ agendas. Using performance metrics and targets for innovation helps senior management integrate innovation into their normal pattern of business and creates an environment where staff are comfortable with innovating and better use of existing talents is made.

Barsh et al. (2008), established a strong channels of communication networks that should determine the innovation effectiveness. Effective networks allow people with different kinds of knowledge and ways of tackling problems to cross-fertilize ideas; New ideas breed more new ideas, so networks can generate a cycle of innovation where developing the innovation strategy, think about how can create conditions that allow innovation to become part of daily discussions.

2.1.1.4 Expanded "Global and Regional" Model by Peterbock et al (2005)
This model helps in advancing the Globalization initiative by bringing in the following tools, framework, and insight such as: Globalization assessment tool for the organization to benchmark with others global organizations; Organizational Deoxyribo Nucleic Acid assessment tool and Assess Global Leadership Quotient for the leadership team.

Peter bock et al (2005), explanation on the model demonstrated that there is no right or wrong model to adopt or champion within a country’s organization. Essentially both models describe the same overall process when Globalization is managed both the internationally and regionally, the global development policies and strategies such as Sustainable Development Goals and the Regional economic integration through Multinational and Transnational corporate, Trade Facilitation, Economic integration and Free movement can produce a huge support in terms of Bilateral trade agreement, Small, medium cross border trade agreement, trade in services and Investment; Economic development, technical assistance, financial support, budget support and Customization, movement of capital, movement of goods and services, movement of people and right to the residence which should support the national economic development in particular, the Regional economic integration process and the world affairs in general.

### Processes

Facilitating Assessment of where your organization is compared to others; Consensus building in the top management team concerning Globalization strategy, creating their understanding and ownership for execution; Helping organization to align strategy, structure, culture and leadership for seamless global execution and Facilitation of the change process in your organization regarding Globalization. However, it is useful to be aware of both models, especially if the researcher has the misfortune of having to investigate into Documentation relating to regional and global relationship. The commonality in what these process models are seeking to describe under the headings of Globalization, Internationalization, and Localization is to facilitate national economic development.

#### 2.2.4 A Wealth Creation Approach model to Economic Development

Mallory Lynn R. (2014) demonstrates that the Wealth creation is a relatively new but growing approach to economic and community development. In the wealth creation theory, Mallory Lynn R. classified the wealth creation in eight forms of capital stocks: Individual, Intellectual, Natural, Built, Financial, Political, Social, and Cultural, which can be supported by political environment that is interesting on the foreign direct
investment and the growing of economic development of nation. Wealth Works, which used the principals of developing countries, wealth creation generates a systems-thinking approach to economic development that has to be implemented in regions across the country.

Richard (2000). Illustrates the linkages between economic production and the natural world requires to formulate a concept which is broader and richer than ‘land’. That classical notion has heavy agricultural connotations and tends to focus our attention on geographic location, surface area, differential soil fertility, Ecological economists have recently proposed that recognize explicitly the essential role of ‘natural capital’ in commodity production.

The Model for creating Wealth:

![Image of The Model for Creating Wealth](http://dx.doi.org/10.29322/IJSRP.8.5.2018.p7756)

Figure 2.4 The Model for Creating Wealth by Wealth-Building 101 (2010)

Once have a mindset of saving money instead of spending money, we start the accumulation process because it is the money that we want to start to put to work. Like a garden, the money save are seeds, ready to be sown, planted, tended, and then harvested. Whether it is a simple savings account, a brokerage cash account (more on that later), you need to have an account established that is the shelter for the seeds. The United Nations General Assembly recommended an Education for Sustainable Development that clearly recognizes the increasing need to integrate sustainable development issues and principles into education and learning. The World Conference on Education for Sustainable Development held in 2009 at Bonn, Germany recalled the contextual elements that should lead to the development of a new vision of education.

Establish the new stream of income, it can contribute more and more Seeds of wealth into the statement of work account used to build up the income producing assets and accelerate the magic of Compound interest such as enabling more and more of the businesses such as

Sole Proprietorship one of individual or married couple in business alone. Sole proprietorships are the most common form of business structure. This type of business is simple to form and operate, and may enjoy greater flexibility of management, fewer legal controls, and fewer taxes. However, the business owner is personally liable for all debts incurred by the business.

Some example learned lately that the market owns people by making money in the market whether it goes up, or down. Most people take a passive approach to the Market. They do not ‘own’ their decisions. They do not understand the basics, and they are intimidated away from it. Someone told them they should invest so they do, but they take the simple but destructive route of not being engaged in their decisions. The next one is related to that: 2) Buy / Hold. They place an order and forget, no matter what the cycle, economy, or business situation of the particular company they are invested in.

2.1.2 Review of Empirical Literature

Different Knowledge and results derived from investigation, observation, experimentation, or experience done by different researches on similar work with foreign policy strategies (partnership, regional & global and wealth creation strategies) as opposed to theoretical knowledge based on logical or mathematical assumptions were based on what drove the researcher to provide his addition.

2.4.1 The contribution of partnership strategy on economic development in Rwanda

Mario, et al. (2013), demonstrates that partnership strategy as agreements and conventions, Lomé IV Convention and its precursors included were improved the bilateral and multilateral partnership performance of continent such as Africa, Caribbean and Pacific group of countries, with the ultimate aim of promoting their economic development.

According to Global Partnership for Effective Development (2013), Rwanda has all five of the mechanisms for mutual accountability in place in the Global Partnership Monitoring Framework such as Aid Policy, Country-level Targets, Assessment of progress towards targets, involvement of nonexecutive stakeholders, and making the results public. The system of mutual accountability between the Government of Rwanda and the Development Partners has been a factor in the efficient use of resources (Abbott et al 2013).
Table 3: Exports by grouping 2011 & 2012 (Us$ Fob)

<table>
<thead>
<tr>
<th></th>
<th>2011</th>
<th>2012</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tourism (Estimate for Dec 2012)</td>
<td>250,700,000</td>
<td>286,500,000</td>
<td>14%</td>
</tr>
<tr>
<td>Traditional Merchandise (coffee, tea, minerals)</td>
<td>297,310,924</td>
<td>262,949,397</td>
<td>-12%</td>
</tr>
<tr>
<td>Non-traditional Exports</td>
<td>53,098,975</td>
<td>111,130,451</td>
<td>109%</td>
</tr>
<tr>
<td>Re-Exports</td>
<td>36,502,943</td>
<td>107,987,150</td>
<td>196%</td>
</tr>
<tr>
<td>Informal Exports</td>
<td>61,868,853</td>
<td>92,979,044</td>
<td>50%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>699,481,695</td>
<td>861,546,041</td>
<td>23%</td>
</tr>
</tbody>
</table>

Source: BNR Trade Statistics 2011 & 2012

Rwanda’s impressive export growth in 2012 came largely from exports outside of Rwanda’s traditional export sectors. This has also led to a shift in the composition of Rwanda’s export basket in 2012 compared to 2011, with the emergence of a more diversified export base and growth driven by Rwanda’s non-traditional and re-export sectors. A drop in traditional merchandise exports combined with rapid growth in non-traditional exports, re-exports and informal trade has resulted in a reduction of traditional export share of total exports from 66% in 2011 to 46% in 2012.

![Figure 1: Composition of merchandise exports 2011 & 2012 (% of Total Exports)](image)

Traditional Exports refer to Merchandise exports only (Coffee, Tea, Minerals)
Source BNR Trade Statistics (2011 and 2012)

In Rwanda’s non-traditional export sectors, a number of products have emerged this year with substantially higher exports than in 2011. Rwanda’s main non-traditional exports include manufactured goods, horticultural goods and other items such as hides and skins, livestock and other various goods. Rwanda’s manufacturing sector has been performing particularly well, with exports up 142% in 2012 over 2011. Manufacturing exports accounted for 46% of Rwanda’s non-traditional exports until the end of September 2012, up from 40% in 2011.

Products in this sector include: products of the milling industry up 136% with total exports of US$19.8 million (see box 1); beverage exports up 116% with US$13 million in exports; iron and steel exports up 231% with US$ 5.6 million worth of exports; plastics up 263% with US$3.3 million worth of exports; cement and other construction material up 189% with US$3 million in exports; soaps and washing preparation up 293% with exports of US$0.6 million and; animal and vegetable fats up 1022% at US$0.54 million. Rwanda’s largest manufacturing sector to see a fall in exports was footwear where exports saw a 25% drop from US$1.6 million to US$1.2 million.

Nkusi (2015) was assessed the partnerships in trade, taxation, Foreign Direct Investment, Public, private partnership which has been supported by United Nations of development Programme jointly with Rwanda Ministry of finance and planning and its external finance unit in developing a new Donor performance assessment framework, which will define some baseline indicators and targets for cooperation in foreign direct investment, Current Standard ”purchasing power parity” and
taxation and climate change between the Government of Rwanda and development partners. Minecofin, (2012), in their work on remittances and engaging with the philanthropic sector among other initiatives to diversify its financial resources and more gradually move away from aid dependency. At national level the Economic Development and Poverty Reduction Strategy-2 sector and thematic working groups and at a local level the Joint Action Development Forums, coordinate the implementation of Economic Development and Poverty Reduction Strategy 2 and ensure that Development assistance is used in line with its priority es International Non-Governmental Organisation are required to have approval from the Joint action development forum before they work in a district; those working at national level must have approval from the relevant line ministry.

### Table 10: Compliance costs faced by business in Rwanda

<table>
<thead>
<tr>
<th>Compliance costs</th>
<th>Frw (Million)</th>
<th>% of total Compliance costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial registrations</td>
<td>728</td>
<td>1.3%</td>
</tr>
<tr>
<td>Annual registrations</td>
<td>1,952</td>
<td>3.6%</td>
</tr>
<tr>
<td>Tax regulation compliance</td>
<td>21,233</td>
<td>38.8%</td>
</tr>
<tr>
<td>Labour regulation compliance</td>
<td>8,510</td>
<td>15.5%</td>
</tr>
<tr>
<td>Export requirements compliance</td>
<td>1,608</td>
<td>2.9%</td>
</tr>
<tr>
<td>Import requirements compliance</td>
<td>18,390</td>
<td>33.6%</td>
</tr>
<tr>
<td>Doing business with government (tendering)</td>
<td>2,334</td>
<td>4.3%</td>
</tr>
<tr>
<td>Total</td>
<td>54,754</td>
<td>100%</td>
</tr>
<tr>
<td>Rwandan GDP</td>
<td>1,746,700</td>
<td>3.1%</td>
</tr>
</tbody>
</table>


Based on the support explanation from Minicom (2013), the International markets are extremely competitive and many markets can have strict standards on products imported into their territory. Technical regulations extend from the level of toxins in food, to the safety of household electrical appliances. The safety of imports is of paramount concern to agencies concerned for the health of their citizens. Standards are the main way of signalling safety and quality, and ensuring that levels of consistency can be trusted; Rwandan firms therefore must meet the standards required in order to allow their goods to reach key foreign markets, (ibid 2013).

The particular area with heavy standards implications for Rwandan firms is in the exportation of food products to the European Union; the challenges faced are in quality control of processed food products and packaging. (UNCTAD, 2008). South Korea is classified as a non-traditional DP as they have been giving DA for only a relatively short period, but they became an OECD-DAC country in 2006. They have been delivering DA in Rwanda since 2002 according to the OECD database and participate in the DP coordinating mechanisms, including participating in mutual accountability assessments. All their assistance is given as grants and the amount of DA they give has increased from US$0.08m in 2002 to 16.5m in 2014.

The apparent decline in 2014 is probably due to incomplete data collection. However, the funding provided by one of the top philanthropic funders to Rwanda, the Gates Foundation, fell from US$13.09 in 2009 to US$4.82 in 2014 (OECD). The Gates Foundation is the only one of Rwanda’s philanthropic DPs that reports funding to the OECD, and they reported giving a total of US$ 47.92m over the period 2009-2014.
As for RDB et al (2014), demonstrated different investors from around 50 countries investing in Rwanda (FPI inflows are dominated by Foreign Direct Investment (60%) and are characterised by high-retained earnings. FPI increased from US$145.9 million in 2008 to US$427.7 in 2013 (Table 5). In the five years to 2013 its contribution to Gross Fixed Capital Formation grew by an average of 22.3 per cent a year and to Gross domestic product by an average of 12.8 per cent. Flows remain vulnerable to both external and internal economic factors, as is evidenced by the decline in 2010 due to the global economic crisis.

Table 5: Foreign Private Investment in Flows by Category 2008-13 in US$ Millions

<table>
<thead>
<tr>
<th>Years</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDI</td>
<td>66.9</td>
<td>103.3</td>
<td>250.5</td>
<td>119.1</td>
<td>255.0</td>
<td>257.6</td>
</tr>
<tr>
<td>Portfolios</td>
<td>1.1</td>
<td>0.7</td>
<td>1.5</td>
<td>87.3</td>
<td>1.0</td>
<td>1.7</td>
</tr>
<tr>
<td>Other Investment - Debt from Non-affiliates</td>
<td>77.9</td>
<td>35.7</td>
<td>91.0</td>
<td>50.2</td>
<td>153.3</td>
<td>168.4</td>
</tr>
<tr>
<td>Total</td>
<td>145.9</td>
<td>139.7</td>
<td>343.1</td>
<td>356.6</td>
<td>409.3</td>
<td>427.7</td>
</tr>
</tbody>
</table>


RDB (2014), shows how the collected stock of foreign private capital increased threefold between 2008 and 2013, from US$315.7 million to US$1,404.1 million. Foreign direct investment made up 59.7 per cent, other investments 34 per cent and portfolio investments 6.3 per cent. The main sectors of investment were Informational Communication Technology (40%), finance, insurance (20.4%) and manufacturing (14.6%).

The East African Community and Democratic Republic of Congo have emerged as Rwanda’s largest export destinations in 2012. Exports to the EAC and DRC grew by 81% in 2012 with their share of exports increasing from 31% in 2011 to 44% in 2012. Export growth to the region was driven by growth in exports from Rwanda’s non-traditional export sector and re-exports, an issue discussed in more detail below. Exports to Europe saw a year on year drop of 13% as a result of depressed exports from Rwanda’s traditional export sectors.

Figure 3: Destination of Rwandan Formal Merchandise Exports and Re-Exports 2011 & 2012 (%)

Source: RRA Trade Statistics 2011 and 2012

It is arguable that 2012 was the year when Rwanda made the shift from being a country reliant on a few commodity exports to few destinations, to a country with a diversified export base supplying both regional and international markets. While there is still good potential for growth in Rwanda’s traditional export sectors, particularly the mineral sector, Rwanda is no longer reliant on a few commodities to drive export growth. Rwanda’s impressive merchandise export growth in 2012 was driven exclusively by non-traditional exports and re-exports. The emergence of a non-traditional export sector and a healthy re-export sector will also see regional neighbours and other African countries become increasingly important export destinations (see figure 4). In 2012, 64% of Rwanda’s non-traditional exports were exported to the EAC and DRC and with a further 16% to other African countries. For re-exports 77% of exports were to the EAC and DRC with 6% to other African countries.
In the fiscal year 2014/15 the Eurobonds accounted for 21.6 per cent of total public external debt, the rest being mainly concessional loans from multilateral traditional development partners and non-traditional bilateral partners, and they accounted for 46.3 per cent of the debt serviced in that fiscal year, (ibid 2015).

As for UNDP (2008), The Government of Rwanda was determined her partnership strategy which assisted on the increasing of 23% of her Gross Domestic Product; This amounted as an addition of $55 per capita, compared with an average that use to have in Sub-Saharan Africa of approximately $25 per capita in 2008; and assistance accounts for more than half of the Government of Rwanda’s annual budgets and aid' shaped by principles defined in Millennium Development Goals (MDGs), Sustainable Development Goals (SDGs), the Monterrey Consensus, the Rome Declaration on Harmonization and the Paris Declaration on Aid Effectiveness, Ownership, Harmonisation, Alignment, Results and Mutual Accountability.

2.4.2 The contribution of regional and global relations strategy on economic development in Rwanda.

The researcher thinks that the underlying elite bargain is robust and more inclusive than many believe, maintaining it against the natural tendencies that associate with ‘limited access orders’ produces casualties of various kinds, Frederick, et al. (2013) and Khan. (2012), the benefits of regional and global relation economic integration strategy should depend on the level of economic integration and the deeper the integration, the greater the benefits to the participating of the Partner States. BNR (2012), the increase in imports in 2012 was driven by increased imports of capital goods, up 21.6% over 2011, and to lesser extent intermediary goods up 13.5%. Imports of consumer goods are increased by 8.7% over 2011 while imports of energy & lubricants remained constant with just 0.43%, this largely due to a drop in imports of “other fuel products” which feel by 41%.

![Figure 4: Destination of Exports by Export type (Rwf Billion)](image)

**Source:** RRA Trade Statistics 2011 and 2012
National Bank of Rwanda (2015), illustrated that the government has started borrowing on the international and domestic money markets to fund investment. It issued its first Eurobond in 2013 and raised US$400.00 million. Its interest rate stood at 6.2 per cent.

In 2015 decreasing from US$111.6million in 2014 to US$283.5million in 2015 (see table 3). Coffee’s exports increased by 4% in 2015 over the same period in 2014 from US$59.6 million exported in 2014 to US$62 million in 2015. Even though coffee has seen an increase during 2015 the prices dropped by 12% in 2015, the decline has been attributed to a raise in supply of coffee on the world market, especially from Brazil and Colombia, the major growers. Tea exports in 2015 saw increased by 40% in value. Both tea prices and quantity increased with the average price now up 29% per kg and quantity up 9%. As Rwandan tea competes mainly with kenyan teas where both quality and quantities of output were low this year. Furthermore, Rwandan tea is in high demand in the Middle East and with the removal of embargo on iran and reduced conflicts the market demand for tea increased.

### Table 3: Merchandise Exports by Grouping 2015 (Us$ Fob)

<table>
<thead>
<tr>
<th></th>
<th>Jan-Dec 2014</th>
<th>Jan-Dec 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional Exports</td>
<td>322,798,053</td>
<td>283,120,053</td>
</tr>
<tr>
<td>Non-trad. Exports</td>
<td>111,612,906</td>
<td>97,306,266</td>
</tr>
<tr>
<td>Re-Exports</td>
<td>165,351,979</td>
<td>177,000,000</td>
</tr>
<tr>
<td>Informal Exports</td>
<td>107,489,548</td>
<td>108,000,000</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>707,252,485</strong></td>
<td><strong>667,432,586</strong></td>
</tr>
</tbody>
</table>

**Source:** BNR Trade Statistics

The non-traditional export sector saw a 13% drop in export value in 2015 decreasing from US$111.6million in 2014 to
US$97.3 million in 2015. This was the result of a drop in exports from a number of manufacturing and agro process subsectors including: Beverage, spirits and vinegar, Iron and steel, woods and article of woods and essential oils & reineoids, down 63%, 87%, 30% and 23% respectively.

The sub-sectors from manufacturing and agro-processing sector that performed well in 2015 include: Pyrethrum up 36% over 2014; Textiles and footwear up 20% and 47% respectively; salt and plastering materials up 29% with US$6.9 million worth of exports; Edible vegetables roots and tubers up 115%; at US$6.8 million. Edible fruits and nuts up 60% accounting US$188.7 million worth of exports.

Figure 1: Composition of Rwanda’s Non-Traditional formal direct Exports 2014 & 2015 (%)

Source: BNR Trade Statistics 2014 & 2015

Horticulture and agricultural products made a growth of 0.5% where it increased by 67% from US$4.9 million in 2014 to US$8.3 in 2015 as a result of an increase in edible vegetables up 115% and edible fruits and nuts up 60%. Since 2014, horticulture exports have performed well following the removal of the imposition of visa charges to business people by the DRC. Horticulture exports are mainly derived from the accumulation of many small traders to the regional market and small volumes are also exported formally to the European market by some firms.

Livestock and hides and skins declined by 0.7% of total growth as a result of lack of production processes locally, since they imports most of the finished produced from Kenya, plus the establishment of the new tannery has taken some of the production of hides and skins for value addition. Even though most of the sectors has seen a decline in total growth, Re-exports has seen a total growth of 1.8% because of export of petroleum products & other re-exports up 38% and 24% respectively.

Figure 2: Sector Contribution to Total Growth in 2015

Source: BNR Trade Statistics, 2015

Rwanda’s main export destination was Asia Oceania accounting for 35% of total trade. This is followed by the EAC and Europe accounting for 22% and 18% respectively, the Middle East comes next with 16% of total trade. Exports to the EAC saw an increase from 20% in 2014 to 28% in 2015 (figure 3) due to an increase of exports of prepared foodstuffs and vegetable products up 633% and 46% respectively.

Exports to Democratic Republic of Congo increased from 13% in 2014 to 17% in 2015 due to an increase in export of prepared foodstuffs and machinery appliances up 283% and 866% respectively. Exports to Europe decreased from 39% in 2014 to 25% in 2015 because of drop in mineral and non-traditional exports by 29% and 13%. Asian market share of exports decreased slightly from 16% to 15% of exports because of a decrease exports of minerals and vegetable products down 29% and 49%. Export to the Middle East grew in 2015 from 3% to 8% due to an increase of exports of natural or cultured pearls accounting 86% of total exports to the Middle East market. Other Africa remained constant, while the Americas dropped just by 1%.
**Source:** RRA Trade Statistics 2014 & 2015

Annex 3: Exports to the EAC and DRC (US$)

<table>
<thead>
<tr>
<th>Country</th>
<th>Trade type</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burundi</td>
<td>Formal</td>
<td>8,027,724</td>
<td>12,568,421</td>
<td>12,459,842</td>
<td>12,062,942</td>
<td>6,404,190</td>
</tr>
<tr>
<td></td>
<td>Informal</td>
<td>7,630,568</td>
<td>10,735,289</td>
<td>9,282,614</td>
<td>9,586,021</td>
<td>7,097,933</td>
</tr>
<tr>
<td></td>
<td>Sub-Total</td>
<td>12,648,281</td>
<td>23,303,710</td>
<td>21,742,456</td>
<td>21,648,963</td>
<td>13,502,123</td>
</tr>
<tr>
<td>DRC</td>
<td>Formal</td>
<td>57,104,840</td>
<td>98,949,887</td>
<td>102,427,21</td>
<td>60,806,836</td>
<td>70,326,924</td>
</tr>
<tr>
<td></td>
<td>Informal</td>
<td>42,871,534</td>
<td>72,633,957</td>
<td>90,380,054</td>
<td>89,537,310</td>
<td>82,179,695</td>
</tr>
<tr>
<td></td>
<td>Sub-Total</td>
<td>67,985,267</td>
<td>171,583,844</td>
<td>192,807,26</td>
<td>150,344,14</td>
<td>152,506,62</td>
</tr>
<tr>
<td>Kenya</td>
<td>Formal</td>
<td>64,267,763</td>
<td>89,602,120</td>
<td>74,354,195</td>
<td>68,733,550</td>
<td>94,465,455</td>
</tr>
<tr>
<td></td>
<td>Informal</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Sub-Total</td>
<td>-</td>
<td>89,602,120</td>
<td>74,354,195</td>
<td>68,733,550</td>
<td>94,465,455</td>
</tr>
<tr>
<td>Tanzania</td>
<td>Formal</td>
<td>6,855,824</td>
<td>8,911,469</td>
<td>17,914,068</td>
<td>2,366,671</td>
<td>1,771,029</td>
</tr>
<tr>
<td></td>
<td>Informal</td>
<td>84,645</td>
<td>135,677</td>
<td>106,690</td>
<td>63,873</td>
<td>52,868</td>
</tr>
<tr>
<td></td>
<td>Sub-Total</td>
<td>1,106,396</td>
<td>9,047,146</td>
<td>18,020,758</td>
<td>2,430,545</td>
<td>1,823,897</td>
</tr>
<tr>
<td>Uganda</td>
<td>Formal</td>
<td>1,451,275</td>
<td>4,058,939</td>
<td>5,604,584</td>
<td>10,332,279</td>
<td>9,428,099</td>
</tr>
<tr>
<td></td>
<td>Informal</td>
<td>3,800,819</td>
<td>9,474,121</td>
<td>10,401,653</td>
<td>11,310,978</td>
<td>18,982,677</td>
</tr>
<tr>
<td></td>
<td>Sub-Total</td>
<td>8,699,958</td>
<td>13,533,059</td>
<td>16,006,237</td>
<td>21,643,257</td>
<td>28,410,776</td>
</tr>
<tr>
<td>Total</td>
<td>Formal</td>
<td>137,707,426</td>
<td>214,090,834</td>
<td>212,759,902</td>
<td>154,302,279</td>
<td>182,395,697</td>
</tr>
<tr>
<td></td>
<td>Informal</td>
<td>54,387,566</td>
<td>92,979,044</td>
<td>110,171,011</td>
<td>110,498,184</td>
<td>108,313,17</td>
</tr>
<tr>
<td></td>
<td>Sub-Total</td>
<td>192,094,992</td>
<td>307,069,883</td>
<td>322,930,913</td>
<td>264,800,467</td>
<td>290,708,876</td>
</tr>
<tr>
<td>% Growth (total)</td>
<td>40%</td>
<td>59%</td>
<td>5%</td>
<td>-18%</td>
<td>10%</td>
<td></td>
</tr>
</tbody>
</table>

**Source:** BNR Trade Statistics 2011 to 2015

As for Ombeni, (2010), the measures taken to ease border crossing for East Africans include issuance of inter-state passes which commenced on 2003; a single immigration Departure/Entry card which has been adopted by the partner states; harmonization of the procedures of work permits and the classification process which has been finalized; and the studies on the harmonization of Labour Laws and Employment Policies which were identified as the main tools which increased a lot on Rwanda economic development as element of partnership. In addition, economic co-operation and development have been prioritized in the ongoing regional programme in the EAC.

Rwanda met most of the Millennium Development Goals (MDGs) by the end of 2015. Strong economic growth was accompanied by substantial improvements in living standards,
with a two-thirds drop in child mortality and near-universal primary school enrolment. A strong focus on homegrown policies and initiatives has contributed to significant improvement in access to services and human development indicators. The poverty rate dropped from 44% in 2011 to 39% in 2014, while inequality measured by the Gini coefficient fell from 0.49 to 0.45.

Investor nationality: Policy challenges 2015

Rwanda’s exports to the world affairs such as United States of America, German, United Kingdom and other that have been growing steadily over the past 10 years, with an annual average growth rate of 21% and the total trade of Rwanda at the global affairs amounted to $60 million in 2015, with exports to the USA valued at around $46 million, while imports were only $14m down from $21m in 2014, (Minicom. 2015).

2.4.3 The contribution of wealth creation strategy on economic Development in Rwanda

According to The Mifotra (2007), in 2003, the real Gross Domestic Product growth rate was 0.9% compared to 9.4% for 2002 and estimated at 4% for 2004. After exceeding 10% before 2000, the investment rate by providing the wealth creation started declining until it was less than 10% in the same period of before 2000. One of the explanations for this situation is the persistence of negative levels of domestic savings and the reduction of the flow of foreign aid, considering that investment is greatly dependent on foreign aid.

For Minicom (2012), Rwanda’s total merchandise trade was US$2.7 billion, an increase of 14.7% over 2011 (see table 1). Merchandise exports from both formal and informal trade accounted for US$575 million and imports US$ 2.7 billion up 28.1% and 11.4% respectively over 2011. Rwanda ran a merchandise trade deficit of US$1.56 billion in 2012, an increase of 6.5% over 2011. Including preliminary data for tourism, Rwanda’s total exports in 2012 were just under US$ 861 million, an increase of 23% over 2011.

Table 1: Rwandan Trade Performance 2011 and 2012 (Us$)

<table>
<thead>
<tr>
<th></th>
<th>2011</th>
<th>2012</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formal Merchandise Exports (FOB US$)</td>
<td>386,912,843</td>
<td>482,066,998</td>
<td>24.59%</td>
</tr>
<tr>
<td>Informal Exports</td>
<td>61,868,853</td>
<td>92,979,044</td>
<td>50.28%</td>
</tr>
<tr>
<td>Total Merchandise Exports</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>448,781,695</td>
<td>575,046,041</td>
<td>28.13%</td>
</tr>
<tr>
<td>Formal Merchandise Imports (CIF US$)</td>
<td>1,890,581,271</td>
<td>2,111,731,894</td>
<td>11.70%</td>
</tr>
<tr>
<td>Informal Imports</td>
<td>24,355,922</td>
<td>21,486,595</td>
<td>-11.78%</td>
</tr>
<tr>
<td>Total Merchandise Imports</td>
<td>1,914,937,192</td>
<td>2,133,218,489</td>
<td>11.40%</td>
</tr>
<tr>
<td>Total Merchandise Trade</td>
<td>2,363,718,888</td>
<td>2,711,822,058</td>
<td>14.73%</td>
</tr>
<tr>
<td>Merchandise Trade Balance</td>
<td>(1,466,155,497)</td>
<td>(1,561,729,975)</td>
<td>6.52%</td>
</tr>
</tbody>
</table>
In 2012, 31% of Rwanda’s formal merchandise trade (imports and exports) was with regional neighbors (EAC and DRC). Trade with Asian countries is also significant, with 27% of Rwanda’s trade taking place with the region. Trade with Europe and the Middle East account for 17% each for both regions.

Minicom, (2015), demonstrated how Rwanda has evolved through a period of economic prosperity andmacroeconomic stability in the past two decades; Real Gross Domestic Product grew by an average of 8% annually during the period 2000 to 2013, which is among the highest average growth rates in East Africa. Strong economic growth has resulted in an increase in per capita income from USD225 in 2000 to USD693 in 2013, (AfDB Group, 2014). Inflation rates remain in single digits due to the implementation of robust macroeconomic policies and the easing of global food and fuel prices. Fiscal deficits after grants have also been contained at less than 5%. High import demand particularly for intermediate and capital goods continues to outstrip the narrow but expanding export base leading to trade deficits, (ibid. 2014).

### Table 1: Rwandan Merchandise Trade Performance Jan-Dec 2014 and 2015 (US$)

<table>
<thead>
<tr>
<th></th>
<th>Jan-Dec 2014</th>
<th>Jan-Dec 2015</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Formal Merchandise Exports</strong></td>
<td>599,762,937</td>
<td>558,749,806</td>
<td>-6.8%</td>
</tr>
<tr>
<td>(FOB US$)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Informal Exports</strong></td>
<td>107,489,548</td>
<td>107,815,122</td>
<td>0.3%</td>
</tr>
<tr>
<td><strong>Total Merchandise Exports</strong></td>
<td>707,252,485</td>
<td>666,564,929</td>
<td>-5.8%</td>
</tr>
<tr>
<td>(CIF US$)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Formal Merchandise Imports</strong></td>
<td>2,386,915,894</td>
<td>2,319,998,771</td>
<td>-2.8%</td>
</tr>
<tr>
<td>(CIF US$)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Informal Imports</strong></td>
<td>19,358,076</td>
<td>21,950,956</td>
<td>13.4%</td>
</tr>
<tr>
<td><strong>Total Merchandise Imports</strong></td>
<td>2,406,273,970</td>
<td>2,341,949,727</td>
<td>-2.7%</td>
</tr>
<tr>
<td><strong>Total Merchandise Trade</strong></td>
<td>3,113,526,455</td>
<td>3,008,514,656</td>
<td>-3.4%</td>
</tr>
<tr>
<td><strong>Merchandise Trade Balance</strong></td>
<td>-1,699,021,486</td>
<td>-1,675,384,798</td>
<td>-1%</td>
</tr>
</tbody>
</table>

Source: Rwanda Revenue Authority trade data, 2015

The slight decrease in imports (down 3%) in 2015 over 2014 was a result of a decrease of energy and lubricants imports, which decreased by 21% over 2014. Imports of consumer and capital goods increased by 6% and 2% respectively as a result of domestic articles and trailer imports. Intermediary goods imports also saw a decrease of 5% as a result of industrial products imports. Informal cross border imports increased by 13% over 2014.

The informal cross-border trade accounts for a considerable amount of Rwanda’s regional trade. BNR’s informal cross-border trade survey indicates that Rwanda exported US$108.3million informally in 2015 while informally importing US$22 million. Unlike the formal sector, where Rwanda runs a trade deficit, Rwanda runs an informal trade surplus of US$86.3million.
Rwanda’s main informal exports in 2015 is the RDC, were products from bovine cattle live amounted US$ 6.2 million exported primarily to the DRC, followed by Uganda with a value of us$ 1 million (see table 5). Other chemical rubber and plastic products comes in second place amounting us$2.2 million with major markets in DRC, followed by Burundi and Uganda. Other informal exports includes maize flour, Irish potatoes and domestic metal products were RDC have the largest value of informal trade.

As for UNCTAD et al. (2010), demonstrates how the wealth creation has supported a lot on the value of Rwanda’s merchandise exports totalled about $183 million and that of imports $697 million, or 7 per cent and 28 per cent of Gross Domestic Product respectively, recording a merchandise deficit of about $514 million. In relation to global merchandise exports and imports, this represented 0.001 per cent and 0.004 per cent respectively. Services exports in 2007 represented 44 per cent of total exports while services imports represented 28 per cent of total imports, (ibid, 2010).

<table>
<thead>
<tr>
<th>No</th>
<th>EAC countries</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>Mean in 4 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Rwanda</td>
<td>7.9</td>
<td>8.8</td>
<td>4.7</td>
<td>7.0</td>
<td>28.4/4=7.1</td>
</tr>
<tr>
<td>02</td>
<td>Kenya</td>
<td>6.1</td>
<td>4.6</td>
<td>5.7</td>
<td>5.3</td>
<td>21.7/4=5.4</td>
</tr>
<tr>
<td>03</td>
<td>Uganda</td>
<td>9.7</td>
<td>4.4</td>
<td>3.3</td>
<td>4.8</td>
<td>22.2/4=5.6</td>
</tr>
<tr>
<td>04</td>
<td>Tanzania</td>
<td>7.9</td>
<td>5.1</td>
<td>7.3</td>
<td>7.0</td>
<td>27.3/4=6.8</td>
</tr>
<tr>
<td>05</td>
<td>Burundi</td>
<td>4.2</td>
<td>4.0</td>
<td>4.6</td>
<td>4.7</td>
<td>17.5/4=4.4</td>
</tr>
<tr>
<td>06</td>
<td>South Sudan</td>
<td>-4.6</td>
<td>-46.1</td>
<td>13.1</td>
<td>3.4</td>
<td>-37.7/4=-9.4</td>
</tr>
</tbody>
</table>

Source: East Africa community comparison, 2015

With Klaus. et al. (2011), Investor friendly climate in Rwanda was characterized by official ranking given to Rwanda according to the effort country is using which affect it as 2nd best global reformer 2012; most competitive place to do business in east Africa countries and 3rd in Africa. As the Klaus. et al. (2011), continue mentioning, Rwanda was ranked as a 2nd most reformed country in the world; 3rd most competitive place to do business in Africa; 1st Most competitive place to do business in East African Community region; 8th easiest place to start a business; 6hrs to register business; 19th easiest place to pay taxes worldwide.

BNR, (2015), with strengthening and broadening the participation and involvement of Rwanda Foreign policy, the Gross Fixed Capital Formation in Rwanda decreased to 342 Billion RwF in 2015 from 343 Billion in 2014. This Gross Fixed Capital Formation in Rwanda decrease had had an average of 316.69 Billion RwF from 1999 until 2015, reaching an all-time high of 804 Billion RwF in 2010 and a record low of 128 Billion RwF in 1999.

2.2 Models on the best practices

2.2.1 Derivation of Conceptual Framework

A lot of empirical evidence can be found in the literature that foreign policy strategies contributes on economic development by rising different strategies such as Partnership strategy; Regional and global relations strategy and Wealth creation strategy which should support on the implementation to achieve the economic development of a national. The conceptual framework illustrates that foreign policy strategies indeed affect economic development of a country.
study was applied Qualitative research paradigm as a systematic subject approach used to describe the Profitability, Capital adequacy, Asset quality, Liquidity and Risk management through specific approach which was a Case study that described in-depth the experience of one or more than one Public and Private Institutions with method of direct observation and interaction on the subject. In the findings it was established that Partnership strategy, Regional and Global relations strategy and Wealth creation strategy can have a significant contribution on Economic Development in Rwanda. Different Data have been obtained from officials of the Public and Private Institutions from 42 from 30 Cooperatives, 29 from MINICOM, 34 from MINICOFIN, 18 from Internationals NGOs, 26 from Rwanda Local NGOs, 21 from Rwanda Civil Society Platform, 16 from Multinational and Transnational Corporate (investors), and 42 from 30 District Mayors which given 214.

In practice different tools have been used to support gears component with the following activities such as Selection of sample techniques, Develop research instruments questionnaires, Collection of data (the research has been used both primary and secondary data), data was Processed (using SPSS software which assisted on process) and analysis, interpretation and recommendations have been determined by the researcher.

3.1 Research approach
3.1.1 Qualitative versus quantitative research approach
Qualitative versus quantitative research approach of 462 from 30 Rwanda Cooperatives, Ministry of Trade, Industry, Ministry of Finance and Planning, Internationals NGOs, Rwanda Local NGOs, Rwanda Civil Society Platform Multinational and Transnational Corporate (investors) and 30 Districts

3.1.1.2 Proportional stratified sample size:
The proportional stratified sample size means that, the number of sampling units drawn from each stratum is in the proportion to the relative population size of that stratum. A sample size of 82 was used on this study after a simplified formula calculated the said sample sizes according to Yamane (1967) which provided a simplified formula as its bellow.

Table 2.2: Stratum sample size
Stratified random sampling is a method of sampling that involves the division of a population into smaller groups known as strata. In stratified random sampling, the strata are formed based on members’ shared attributes or characteristics. A random sample from each stratum is taken in a number proportional to the stratum’s size when compared to the population. These subsets of the strata are then pooled to form a random sample. Where n is the sample size, N is the population size, and e is the level of precision 10% for our study.

Thus,
As Yamane (1967) added, The proportional stratified sample size means that, the number of sampling units drawn from each stratum is in the proportion to the relative population size of that stratum.
Table 2.3 Proportional stratified sample size is determined by the following formula:

<table>
<thead>
<tr>
<th>N</th>
<th>Stratum composition</th>
<th>Nh (the population size for stratum h)</th>
<th>nh (sample size of the stratum h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30 Cooperatives</td>
<td>90</td>
<td>42</td>
</tr>
<tr>
<td>2</td>
<td>MINICOM</td>
<td>63</td>
<td>29</td>
</tr>
<tr>
<td>3</td>
<td>MINICOFIN</td>
<td>74</td>
<td>34</td>
</tr>
<tr>
<td>4</td>
<td>Internationals NGOs</td>
<td>40</td>
<td>18</td>
</tr>
<tr>
<td>5</td>
<td>Rwanda Local NGOs</td>
<td>55</td>
<td>26</td>
</tr>
<tr>
<td>6</td>
<td>Rwanda Civil Society Platform</td>
<td>15</td>
<td>21</td>
</tr>
<tr>
<td>7</td>
<td>Multinational and Transnational Corporate (investors)</td>
<td>35</td>
<td>16</td>
</tr>
<tr>
<td>8</td>
<td>30 Districts</td>
<td>90</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>462</td>
<td>214</td>
</tr>
</tbody>
</table>

Source: Secondary data, 2016

A sampling frame facilitates formation of a sampling unit that refers to one member of a set of entities being studied, which is the material source of the random variable (Bailey, 2008). Common examples of a unit would be a single person, animal, plant, or manufactured item that belongs to a larger collection of such entities being studied. For the purpose of this study, the sampling frame for the target population should be all 213 selected officials from 30 Cooperatives, MINICOM, MINICOFIN, Internationals NGOs, Rwanda Local NGOs, Rwanda Civil Society Platform, Multinational and Transnational Corporate (investors) and 30 Districts. A Stratified random sampling methodology was employed since 214 Official individuals from different Institution working in the Country was selected using Yamane (1967) formula at the research that will be conducted on the impact of economic analysis on project implementation selected from total of 413 population working in different Public-Private Institutions

3.1.1.2 Data Collection Instruments
The researcher collected primary and secondary data. Primary data was collected using structured questionnaires designed to find answers from respondents and are comprising closed and open questions to seek specific answers on the variables under study. While secondary data was collected through consultation of different documents as registration book, monitoring books, Reports and Experts status books all from Public-Private Institutions

3.1.1.2 Data Validity
In order for a questionnaire to be useful, the data it produces must be truthful, a researcher must know that the results are meaningful and can be applied more generally than to just the sample tested. Proving the credibility of the questionnaire and ensuring that the resulting data reflect the “truth”. For validation of data during this research, questionnaire will be consulted by experts and professors who understanding well the topic, their opinions was taken into considerations and collections was made until their satisfactory level before questionnaires are distributed to the site. Use the following formula, using the total number of experts (N) and the number who rated the object as essential (E): CVT = [(E - (N / 2)) / (N / 2)]

3.1.1.2 Data Reliability
A researcher confirmed the reliability of data collected using a test/retest technics meaning that repeatability of measurement where a person's score on the same test given twice is similar. Conclusion validity was used to confirm if there is connection between the Foreign Policies strategies and Rwandan Economic Development. The inter-rater reliability coefficient is often calculated as a Kappa statistic. The formula for inter-rater reliability Kappa is this:

K =

In this formula, P observed is the observed percentage of agreement.

IV. RESULTS, ARGUMENT, CONCLUSION AND RECOMMENDATIONS
The Facts and critical analysis done after collection of data by scholars on cases well identified with the purpose of provide the clarification on the objectives determined either by the scholars or any one from the private or public and come up with findings to be based on any measurement resolution

4.1 Response Rate
The number of questionnaires, administered to all the respondents, was 82. A total of 81 questionnaires were properly filled and returned from the Institutions employees. This represented an overall successful response rate of 98.8%. According to Mugenda (2003), a response rate of 50% or more is adequate. Babbie (2004) also asserted that return rates of 50% are acceptable to analyze and publish, 60% is good and 70% is very good.
Table 3.4: Response Rate

<table>
<thead>
<tr>
<th>h</th>
<th>Stratum composition</th>
<th>Distributed</th>
<th>Returned</th>
<th>Returned rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30 Cooperatives</td>
<td>42</td>
<td>42</td>
<td>100%</td>
</tr>
<tr>
<td>2</td>
<td>MINICOM</td>
<td>29</td>
<td>29</td>
<td>100%</td>
</tr>
<tr>
<td>3</td>
<td>MINICOFIN</td>
<td>34</td>
<td>34</td>
<td>100%</td>
</tr>
<tr>
<td>4</td>
<td>Internationals NGOs</td>
<td>18</td>
<td>18</td>
<td>100%</td>
</tr>
<tr>
<td>5</td>
<td>Rwanda Local NGOs</td>
<td>26</td>
<td>26</td>
<td>90%</td>
</tr>
<tr>
<td>6</td>
<td>Rwanda Civil Society Platform</td>
<td>21</td>
<td>23</td>
<td>100%</td>
</tr>
<tr>
<td>7</td>
<td>Multinational and Transnational</td>
<td>16</td>
<td>6</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>Corporate (investors)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>30 District Mayors</td>
<td>42</td>
<td>16</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>214</td>
<td>213</td>
<td>98.8%</td>
</tr>
</tbody>
</table>

Source: Primary data, 2017

4.1.1 Demographic information

This section presents the demographic characteristics such as gender, level of education, year worked in the Organizations or Institutions, size of the organization and years of Institutions and organization' existence consult.

4.1.1.1 Gender of the Respondents

A sample of 214 respondents was given a questionnaire on their gender in Rwanda. The 213 respondents who returned the questionnaire, 48.1% were males; while 51.9% was females. This implies that females are majority of our respondents, which force their participation in Rwandan economy and its development.

Figure 4.1: Gender of the Respondents
Source: Primary data, 2017

4.1.1.2 Level of Education

Respondents’ qualifications varied greatly. Although most employees had University level qualifications with 39.5%, the study recorded 33.3% respondents with postgraduate level, 14.8% respondents with college level and 12.3% respondents with secondary level.

Figure 4.2: Level of Education
Source: Primary data, 2017

The researcher to present experience/duration distribution categories of the respondents used frequency tabulation. Table 4.4 below presents the results:

Figure 4.3: Working experience in Institution
Source: Primary data, 2017

The study sought to find out the years the respondents had worked in the organization. The figure 4.3 shows that 40.70% of respondents indicated that they had worked for less than 2 years while 37% indicated between 3 to 5 years and 22.2% indicated over 5 years. The findings imply that the respondents had worked. This implies that majority of respondents at least are experienced with at least three or more years in institution (37%+22.2%=59.3%). Those with low experience estimated to two years or less were not ignored (40.7%).
4.1.1.4 Years of working experience
During the research, we were interested in working experience to view if the responses were valid and could contribute to the research objectives. The following table gives us the picture.

<table>
<thead>
<tr>
<th>Valid</th>
<th>Less than 2</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>87</td>
<td>40.7</td>
<td>40.7</td>
<td>40.7</td>
<td></td>
</tr>
<tr>
<td>3 to 5 years</td>
<td>79</td>
<td>37.0</td>
<td>37.0</td>
<td>77.8</td>
<td></td>
</tr>
<tr>
<td>Over 5 years</td>
<td>47</td>
<td>22.2</td>
<td>22.2</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>213</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Primary data, 2017

From table 4.2 above, 40% of the respondents have less than 2 years of working experience, 37% have 3 to 5 years, 22.2% have over 5 years. This implies that majority of respondents are less experienced in their institutions or organization.

<table>
<thead>
<tr>
<th>Valid</th>
<th>Type of Institution</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>public</td>
<td>134</td>
<td>63.0</td>
<td>63.0</td>
<td>63.0</td>
</tr>
<tr>
<td></td>
<td>Private</td>
<td>74</td>
<td>34.6</td>
<td>34.6</td>
<td>97.5</td>
</tr>
<tr>
<td></td>
<td>NGOs</td>
<td>3</td>
<td>1.2</td>
<td>1.2</td>
<td>98.8</td>
</tr>
<tr>
<td></td>
<td>Both public-Private</td>
<td>3</td>
<td>1.2</td>
<td>1.2</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>213</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Primary data, 2017

From table 4.3 above, 63.0% of respondents were from public institution, 34.6% were from private sector, and 1.2% were from NGOs and Both public-Private institutions separately.

<table>
<thead>
<tr>
<th>Valid</th>
<th>Life of institutions</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 to 5 years</td>
<td>50</td>
<td>23.5</td>
<td>23.5</td>
<td>23.5</td>
</tr>
<tr>
<td></td>
<td>6 to 10 years</td>
<td>45</td>
<td>21.0</td>
<td>21.0</td>
<td>44.4</td>
</tr>
<tr>
<td></td>
<td>11 to 15 years</td>
<td>21</td>
<td>9.9</td>
<td>9.9</td>
<td>54.3</td>
</tr>
<tr>
<td></td>
<td>Over 15 years</td>
<td>97</td>
<td>45.7</td>
<td>45.7</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>213</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Primary data, 2017

The results from table 4.4 indicates that 45.7% of respondents approved that their organization or institutions have been in operation over 15 years, 23.5% between 1 to 5 years, 21% between 6 to 10 years and 9.9% between 11 to 15 years.

4.1.2 Institution’s contribution to the Rwanda’s foreign policy
The researcher wanted to know the respondents views to the contribution of their working institution in the foreign policy implementation. This shows also the dispersion of the sector and different knowledge from different sources.
Table 4.8 Does your Organisation or Institution works with one of these strategies of Rwanda’s Foreign Policy which are Partnership, Regional and global relations and wealth creation?

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid No</td>
<td>6</td>
<td>7.4</td>
<td>7.5</td>
<td>7.5</td>
</tr>
<tr>
<td>Yes</td>
<td>74</td>
<td>91.4</td>
<td>92.5</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>80</td>
<td>98.8</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>System</td>
<td>1</td>
<td>1.2</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>213</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Primary data, 2017

The findings from table 4.5 show that 91.4% of Respondents said that their institutions work closely with the Rwanda’s foreign policy, and only 7.4% said their Institutions are not contribute to the implementation of the foreign policy while only one respondents did not say nothing. This gives the researcher, a picture that the majority of respondents consider the contribution of their respective institutions in the implementation of the Foreign Policy.

Table 4.9 If yes how the institution contribute on the economic development of Rwanda

<table>
<thead>
<tr>
<th>Valid</th>
<th>Attracting foreign investors</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Promote Bilateral and multilateral cooperation</td>
<td>16</td>
<td>7.4</td>
<td>7.4</td>
<td>39.5</td>
</tr>
<tr>
<td></td>
<td>Facilitating trade</td>
<td>55</td>
<td>25.9</td>
<td>25.9</td>
<td>65.4</td>
</tr>
<tr>
<td></td>
<td>Equipping students with relevant skills</td>
<td>11</td>
<td>4.9</td>
<td>4.9</td>
<td>70.4</td>
</tr>
<tr>
<td></td>
<td>Improving export promotion</td>
<td>63</td>
<td>29.6</td>
<td>29.6</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>213</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Source: Primary data, 2017

The results from table 4.6 reveal that 68 from 213 respondents equivalent to 32.1% confirmed that their institution contribute on the economic development of Rwanda through Attracting foreign investors, 63 equivalent to 29.6% through Improving export promotion, 55 respondents equivalent to 25.9% through Facilitating trade, 7.4% through promoting Bilateral and multilateral cooperation, and 4.9% through equipping students with relevant skills.

4.1.3 Perceptions and attitudes towards the contribution of partnership strategy between Rwanda and the rest of the world

This section aim to establish the views of respondents to the contribution of partnership strategy on increasing the economic development of Rwanda. The tables below show the respondents perspectives to the strategy.

4.1.3.1 Contribution of Rwanda foreign strategy to her economy

Respondents were asked whether Rwandan foreign strategy was contributed to her economy.

4.1.3.2 Technical and financial contribution

As illustrated in the table below, respondents have shown their perception of Rwanda foreign strategy contribution to the technical and financial contribution to the economy. All respondents support that Rwanda foreign strategy contributes to the financial and technical cooperation between countries and international organs.
Among 213 respondents, 53.1% strongly supported and 46.9% supported the idea of technical and financial cooperation between countries and organs. There was any disagree in the responses.

### Table 4.10 The Technical, Financial bilateral and multilateral cooperation between Rwanda and world have a positive influence on Rwanda GDP

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly agree</td>
<td>113</td>
<td>53.1</td>
<td>53.1</td>
<td>53.1</td>
</tr>
<tr>
<td>Agree</td>
<td>100</td>
<td>46.9</td>
<td>46.9</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>213</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

**Source:** Primary data, 2017

For the case of rising Rwanda exports partnership from the investments interviewers were shown their views regarding the contribution of foreign strategy to the exports growth.

### Table 4.11 Partnership with countries in terms of trade and investment raise the access of Rwandan exports to foreign markets

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly agree</td>
<td>105</td>
<td>49.4</td>
<td>49.4</td>
<td>49.4</td>
</tr>
<tr>
<td>Agree</td>
<td>103</td>
<td>48.1</td>
<td>48.1</td>
<td>97.5</td>
</tr>
<tr>
<td>Disagree</td>
<td>5</td>
<td>2.5</td>
<td>2.5</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>213</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

**Source:** Primary data, 2017

For the case of rising Rwanda exports partnership from the investments interviewers were shown their views regarding the contribution of foreign strategy to the exports growth.

### Table 4.12 Development through bilateral and multilateral affect positively the economic development of Rwanda community by providing necessary

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly agree</td>
<td>87</td>
<td>40.7</td>
<td>40.7</td>
<td>40.7</td>
</tr>
<tr>
<td>Agree</td>
<td>113</td>
<td>53.1</td>
<td>53.1</td>
<td>93.8</td>
</tr>
<tr>
<td>Disagree</td>
<td>13</td>
<td>6.2</td>
<td>6.2</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>213</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

**Source:** Primary data, 2017

93.8% of all respondent agreed (strongly agree and Agree) that bilateral and multilateral cooperation contribution was one of the sources of economic development of the country. While other 6.2% disagreed that, the cooperation did not contribute to the Rwandan development. The 6.2%’s perception was that collaborating with neighboring countries like DRC and Burundi could not develop a country.

### 4.1.3.3 Investments contribution to raise Rwanda exports partnership

4.1.3.4 Perception on the Rwandan development vis a vis the foreign strategy

Respondents perception to the Rwandan development vis a vis the bilateral and multilateral partnership were to classify their views on the issue. Their responses were summarized in the table below.

### 4.1.3.5 Perception on the Rwandan unemployment status vis a vis the foreign strategy

Respondents perception to the Rwandan unemployment status vis a vis the bilateral and multilateral partnership were to classify their views on the issue. Their responses were summarized in the table below.
Table 4.13  Partnerships decrease number of unemployment and opened a free movement system

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td>213</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>Strongly agree</td>
<td>95</td>
<td>44.4</td>
<td>44.4</td>
<td>45.7</td>
</tr>
<tr>
<td>Agree</td>
<td>97</td>
<td>45.7</td>
<td>45.7</td>
<td>91.4</td>
</tr>
<tr>
<td>Disagree</td>
<td>15</td>
<td>7.4</td>
<td>7.4</td>
<td>98.8</td>
</tr>
<tr>
<td>Strongly disagree</td>
<td>3</td>
<td>1.2</td>
<td>1.2</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: Primary data, 2017

Among 213 respondents, 210 responds and three not respond. In addition, from the responds 192 or agreed (Strongly agree were 95 and agree were 97) and 18 disagreed (15 disagree and 3 strongly disagree). This shows that majority of respondents supported that partnership help in decrease of number of unemployment and opened movement system where Rwandans should move with their capital, their goods and services even working abroad by importing and exporting and business experiences that affect passively the economic development of Rwanda.

Table 4.14  Factors of partnership used by institution that contribute to Rwanda development

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td>213</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>Regional and global cooperation</td>
<td>42</td>
<td>19.8</td>
<td>19.8</td>
<td>19.8</td>
</tr>
<tr>
<td>Facilitating trade</td>
<td>34</td>
<td>16.0</td>
<td>16.0</td>
<td>35.8</td>
</tr>
<tr>
<td>Facilitating foreign investors</td>
<td>29</td>
<td>13.6</td>
<td>13.6</td>
<td>49.4</td>
</tr>
<tr>
<td>Free movement promotion</td>
<td>24</td>
<td>11.1</td>
<td>11.1</td>
<td>60.5</td>
</tr>
<tr>
<td>Made in Rwanda promotion</td>
<td>32</td>
<td>14.8</td>
<td>14.8</td>
<td>75.3</td>
</tr>
<tr>
<td>increase investment in infrastructure</td>
<td>26</td>
<td>12.3</td>
<td>12.3</td>
<td>87.7</td>
</tr>
<tr>
<td>Peace keeping</td>
<td>3</td>
<td>7.4</td>
<td>7.4</td>
<td>95.1</td>
</tr>
<tr>
<td>Skills transfers</td>
<td>89</td>
<td>4.9</td>
<td>4.9</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>213</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Source: Primary data, 2017

The results from table 4.11 indicates that 19.8% of respondents confirmed that factor of partnership used by institution that contribute to Rwanda development regional and global cooperation, 16% is facilitating trade, 14.8% in made in Rwanda promotion, 13.6% is facilitating trade, 12.3% is increasing investment in infrastructure, 11.1% free movement promotion, 7.4% is peace keeping and 4.9% is skills transfers.

4.1.3.6 Other factors of partnership strategy contributive on Rwanda economy

During the research, respondents have given some factors, which could contribute on the economic development of a country. Some of them have grouped in seven main economic sectors:

4.1.4 Perceptions and attitudes towards the contribution of collaborating with regional and global to the economic development of Rwanda

This section focuses on the results of the research on the contribution of regional and global relations strategy on the economic development of Rwanda. Respondents have shown their views on the importance of Rwanda for being a member on the international or regional organs.

4.1.4.2 Relationship with regional and global organs increase Rwandan economic pillars

This question in brought to check the perception of respondents to the importance of being part in regional and international organs.
Table 4.16 Regional and global integration values through free movement of goods, services, people, capital, residence is increasing GDP, life expectancy, literacy and level of employment

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td>3</td>
<td>1.2</td>
<td>1.2</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>100</td>
<td>46.9</td>
<td>46.9</td>
</tr>
<tr>
<td>Agree</td>
<td>103</td>
<td>48.1</td>
<td>96.3</td>
</tr>
<tr>
<td>Disagree</td>
<td>8</td>
<td>3.7</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>213</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: Primary data, 2017

Among 213 respondents, 210 have given their views and one not say anything. From 210 responses 203 or 96.25% supported, the idea (strongly agree 100 and agree 103). While 8 or 3.75% of them disagree that being part of regional or global organs could increase the wealth of Rwandan. This shows that Rwanda growth from 2000 until now is growing, and for sure the foreign strategy has play a big role.

Table 4.17 Regional bloc active membership enables Rwanda to extend trade territory

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td>5</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>89</td>
<td>42.0</td>
<td>44.4</td>
</tr>
<tr>
<td>Agree</td>
<td>115</td>
<td>54.3</td>
<td>98.8</td>
</tr>
<tr>
<td>Strongly disagree</td>
<td>3</td>
<td>1.2</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>213</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: Primary data, 2017

Viewing the data presented in the table above, among 213 respondents, only 198 responds to the question and 5 did not. 204 or 97.5% (Strongly agree 89 and 115 agree) agreed that adherence of Rwanda in regional block extend trade territory and has increase the Rwanda trade and two respondents did not recognize its impact on Rwanda trade. This shows that the adherence of Rwanda to the regional blocs was significantly extend our trade and then has contribute on the economic growth of the country.

Table 4.18 Rwanda adherence on regional/global relations is very crucial on promoting peace, security and stability

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td>5</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>97</td>
<td>45.7</td>
<td>48.1</td>
</tr>
<tr>
<td>Agree</td>
<td>105</td>
<td>49.4</td>
<td>97.5</td>
</tr>
<tr>
<td>Disagree</td>
<td>5</td>
<td>2.5</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>213</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: Primary data, 2017

Among 213 respondents, 207 respond to the question and two did not. From those 201 or 97.5% (97 strongly agree and 104 agree) agreed that Rwanda adherence on regional/global organs had promoted peace, security and stability while other 5 responds or 2.5 % disagreed that it did. Drawing on the data Respondents had recognized the impact of being part in regional and international organs to the peace, security and stability of a country.

4.1.4.3 being a member of regional group to Rwanda extend trade territory

Rwandan trade has been mainly unbalanced where the imports dominate the exports of the country. According to the trade statistics information of Rwanda, trade balance has increased during the years. During this research, we wanted to know the respondents view to the being a member of some regional blocs of Rwanda and its extend to trade in territory.

4.1.4.4 Rwanda partnership with peace, security and stability

Partnership is crucial for maintaining and promotion of peace and sustainable development. This can be only achieved through collective efforts. As we are all aware, our world has never been free from crises arising from multiple causes. During this research, we wanted to check the perception of our respondents on their view for being member of Rwanda in different organs on the issue of security and stability. Table below summarize their view.

4.1.4.5 Impact of Regional/global organs to the Rwanda economic growth
Regional integration is a complicated progress. Economic growth rates that are not large enough to counteract the negative effects of global economic meltdowns leave many developing countries greatly exposed and this can result to great suffering for a majority people. For economies that are heavily reliant on a few commodity exports of homogeneous nature, the need to come up with long term macroeconomic policies aimed at diversification of their exports through development frameworks that pay close attention to increase investment and new technologies cannot be overemphasized. From this concept, the researcher wanted to see the views of respondents to the impact of those regional/global organs to the Rwandan economic growth.

Table 4.19  Is Regional/global relations contribute to Rwanda economic growth?

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td>Yes</td>
<td>210</td>
<td>98.8</td>
<td>100.0</td>
</tr>
<tr>
<td>Missing</td>
<td>System</td>
<td>3</td>
<td>1.2</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>213</td>
<td></td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: Primary data, 2017

From the table above, among 213 questioned, 210 respond and only 3 did not. All respondents 210 or 100% affirmed that being a member in different organs had contribute to the Rwanda economic growth.

4.1.4.6 Investment of foreign partners in achieving Rwanda visions

Rwanda’s long-term development goals are defined in vision 2020 a strategy that seeks to transform the country from a low-income agriculture based economy to a knowledge based, service oriented and economy with middle-income country status by 2020. In other to achieve this, the private sector has to play a bigger role in ensuring economic growth. Investment relies heavily on foreign and domestic parts.

Table 4.20  Vision 2020 can be achieved through increasing in investment with foreign partners

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly agree</td>
<td>120</td>
<td>56.8</td>
<td>56.8</td>
<td>58.0</td>
</tr>
<tr>
<td>Agree</td>
<td>87</td>
<td>40.7</td>
<td>40.7</td>
<td>98.8</td>
</tr>
<tr>
<td>Disagree</td>
<td>3</td>
<td>1.2</td>
<td>1.2</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>213</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Primary data, 2017

Among 213 respondents, 210 respond to the question and one did not. From those, 207 or 98.75% (120 strongly agree and 87 agree) agreed that Rwanda could achieve the vision by increasing investments from foreign partners other 3 respondents or 1.25 % disagreed that it did. This shows that even Rwanda development players’ institutions recognize the role of foreign partners in the development of a country like Rwanda.

4.1.4.7 Foreign Direct Investment and tourism promotion to wealth creation in Rwanda

Developing countries today compete to attract foreign direct investment to their local economic area. Rwanda government has created an environment conducive to investment, to attract both local and foreign investment finance. The investment and tourism sector have been the main investment arra that Rwanda has shown to be invested in. The respondents asked to give us their opinions to their views on their promotion to the wealth creation in Rwanda.

Table 4.21 Foreign Direct Investment and tourism promotion supported by Rwanda foreign policy strategies cumulating wealth creation

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly agree</td>
<td>113</td>
<td>53.1</td>
<td>53.1</td>
<td>53.1</td>
</tr>
<tr>
<td>Agree</td>
<td>92</td>
<td>43.2</td>
<td>43.2</td>
<td>96.3</td>
</tr>
</tbody>
</table>
The table above shows that the majority of respondents have affirmed that FDI and tourism contribute to the wealth creation. Among 213 respondents, 210 or 96.3% (53.1% strongly agreed and 43.2% agreed) agreed that it contribute while other three or 3.7% disagreed their impacts on wealth creation.

According to the analysis performed, it was found that FDI did accelerate growth in Rwanda. The initial human capital increase, some social development and institutional parameters do represent positive influence of FDI on economic growth. The influence of FDI on wealth creation depends on which sector (manufacturing, agriculture etc.) FDI flows are directed. In general, positive influence of FDI is explained by “technological diffusion” originating from firms accepting foreign capital and spreading to related companies in a form of technical support of suppliers (customers) and business environment. Technological diffusion is associated with positive external effect of FDI.

### Table 4.22 The transfer of knowledge, skills and talent improve domestic productions and its innovation

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly agree</td>
<td>129</td>
<td>60.5</td>
<td>60.5</td>
</tr>
<tr>
<td>Agree</td>
<td>84</td>
<td>39.5</td>
<td>39.5</td>
</tr>
<tr>
<td>Total</td>
<td>213</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: Primary data, 2017

The results from table indicates that 60.5% of respondents strongly agreed that the transfer of knowledge, skills and talent improve domestic productions and its innovation, 39.5% agreed.

### Table 4.23 Factors partnership has to increase for the economic development

<table>
<thead>
<tr>
<th>Economic Sector</th>
<th>Selected frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural</td>
<td>166</td>
</tr>
<tr>
<td>Trade</td>
<td>195</td>
</tr>
<tr>
<td>Industry</td>
<td>210</td>
</tr>
<tr>
<td>Tourism</td>
<td>205</td>
</tr>
<tr>
<td>Services</td>
<td>137</td>
</tr>
<tr>
<td>Health</td>
<td>108</td>
</tr>
<tr>
<td>Education</td>
<td>155</td>
</tr>
</tbody>
</table>

Source: Primary data, 2017

The Rwandan party leadership has to look at the several sector of economic to attract partnership involve in. Our respondents choose to shows the area that mainly need partnership to be developed. In the table above, respondents choose mainly industry (210 votes), tourism (205 votes), trade (195 votes), agricultural (166 votes), education (155 votes), Services (137 votes) and health (108 votes) to be enforced in development of our country.
V. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary
From the findings it was observed that majority of respondents were from the public Institutions at 63.0%. The findings also revealed a majority response being Female at 51.9%, the majority having been in those position for between 1 year to 4 years (40%). The highest level of education for the majority respondents was degree at 39.5%, with each institution surveyed having a combined workforce between 50 to 199 (78.2%).

5.2 Contribution of partnership strategy on economic development in Rwanda
The first objective of the study was to demonstrate the contribution of partnership strategy on economic development in Rwanda. The Results showed that Partnership with different countries in terms of trade and investment raise the access of Rwandan exports to foreign markets by removing barriers to trade and providing necessary infrastructure and finance which motivate Rwandans to increase their production and importing abroad vis versa that increase the individuals Gross Domestic Product per capita (life expectancy, Literacy and levels of employment, Infrastructure, Personal dignity and Freedom of association);

The Foreign Direct Investment The prospects for 200-2015 are for higher flows, with rise record in the Foreign direct investment (FDI) inflow owing to the fact that 2015 new investment projects attraction was at its best with over 800 million US$ worth of foreign private investment projects registered in that year.

The results confirmed that foreign policy strategy has a statistically significant effect on economic development Rwanda as Sig=0.004<0.05

5.2.2 Contribution of regional and global relations strategy on economic development
The second objective of the study was to assess the contribution of regional and global relations strategy on Rwandan economic development. The Results indicate that Being member of Regional Integration, Intra-Africa cooperation and multilateral organization which Rwanda is actively contributing and making her as an important player in multilateral system which encourage the International community (UN, AU, EU, EAC, ECCAS, ICGLR, AIMS, TWAS…) to trust Rwanda as peaceful, secure and stable for hosting International occasions and is affecting positively her economic development. 100% of respondents affirmed that being a member in different organs had contributed to the Rwanda economic growth. It has observed that Regional &Global contribute statistically and significantly to balance of trade as sig=0.002<0.05

5.2.3 Contribution of wealth creation strategy on Rwandan economic development
The third objective of the study was to determine the contribution of wealth creation strategy on Rwandan economic development. The findings of this paper confirm a positive and statistical significant relationship between wealth creation strategy to GDP per capita in Rwanda because p-value=0.003<0.05. There is also a statistical significant relationship between wealth creation strategies to balance of trade as p-value=0.003<0.05. It is explained by the reforms undertaken by the government of Rwanda in making the country a favorable place for investments through the stability of macroeconomic and political environment

5.2 Conclusions
In view of the findings as well as the conclusion deduced from the study some recommendations were made.

5.3.1 Partnership strategy on Rwandan economic development
Partnership strategy was found to have an effect on economic development in Rwanda through attracting foreign investors, improving export promotion, facilitating trade, promoting Bilateral and multilateral cooperation and equipping students with relevant skills. The findings indicated that Partnership with countries in terms of trade and investment raise the access of Rwandan exports to foreign markets as confirmed by majority of respondents.

5.3.2 Regional and global relations strategy on Rwandan economic development
Results also led to the conclusion that factors of Regional and global relations strategies which contributed on Rwandan economic development were regional and global cooperation, facilitating trade, made in Rwanda promotion, increasing investment in infrastructure, free movement promotion, peace keeping and skills transfers. The agreements percentage of respondents on questionnaire has also approved that regional and global relations strategy contribute on Rwandan economic development.

5.3.3 Wealth creation strategy on Rwanda economic development
The findings of this paper confirm a positive and statistical significant relationship between wealth creation strategy to GDP per capita in Rwanda because p-value=0.003<0.05. There is also a statistical significant relationship between wealth creation strategies to balance of trade as p-value=0.003<0.05. This is a response to continuously improving business environment and proof of existence of investment opportunities within the country, which in return influence the country’s development.

5.3 Recommendations
Based on the results, findings and conclusions the following recommendations were proposed. The study recommends that government of Rwanda should diversify partnership strategies in the areas such as research and development, education, science and technology, health, manufacturing in order to ensure rapid and sustainable economic development.

Exports are of fundamental importance to the achievement of Rwanda’s economic development and poverty reduction targets that is why the Government of Rwanda should set specific export growth target to be achieved and make effort to increase and sustain its participation in both regional and international trade.
Monitoring of Rwanda’s trade performance on a regular basis should help in understanding trends and patterns in trade and provides an opportunity to highlight emerging issues.

The local business community plays a critical role in employment and economic development partnerships in country. In fact, in some instances, it was found that the business community simply bypasses governmental efforts, if they think that they are unresponsive or cumbersome. While it is in the public interest to establish general guidelines such as targeting assistance at individuals and communities that are experiencing economic hardships, if country mandate too many guidelines, reporting requirements and procedures, it is possible that the business community will not actively participate.

### 5.4.2 Regional and global strategy on Rwandan economic development

To increase Rwanda’s integration into the International community and the world economy in order to attract foreign investors because their contribution has found to be positive and statistically insignificant in increasing Gross Domestic Product per Capita.

The government of Rwanda should maintain international cooperation and continue working to enter into multilateral conventions and bilateral agreements in the field of education, science, culture, implementation of joint research and development of projects. There is a need to increase Rwanda’s integration into the international community and the world economy.

Exports are of fundamental importance to the achievement of Rwanda’s economic growth and poverty reduction targets. The Government of Rwanda should therefore making every effort to increase and sustain its participation in both regional and international trade.

The Government of Rwanda should take in to consideration the External factors such as slowing economic, continent such as low prices and political unrest in those countries that cause the poor performance of exports and should understand the attribution movements in trade is generally difficult, as many countervailing factors influence the buying and selling of goods and services to and from an economy.

Nevertheless, some external factors are very likely to have had an impact on Rwanda’s imports and exports. Competitiveness in the region likely have been a significant cause of the overall poor performance of exports. A sharper slowdown in Chinese economy and weak recovery in the EU has had a negative impact on demand globally.

### 5.4.3 Wealth creation strategy on Rwanda economic development

The institutions in charge of Foreign Policy strategies in Rwanda should first understand the Vision of the Country, which is to transform Rwanda into middle-income nation in which Rwandans are healthier, educated and generally more prosperous. Through working with other countries under partnership frameworks, would support wealth creation as intended by national development policy and strategies such as vision 2020 and national strategy for transformation.

Based on the Study, it was found that there are technical gaps between Public Institutions where there is lack of coherent coordination mechanisms between their developmental policies and Foreign policy. The government is thus urged to ensure that the coordination of foreign policy and development policies are properly coordinated, monitored, and updated to keep them responding on the countries development wants.

The study also found that institutions in charge of trade should encourage export by promoting made in Rwanda, facilitating trade and increasing investment in infrastructure because the results have proved positive but statistically insignificant relationship between balance of trade and GDP per Capita.

The study recommends developing economic and trading diplomacy strategy, providing diplomatic means to promote and protect Rwanda’s interests, creating favorable conditions for the expansion of Rwanda’s business and exporting products to global markets.

The study recommends also the Government of Rwanda to ensure participation of the country in international economic organizations and financial institutions, promote Rwanda's representation and decision making in international organization As Government of Rwanda has set targets to become a middle-income country by 2035, a highest income country by 2050. To achieve those targets, both public and private actors need to work together and coordinate their actions.

### 5.4 Areas for Further Research

A replica of this study can be carried out with a further scope to include other state corporations and see whether the findings hold true. Future studies should apply different research instruments like interview guide, focus group discussions to involve respondents in discussions in order to generate detailed information which demonstrate how Rwanda’ Foreign policy strategies contribute on Rwandan economic development.

This study can, however, also be applied to other geographical areas as a foreign policy strategies of any country should be contributing on the economic development whatever classes its classified on. One of the applications of the research would be to extend the framework to the whole Barents Region. Multiple-case analysis would, therefore, allow for greater generalizability and making assumptions about the trade development strategy of Russia in the international arena.

Another stream of research could be directed towards closer investigation of each constituent part of the conceptual framework, which would ensure a deeper understanding of the framework’s influence on free movement and cross-border cooperation as an element of foreign policy strategies. Research embedded in another context could address new issues and areas within the field of economic diplomacy, trade promotion, infrastructure development, intelligent growth or support for market access.

Finally, in this study the strategizing instances analyzed were initiated and executed by either formal or informal regional and International institutions; however, the types, availability, role, importance and influence of these institutions on economic development were not deliberated. Paying closer attention to the local institutional landscape would afford an opportunity to obtain valuable knowledge concerning its effect on the business environment and govern the necessary potentially institutional changes.
In addition, a deeper understanding of local institutions would allow foreign business actors develop adequate strategies, foresee, and respond proactively to possible difficulties arising from the specifics of the institutional landscape.

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Public Awareness and Attitude towards Herbal Medicine Campaigns for the Prevention and Treatment of Sexually Transmitted Diseases in South-East Nigeria

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Abstract- Despite the existence of herbal medicine campaigns against sexually transmitted diseases in Nigeria, cases of people suffering from STDs still rise by the day, especially in South Eastern rural areas, where discussing sex related issues are considered taboo in many households. Thus, many people are forced to swallow their illnesses and pretend they are fine. However, the introduction of herbal medicine campaigns in various forms of media such as outdoor, radio, television, newspaper and internet have helped to expose people to issues relating to STDs in Nigeria. The main objective of this research therefore was to find out public awareness and attitude towards herbal medicine campaigns for the prevention and treatment of STDs in South-East Nigeria. It employed the survey research design with questionnaire as instrument for data collection. A sample size of 385 was drawn from the population comprising of all the residents of Anambra, Ebonyi and Enugu states by means of Australian Size Calculator of the National Statistical Service (NSS). Theories of agenda-setting and health belief model were used to back-up this study. Data generated found that the publics of South-Eastern Nigeria are aware of herbal medicine campaigns against STDs in Nigeria. Outdoor/word-of-mouth was considered the most dominant medium of herbal medicine campaign, followed by radio, television, internet, billboard and newspaper. The attitude of the publics towards the campaign was found to be more positive than negative, although certain factors like lack of herbal medicine regulation hampered the effectiveness of the campaigns. Recommendations are that the campaign producers should make the internet as their most dominant medium. Health communicators are also encouraged to enlighten parents about the need to educate their children about sex related issues.

Index Terms- Awareness, Attitude, Herbal Medicine, Campaign, Sexually Transmitted Disease

I. INTRODUCTION

1.1.1 Background of the Study

The role of campaigns in moulding public opinions, habits, views and attitudes towards an issue, place or person can never be overemphasized. Many scholars have asserted, by various means, that campaigns are series of organized actions which are done for particular reasons.

Keen observation of the world media environment will prove how campaigns have aided different disciplines in eliciting change in the minds of their target audience. In the political field, campaigns have been voraciously consumed during elections to attract votes. The geographical sector also use campaigns to inform and warn people about an impending weather disaster and how those dwelling in the affected areas can avail themselves of the consequences of the disasters.

In the health sector, campaigns have been used to inform and educate people about outbreaks of diseases and how to treat and prevent them. The cases of Ebola virus and Lassa fever in Nigeria are typical examples. According to Wakefield, Loken and Hornik (2010, P. 1), in their work, “Use of mass media campaigns to change health behaviour”, mass media campaigns can produce positive changes or prevent negative changes in health-related behaviours across large populations.

Johnston (2012, P. 5) asserts that media campaigns are used to increase awareness, analyse features, evaluate benefits, create reminders and promote loyalty. Ambler (2000) also states that campaigns have major influences on consumption volume of sales in the short-run as well as sales volume.

Sahid (1999) identified six fundamental principles on which campaigns have been unanimously agreed upon by researchers. These include:

- To secure attention
- To arouse interest
- To develop and sustain that interest
- To incite action and
- To create goodwill

Rai (2013, pg. 2) maintains that all efforts to make campaigns are centred on the sole aim of making it so effective and persuasive in natural ways so as to serve the need of meeting the consumer’s psyche in a positive way.

However, campaigns cannot exist without the mass media. In fact, it is not an exaggeration to say that campaigns are media tools for public communication. Media tools could be traditional, digital and social media. Traditional media tools include word-of-mouth, billboards, banners, newspapers, magazines, television, radio and telephone directories while digital media consist of search engine optimization, mobile marketing,
interactive online advertisements, opt-in email and online partnerships such as affiliate partnership and sponsorship. Social media tools include blogging, tweeting, posting, sharing, networking, pinging, bookmarking, media sharing and commenting in social media websites such as Twitter, Facebook, Orkut, LinkedIn, Pinterest, Reddit and Youtube. (Ettee, 2013).

Despite these classifications, research has confirmed that due to the vast increase in technological innovations and the immense diversity of world economy, health, politics, religion and culture, these media tools are supposed to be combined for effective inculcation of media messages. This brings to mind the trendy marketing campaigns strategy called, Integrated marketing campaigns (IMC). Business Dictionary (BD) (2015, P. 1) defines Integrated Marketing Campaigns as an approach to achieving the objectives of a marketing campaigns, through a well coordinated use of different promotional methods that are intended to reinforce each other. As defined by Americal Association of Advertising Agencies, integrated marketing communications recognize the value of a comprehensive plan that evaluates the strategic roles of a variety of communication disciplines.

From these preludes, the window to the soul of this study is opened. Herbal medicine campaigns against sexually transmitted diseases have been going on in traditional, digital and social media all over the States in Nigeria. It is very common for one to go to open markets, roadsides and open parks in Nigeria and hear loud voices of vendors describing signs and symptoms of sexually transmitted diseases and calling on passersby to buy drugs that would cure them. It is also not unusual for one to tune into local and national radio and TV stations and listen to programmes dwelling on sexually transmitted diseases, how to prevent and treat them, inclucing drugs to buy to get them cured. Even in newspapers and magazines, there are many of adverts in form of campaigns dished out everyday by traditional health practitioners about their herbal medicines and how these medicines can cure all sorts of sexually transmitted diseases. Included in the campaigns are also testimonies/narrative accounts created by people who have used these medicines and how the medicines have cured their diseases instantly.

There are also many of websites and social media pages created by these herbal health practitioners to campaign and sell their products. Fliers and billboards are also widely used by them for these campaigns.

These campaigns are so viral that children can even be heard recounting the words of the vendors and the songs used in such campaign programmes.

The virality of these campaigns is because, according to Olapade (1998) in Adegoju (2008), there has been a global resurgence of interest in Traditional Medicines in the last ten years probably because many of the known synthetic drugs in allopathic medicines for the treatment of various ailments are failing or that the causes of these various diseases are developing resistance to the known drugs.

Little wonder then that a new class of herbal medical practitioners has emerged in Nigeria, professing to be well talented, educated and versatile in formulating and modernizing herbal medicine. They also claim that their activities have been under control and monitoring by relevant bodies such as the Nigeria Natural Medicine Development Agency and National Agency for Food and Drugs Administration and Control. (Adegoju, 2008).

It is in view of these facts that the crux of this study is built on; to find out public awareness and attitude towards herbal medicine campaigns for the prevention and treatment of sexually transmitted diseases in Nigeria.

II. STATEMENT OF PROBLEM

Despite the recurrent attempts by Nigerian health practitioners and agencies to tackle sexually transmitted diseases in Nigeria through the use of herbal medicine campaigns in various media platforms, cases of victims suffering from this disease still rise by the day. According to Cates (2003), more than 20 STIs have been identified by the National Institute for Allergy and Infectious Diseases in Nigeria. Some of the bacterial infections are venereal syphilis, gonorrhoea, chancre, candidiasis, trichomoniasis and non-gonococcal urethritis. Okpara (2010) cited in Hamid and Baba (2014) observed that the Nigerian media are yet to effectively play the surveillance function of the media in their campaigns against sexually transmitted diseases.

This problem has been attributed to many factors such as lack of public awareness, publics’ lacadaisical attitude towards the campaign programmes, use of inaccessible media for creating the campaigns, complicated and unserious campaigns messages, emotional, psycological and physiological problems.

Several researches have been carried out using different survey instruments to find out public’s awareness and attitude towards STD campaigns. It was found out that the research studies have only produced results on HIV/AIDs. Other STD campaigns like Gonorrhoea and Staphylococcus have been ignored even though they are paramount and deadly to the body.

Because of the versatility of these herbal medicine campaigns messages against sexually transmitted diseases, it becomes pertinent to investigate the level of its awareness, its effectiveness and level of its behavioural influences. The need for this investigation is not far-fetched. Some researchers have found out that most people do not lend credibility to these campaigns messages. They consider the messages as mere lies fabricated by selfish vendors for economic reasons. They believe that these messages cause more harm than good as they insert fear in the minds of the listeners and viewers. In fact, some researchers have called these campaigns messages aggressive, forceful, unattractive and vulgar (James, 2013).

The problem of this study therefore is to find out the generalized pattern herbal medicine campaigns against STDs in various forms of the media are perceived among Nigerian audience. It is this gap that this study wants to fill.

III. OBJECTIVES OF THE STUDY

The major objective of this study is to find out public awareness and attitude towards integrated health campaigns in the treatment and prevention of STDs in South-East Nigeria. This main objective is broken down into the following specific objectives:
1. To ascertain the extent of public awareness of herbal medicine campaigns against STDs.
2. To find out the type of media the public is exposed to in dealing with herbal medicine campaigns against STDs.
3. To ascertain users' attitudes of herbal medicine campaigns in preventing and treating STDs.
4. To find out the factors affecting the effectiveness of herbal medicine campaigns in treating and preventing STDs.

IV. LITERATURE REVIEW

In a study carried out by Babalola, Olarewaju, Omeou, Adefelu and Okeowo (2013) titled “Assessing the adoption of roll-back malaria programme (RBMP) among women farmers in Ikorodu local government of Lagos state”, the findings demonstrated the importance of education and awareness efforts on controlling diseases. The authors recommended that awareness campaigns as regards the health and economic advantages of diseases should be intensified especially through the mass media. They also procured the need to focus policy on collaborative efforts of health personnel, cooperatives, media houses and government agencies in fashioning out awareness programmes that incorporate socio-economic characteristics of the audience especially at the local government level.

Meanwhile, Oyesomi (2010) in his work, “Making a difference in HIV/AIDS awareness for Nigeria’s development: the role of the media”, stated that despite several campaigns and awareness, its impact has become a devastating obstacle to development (pg. 2). According to Oyesomi, widespread lack of awareness, denials, stigma and discrimination constitute major challenges and obstacles to effective HIV/AIDS prevention education. He further asserted that greater participation of the mass media in HIV/AIDS awareness stems from the realization that they could exercise considerable influence on the public by increasing people’s knowledge, attitude and promoting debates on HIV/AIDS as well as sensitizing and mobilizing people against the epidemic.

Odutolú (2006) in agreement, encouraged the media practitioners to become more active in the HIV/AIDS communication domain at individual, institutional and professional levels. (p. 8).

Let us look at another health campaigns issue on female genital mutilation, a major cause of STDs. Okofo (2015), in his study, “the influence of media campaigns in the orientation of female genital mutilation practice in selected communities of South-Africa”, gathered that media campaigns against FGM have paid off and recommended that sensitization programmes like seminars should be organized for traditional rulers, religious leaders and other opinion leaders to enable them use other rural media communication channels to further sensitize and mobilize the rural women so as to consolidate the gains of the campaigns and ensure total eradication of the FGM practice. (p. 5).

Again, Keating, Mockers and Adewuyi (2006) conducted a study to investigate the effectiveness of media campaigns in enhancing awareness and prevention of HIV/AIDS with a particular focus on reproductive health. Their finding revealed that media campaigns reached a large portion of the target population and exposure to mass media messages increased awareness of HIV/AIDS, resulting in change in behaviour.

A similar study was carried out by Kiragu and Omotara (1992) to determine the influence of mass media messages in promoting family planning approaches in Nigeria, the result of the study showed that mass media campaigns via radio and television, print materials as well as advocacy proved to be successful in communicating the policy to the people.

In another research conducted by an unknown author among 2000 out-of-school youths in 10 Nigerian cities to assess the levels of their knowledge, attitudes, behaviours and media habits relating to sex, STDs and HIV/AIDS prevention and education in Nigeria, the results showed that 83% of the respondents have heard about HIV/AIDS through the mass media and 76% were aware that unprotected sex leads to STD infections.

In another study, Bauman (1991) analyzed prevention of cigarette smoking by adolescents through the use of mass media campaigns. He found out that the mass media campaigns especially radio had a modest influence on spreading the consequences of smoking. The study also found out that despite the expensive nature of the TV campaigns, they were not more effective than the radio alone.

Bowen (2013) also found bits of attitudinal change from respondents in his study. He looked at the impact of mass media campaigns on bed net use in Cameroon and found out that after listening to a programme called ‘Kopalu Night Watch’ media campaigns, more than half of the respondents ensured they used bed nets to prevent malaria.

In the same vein, Keating, Meekers and Adewuyi (2006) assessed the effects of media campaigns on HIV/AIDS awareness and prevention in Nigeria. Results of the study showed that more males were exposed to the campaigns and the mean number of radio ranked highest while television was lowest. These media activities had high reach among the target population.

Despite the relatively high percentage of respondents that believe consistent condom can reduce the risk of HIV infection, relatively low numbers of respondents reported using a condom. The authors contend that programmes that specifically target rural populations, females and unmarried individuals, as well as disseminate information on where to obtain condoms are needed to increase condom use in Nigeria.

Though many researchers contend with the effectiveness of the radio in awareness and attitudinal change as seen in our discussion, a study conducted by Adegbeke, Fife, Ogumika and Heemer (2014) came out with a different finding. According to these authors, in their study titled “the influence of HIV/AIDS public enlightenment campaigns on adolescents’ sexual behaviour in Nigeria”, the print media exerted significantly more influence on adolescents’ knowledge, attitudes and beliefs about HIV/AIDS than broadcast media (radio and TV), while organized activities had no effect on HIV knowledge, attitudes and beliefs. The discovery was that information received from print media such as books, magazines, newspapers, posters and billboards had a more significant influence on people’s knowledge because it is more than mere exposure, such as the case with the broadcast media. (p. 5).

Meanwhile, several scholars have continued to question the epistemological assumptions inherent in knowledge
production of STIs education promotion (Fanon, 1986; Valentin Mudimbe, 1988; Oyewumi, 1987). These scholars provided a paradigm within which to understand that the highly hyped Western models have their own limitations and that there is a need to recognize that Africans have their own ways of creating knowledge too which must be recognised as the most appropriate cultural model for understanding Africa and its people.

Similarly, Airhihenbuwa (2007) argued that it is important for the design and implementation of STD interventions to target audience with solutions within the context of their values and beliefs which they can adequately understand. Other critics believe that many health communication programmes were unsuccessful mainly because the campaigns planners possessed minimal understanding of the cultural practices of their target communities.

Green (1999) supports this assertion by expressing that it is important to understand how Africans and people from different cultures understand infectious diseases because when health communication programmes ignores the most important aspect of culture, there is a huge probability that they will achieve zero success in their quest to change the behaviour of people.

A cultural approach offers a chance to improve the effectiveness of global HIV/AIDS strategy and rebuild the trust of communities through more sensitive modes of engagement. In so far as a cultural approach allows prevention and care methods to come from within the culture, it improves the socio-cultural ownership and credibility (Somma & Bodiang, 2003). Local community-based approaches driven by reports from the community will remain the most important means of influencing people (Uwah, 2013).

Therefore, Airhihenbuwa and Webster (2004) argued that it is importantly crucial for the design of health communication programme to focus on the African identity of the target audience by deconstructing conventional assumptions and theories that were used in public health issues and solutions in the continent. Selikow (2006) suggests a similar idea that mass media campaigns alone cannot facilitate behaviour change among adolescents but that a multi-pronged approach to media theory led initiatives of behaviour change, dealing with multiple sources of conflicting information and challenging traditional ideas of masculinity and femininity all play a role in ensuring the effectiveness of HIV/AIDS enlightenment programmes.

There is another new discovery. Apoh, Kwakye and Badadu (2015) found out that learning about insecticide treated nets through health workers increases the use of insecticide treated nets more than any other channels of exposure. This is supported by a study in Vandatu (2016) which found that participants appeared to be more influenced by those that they saw as an authority when it comes to health issues. Therefore, community based educational radio campaigns involving health workers are recommended to target universal health communication.

Meanwhile, social media have also been recorded as one of the best channels of mass media campaigns against diseases. In a study carried out by Tsegyu (2015) titled, “An appraisal of mass media awareness campaigns in curbing the spread of Ebola Virus Disease among residents in Minna, Nigeria, Tsegyu conducted a survey research of which respondents attested to the fact that jingles, interviews, articles and advertisements in the print media and social media networks like Facebook, MySpace and Twitter were communication strategies adopted by the mass media in creating awareness on the outbreak of the Ebola virus. The study further found out that the effect of mass media awareness campaigns on the attitude of the residents of Minna metropolis was positive and effective and that the residents were able to change their attitude towards the cure of the virus as majority of them bought into the bitter kola and salt therapy.

However, a similar study like Tsegyu’s work had a different finding. Obukoadata and Abuah (2014) in their work “Media surveillance function in Nigeria: influence and perceptual frames”, found out that media surveillance campaigns in controlling and preventing diseases have attendant negative consequences for the people (p. 6). According to Obukoadata and Abuah,

Specific on this was the panic created by the message on the usage of salt solution as an antidote that went viral which the respondents identified as catastrophic since the panic of media earlier portrayal of the stealthily nature of the Ebola Virus Disease made most people not to weigh the outcome of a concentrated salt solution on their health as well as never bothered in most cases to seek medical attention before applying the solution. Media reports indicated casualties from the use of the magical antidote.

According to the researchers, Ebola Virus Disease campaigns made people to avoid sick people; people no longer display warm African greeting pattern for fear of contact and a drastic minimization of contact with other people through avoiding church services, parties, gatherings and crowded places. Despite all these negative comments, the researcher also noticed that some of the respondents saw EVD messages to be right in time, quick enough to help the society and that adequate information was provided to help control and prevent the disease. But, some of the respondents indicated that since the disease broke out in other countries, the campaigns should have been started before the outbreak. The study recommended that information on disease control and prevention must be strategically designed and not left at the mercy of citizen journalists or else the result will be a cacophony of information that will result in panic for the society. (p. 10).

A critical look at these reviews shows that not much work have been carried out on STD campaigns. Meanwhile, the reviews are limited basically to campaigns planning and attitude and behavioural change. Unlike these reviews, this research work would not only assess the attitudes, awareness and behaviour but would also delve deeper into seeking the types of media exposure, the content quality, the levels of reliability and factors affecting the campaigns carried out on sexually transmitted diseases in Nigeria.

It is expected that this research would make a lot of difference to the existing literatures and also open the eyes of prospective researchers to new angles of study.

V. THEORETICAL FRAMEWORK

This work is anchored on two fundamental theories; Agenda setting theory and health belief model. Like a bullet, STD campaign messages would be received by the individual
directly and it would have an immediate and powerful effect on the individual, persuading him or her to behave exactly the way the message advocated. This process is called the hypodermic syringe or needle theory because it is believed that the media message acts like the content of a hypodermic syringe, which, when emptied into an audience, would have an instant effect like the drug for a real syringe.

Mass communication messages are passive, and the mass media can, therefore, control and influence members of the audience. The mass media are powerful and persuasive, and members of the mass communication audience are seen as weak and in danger of having their values and behaviour changed by mass media messages (Okunna, 1999). Therefore, constantly feeding the media audience with campaigns messages on the causes, symptoms, treatments and preventions of STDs will actually help to illicit changes in the behaviour of the audience that will achieve the objective.

On the other hand, health Belief Model (HBM) is a psychological model that attempts to explain and predict health behaviours. This is done by focusing on the attitudes and beliefs of individuals. According to Burke (2015), the Health Belief Model (HBM) is an intrapersonal (within the individual, knowledge and beliefs) theory used in health promotion to design intervention and prevention programmes. Applied in this study, herbal medicine campaigns use the psychological impact of the health belief model to make people understand the negative impacts of sexually transmitted diseases and how to prevent and treat them.

VI. RESEARCH METHODOLOGY

This research was anchored on survey research methodology. The population for this study comprised everyone in South-east region of Nigeria. The region is made up of five states of: Abia, Anambra, Ebonyi, Enugu and Imo. It would be cumbersome however, to study the entire five states in the region, so the researchers therefore decided to randomly select three states from the region which include: Anambra, Enugu and Ebonyi states as sample to represent the entire region in the study. According to 2006 population census in by the National Population Commission (NPC), population of the selected states are: Anambra= 4,177,828; Enugu= 3,267,837; Ebonyi= 2,176,947.

Therefore, the combined total population of the three states would be 9,622,612. This population figure however, is too old and do not reflect the current population of the states. To get estimate of the current population, the researcher therefore used annual population growth rate projection to calculate for the population of the states over a ten year period. Hence, using the straight line formula, 12,701,847 would become the current population of the states over a ten year period. Hence, using the annual population growth rate projection to calculate for the and do not reflect the current population of the states. To get

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In calculating the sample size, the Australian Calculator as provided by the National Statistics Service (NSS) was used to get the sample size of 385.

Multi-stage sampling was used to generate data for this study. The researchers randomly selected one LGA/town from each senatorial district. To generate data for this study, questionnaire was used as instrument for data collection.

VII. DISCUSSION OF FINDINGS

This study made a number of findings which are discussed in this section, guided by the four research questions. Result showed that the public is aware of STDs in Nigeria. Gonorrhoea, HIV/AIDS and staphylococcus ranked the most common STDs in Nigeria. Syphilis is also common but not as these three. Chlamydia is the least common type of STD prevalent in Nigeria as it recorded low awareness in all the states. It was found out that the public have access to word of mouth/outdoor media, radio, television, billboards, fliers, newspapers and internet and that they have seen and listened to herbal medicine campaigns in all of these platforms. It was also discovered that almost all the respondents said that they often and very often listen to the campaigns in the media platforms listed earlier. Only very few people said they rarely and never listen to the campaigns. The kind of campaigns they are exposed to include: Ossa herbal, Goko cleanser, Katoka Mixture, Gbogbonishe, Agnes Nwamama, Papa and Mama Oshun, Deep Root, Jerusalem stone, Anya Ben and co, Green World Intl, Tianshe, UNO and Emma.

On the types of media the public is exposed to in dealing with herbal medicine campaigns against STDs, it was found out from the herbal medicine campaigns are mostly listened to via the word-of-mouth medium more than any other medium. This is followed by radio, then billboards before internet and lastly, newspaper. This is in line with what Kotler and Armstrong (2006) earlier explained in the literature about face-to-face medium being the most versatile means of communication in human existence as it allows one to express oneself.

As regards public attitude towards herbal medicine campaigns for prevention and treatment of STDs in South-East Nigeria, more than half of the respondents said they have never suffered from STDs while a little less than half said they have been victims. However, despite many people claiming not to have ever suffered from STD, a large number of people agreed to have bought the campaigned products to cure their STDs, although, the number of people who claimed they have never bought the products outweigh those that said they have. A large number of people also agree to have bought the products for their friends who have STDs.

Results of this study also show that these campaigns provide a lot of information about the importance of practising safe sex. Not only that, the campaigns also make people to buy the medicine and take, even when they don’t have STD, so as to prevent the symptoms described in the campaigns from manifesting in their bodies. As they say, prevention is better than cure. According to Krepps and Silvaram (2009), television and other forms of communication have enormous influences in educating and empowering individuals to avoid contracting diseases. Also, the campaign went a long way in helping people cure their STDs as a reasonable number of the respondents whose health status was extremely bad, moderately bad and just bad were reported cured after taking the campaigned products.

However, 70% of the respondents do not believe that the herbal medicines can cure all the STDs indicated in the campaign. This result proves what Adegoju (2008) found in his study, “that herbal medicine campaigns possess exaggerated power of discourse” (Pg. 54). Findings reveal that the voices of the campaigners are audible enough to alert the health consciousness of the respondents. Hence, loudspeakers in the
markets, studio microphones, bold and colourful headlines and pictures splashed in the front and back of newspaper pages, billboards and fliers are messages on their own, saying “hear me, hear me! Read me, read me!” ”

Besides, the loud voices shouting, “O na-ako gi oko? I n’enwe watery discharge?” are enough to make one, even for a second, examine one’s body and keep one into retrospection about the way one has been living one’s sexual life.

Many of the respondents attested to remembering the campaign after listening to it. This means that the campaign is successful in appealing to the selective retention quality of which successful campaigns are characterized by. According to Okoro (2015), a campaign is a failure if no one remembers to sing it. It was also discovered that the campaign was long, serious and funny and engaging to a large extent. About the language, 51% of the respondents do not perceive the language as being vulgar while 49% thinks the language is vulgar. Meanwhile, 74% have never visited the campaign offices, 26% have. This means that the campaigns to a large extent do not affect the ‘visiting spirits’ of the public. Asked whether the campaigns elicit fear of infertility and barrenness in them, 70% of the respondents said yes while 30% said no. Finally on attitude, the researcher found that out 60% of the respondents believe that the testimonies accompanying the campaign messages are fabricated while 40% believe that they are true. No wonder Darrel Huff cited in Lucas (1999:128) argues that although testimonies do not lie, they can be manipulated and distorted as there are no ways the audience could test or confirm the figure.

Factors affecting the effectiveness of the herbal medicine campaign in preventing and treating STDs are use of indigenous language and lack of herbal medicine regulation. Some of the respondents also believe that some of the campaigned herbal products are dangerous and can kill. Almost all the respondents agreed that stigmatization of STD patients pose great threat to the effectiveness of the campaign in treating and preventing STDs. Other factors include shyness, financial challenges, and prejudice against herbal medicine by educated people, location, noise pollution, exaggeration and overuse of propaganda.

Data generated from the study showed a high level of awareness of herbal medicine campaigns. Respondents also indicated word of mouth, radio, television, internet, newspaper, billboards and fliers as the media for herbal medicine campaign with word of mouth ranking first and radio second. The respondents also showed awareness of STDs and identified HIV/AIDS, Gonorrhoea and Stphylococcus as the most common STDs in South-East Nigeria. Other not as popular are syphilis and chlamydia. The attitude towards the herbal medicine campaigns was more positive than negative while numerous factors were identified as militating against the effectiveness of the campaign messages.

IX. RECOMMENDATIONS

In the course of this study, some research findings were made. It is on the basis of these findings that the following recommendations were made:

1. Health communicators should go beyond the use of outside radio and word of mouth. Herbal medicine producers who want to campaign for their company products should embrace the internet, especially the social media. They should have a blog, a facebook page or twitter page where they can judiciously talk about their products without reservations. They should also have an online shopping platform where people can easily order for their products without feeling shy. Outdoor and radio campaign is important but most people who are in the market already have their budgets and may have just come across the campaign by chance. Internet creates a relaxing atmosphere for the public to carefully read about the product and make their demands without feeling shy.

2. Moreover, photos and video clips of people who have used the products should be uploaded in their blogs and facebook so as to create more emotional appeal and trustworthiness.

3. Also, comment sessions should be made available in blogs and social media pages where the public can easily critique their products and make recommendations that would make their products come more alive. This would also reduce the stress of visitation as all consultations are made online.

4. Health communicators should master the art of dressing well. A health communicator who looks dirty and unkempt with a dirty van roaming round the market cannot be taken too seriously. Because health is associated with cleanliness, herbal medicine campaign messengers must learn to dress clean and look tidy in order to attract customers.

5. Health communicators should not be extremists. A little propaganda adds taste to the campaign but too much of it spoils it entirely. Therefore, exaggeration of efficacy of their products should be curtailed and brought to realistic level so as to ensure more credibility.

6. Herbal medicine campaigners are also encouraged to diversify the types of STDs they talk about. There are numerous STDs besides these ones that people should be aware and conscious of.
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The Role of HMI in Socio-Political Change

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I. INTRODUCTION

This article guides a stepwise walkthrough by Experts for writing a successful journal or a research paper starting from inception of ideas till their publications. Research papers are highly recognized in scholar fraternity and form a core part of PhD curriculum. Research scholars publish their research work in leading journals to complete their grades. In addition, the published research work also provides a big weight-age to get admissions in reputed varsity. Now, here we enlist the proven steps to publish the research paper in a journal.

HMI is a Muslim University Students Association in Indonesia and it was founded on February 1947 in Yogyakarta town Central Java when Indonesian nation was in the midst of struggle for defence of independent proclamation from the menace of Dutch colonialism which was trying to reoccupy the country. The objective of HMI is put forward first time by Lafran Pane on the occasion of conference of Persatuan Pelajar Indonesia, PPI (Islamic Student Union) held in Ponorogo East Java from 4th to 6th November 1947.1 In this paper I would like to describe more on the role of this muslim youth organisation in the change of Socio politics of Indonesia during the Soeharto regime from 1978 up to 1998.

In the history of Indonesian politics, Christian Snouch Hurgronje, Soekarno and Soeharto have applied Ali Abdul Raziq’s notion. Even in the New Order regime, President Soeharto handled the Islamic affair in the country based on the separation between religion and politics. The main reason of the two former Indonesian Presidents taking the decision was experience of the politics apparently weakened, the role of its religious and social dimensions has developed and flourished from time to time until today.2

Like the view of former President Soekarno and secular nationalist group the HMI is of the view that Islam without political party became stronger. If the view of President Soeharto was predicated on political reasons, the HMI’s view was based on religious motivation, namely to make Islam a religion that helped to unite the entire people in order to gain the national interest, and the desire of togetherness, although the religious view was definitely quite different to those of historical Muslim thought.3

The motto of creating “the intellectual-ulama and the ulama-intellectual” is the other factor which indicated the strong desire of the HMI to live as devote Muslims amidst the Indonesian cultural milieu. The effort meant to prepare the leadership of the ummah to enable them to formulate the religious and social notions needed for development. The encouragement to put broader human concern into doctrines of Islam, and interpret Qur’anic doctrine as social justice was indeed a useful contribution and appreciate to be taken up by the HMI, not only for the religious development of the Ummah, but even to meet demands for justice and prosperity of all Indonesian people.

The MHI has been adopted the concept of amal saleh (good deed) within the Qur’an as their notion on the development of humankind. The HMI’s stand like this was inspired by Fazlur Rahman’s suggestion to determine what is the best for the future of Islam and takes into consideration what is fundamental Islam, and what is historical Islam.4 The struggle for universal Islamic values, the HMI as an organization of young Muslim intellectuals could accept for meeting the demands of modern Indonesian people without forcibly alienating it from the basic Islamic doctrines.

That the above concept of HMI for development could be seen as relevance to the general development and has lasted in the country under the New order’s sponsorship.

The Indonesian development has shown a paradoxical implementation of models of the development between liberal model of Talcott Parson and conservative model of Huntington. In the Personian

Paradigm, development means change of social and economic structure and shift from a traditional system to a

1 Agussalim Sitompul, Sejarah Perjuangan HMI (Surabaya, Bina Ilmu, 1976), p.30
2 Victor Tanja, HMI, Sejarah dan Kedudukannya,dalam Pergerakan-Pergerakan Muslim Modern, *Jakarta, Suara Harapan, 1991) p..142
3 Cragg, Kenneth, The Call of The Minaret, New York, Oxford University Press, 1964, p. 159

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modern one that my result in social mobilization, development, while in the Huntington paradigm, becomes a combination of modernity and tradition with an effective government. The first paradox is that national development in Indonesia, has to some extent, adopted elements of a liberal development by the creation of modern forms of social and economic structures, yet in the meantime reviving classical indigenous traditions. The second paradox lay in the fact of economic liberalisation at the cost of strong political control.

Strong evidence of that kind of development is to be found in the two different directions of structural transformation that occurred in the economic field and the political one respectively. Structural transformation in the economy already seen in a shift of the income of society from agriculture sector in the agro industry, industry in profit sectors.

The change civic polities, on the other hand, indicated structural transformation in polity, by Praetorians. According to Huntington, the civic polity is a type of politics in which one or more independent political forces dominate social forces, whereas praetorian power of a government is that which is not controlled by the political parties. The latter term might not fit in to Indonesian politics very well, but some elements of Praetorianism were discernible in the New Order government, such as the absence of and independent effective political force, the strength of the bureaucracy in decision-making, and its expansion and interference into almost all social spheres.

In relation to the “ideology” of development, a Praetorians polity has, of course, a political logic of its own, such as an argument for the necessity of national stability for the success and sustainability of development itself. The accentuation of national stability has been one of the characteristics of the New Order’s political engineering. Political institutionalization in this respect is reflected in the security and monolithic approaches exercised by the New Order government. As a consequence, the degree of political participation has been weakened, particularly because political parties, ac vehicles of political expression, were not able to articulate the political interest of the people.

The political institutionalization achieved thus for has not encouraged people’s political participation, because the institutionalization process only strengthened what Professor Liddle has called the “New Order Pyramid”. This pyramid consist of a dominant presidency, which becomes the centre of decision-making, and pattern of state society relationship that combines co-option and response with repression.

According to Liddle, the mechanism of the New Order political structure departs from the presidency at the top giving commands to the military which is a most important element of the bureaucracy and, which in turn, exercises power over society, The whole process of political engineering has effectively created a relatively stable condition of relationship between state and society, or between the ruler and the ruled.

It is in such a political setting that the depoliticization of Islam has been processed. The manner of the process took the form of getting rid Islamic symbols for political activities, eliminating Islamic political parties, and clearing the political arena of Muslim politicians. The depoliticization of Islam has reached its culmination in terms of political vehicle in the amalgamation of all existing Islamic political parties into PPP in 1973, and in terms of political ideology in the obligation to adopt Pancasila as the asas tunggal (the sole basis) by all political parties and mass organizations in 1985.

The depoliticization of Islam was part of a broader target, namely the depoliticization of the people in general. This was seen in the creation of a floating mass population. Which depoliticized people at the grass root level and alienated political leaders from their followers. The streamlining of political parties followed this in to Golkar, the PPP, and the PDI. Islamic political parties responded in a relativists “easy” way toward this streamlining, though the story behind the creation of the PPP is not simple, as Nasir Tamara reported.

From the beginning, NU was the largest member. Although initially not very keen on merging, NU eventually joined without internal conflict. On the other hand, there was unrest within PSII resulting in a leadership change, which was won by pro-merger people. On the other hand, Parmusi and Perti supported a quick merger from the start.

This “easy and quick response” was due in part to the situational logic of politics at the time that led political parties to follow the current of political engineering, and in part to an “intrinsic competition” among Islamic political groups to be seen as the first supporter of the regime.

Escaping from the obligation not to include any mention of Islam in the new party’s name, Muslim leaders have chosen the term persatuan (unity and pembangunan (development). They hoped by so doing not to delete some mention of Islam, because the term persatuan indicates one of the most important principles of Islam. They also hoped that the amalgamation would provide them with Hikmah (in Indonesia language understood, interalia, in the sense of blessing in disguise). To establish ukhuwan Islamiah (taken from Arabic words) namely Islamic brotherhood. The adoption of the term pembangunan was perceived as agreement with and support for the New Order’s policy of development. It is possible that the use of the term’s persatuan and pembangunan was meant to convey a message that the PPP, the “Islamic” party, had emerged to gain the support of the Muslim community in order to participate in the national development process.

It is notable that Muslims responses to the political change during the first ten years of the New Order (1996-1976) which, in relation to the agenda for the depoliticization of Islam, might be identified as a “period of conditioning” appeared more political in nature, although with critical accommodation. Little intellectual response was shown, such as elaboration on the relationship between Islam and the state, the Pancasila, and

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8 Muhammad Kamal Hassan, Muslim Intellectual Responses to “New Order” Modernization in Indonesia. (Kuala Lumpur, 1980), pp. 78-116
politics with the exception of the accomodationalist responses of Mintaredja and Nurcholish Madjid.9

Mintaredja ( then the chairman of Parmusj and later President of the PPP ) in his reflection on Islam and the Pancasila considered that Islam does not aims at the creation of an Islamic state because during the time of Prophet Muhammad, the term “state” in the sense of state as we knew it today was not yet in existence.10

In the Mintaredja’s view that the major duty of Muslims is to struggle for creating a true Muslim society which, should be distinguished from an Islamic state. A Muslim society could legitimately exist in a state without undermining its integrity as the nation-state.11

Concerning of relationship between Islam and politics. Mintaredja at the meantime believed in the totalistic character of Islam as a way of life, including political life. He maintains that the political issues are worldly in nature and as such an approach to political issues should be in accordance with is nature.

The slogan promoted by Nurcholish Madjid ( than a national chairman of the HMI ) on the eve of the 1970’s “ Islam-Yes, Islamic party-No “ is similar in nature. The idea is one of the main points of this “ his renewal project “ which as severely criticised by many Muslims.12

Having observed the problems of Indonesia Islam, which lays in the paradox between the defeat of politicised Islam and the rapid expansion of it, Nurcholish Madjin came to the conclusion that Islam’s quantitative growth was not encouraged by the Islamic parties or Islam organizations, for the Islamic parties had failed to build a positive and sympathetic image of Islam.13

According to H, Munawir Sjadjali, in certain circumstances, the absence of the Islamic political parties was better for Muslims. The experiences of national life in the past view years clearly showed that the Muslim ummah’s interests were even served at the time when there was no Muslim party in the Indonesian political sphere, he said.14

From the start of the New Order, especially in the last decade, many expectations of Muslim for the improvement and religious infrastructure and facilities have been sufficiently met. In the past, at the time when Muslim parties were presents, the same expectations had never been fulfilled. The following examples could be advanced.

In the field of law, for instance, with the passing of law No. 14 of 1970’s on judicial Authority the existence of Religious Court of Law ( read: Islamic Court ) is fully recognized as an independent court of law and equal to the other three Courts of law: Public Court, Administrative Court, and Military Court. This law was then followed by the enactment of law No. 7 of 1989 on Religious Court, some of which had prevailed for more than 100 years, and at the same times served as the realization of the stipulation contained in law No. 14 of 1970 on the independence of the Religious Court, to the other three law.

In this context, it should be noted that in 1948, a Muslim party brought up a proposal for the improvement of religious court status to KNIP ( Komite Nasional Indonesia Pusat, or the Indonesian National Central Committee ) which, at the time, served as provisional parliament, but the proposal met with strong opposition from other parties or factions and, being a minority group at the time, that Muslim party could do nothing about it.15

Till in the development in the field of law, up to the year 1991, religious judges had no standardized books of law similar to the KUHP ( Kitab Undang-Undang Hukum Pidana, or the Penal Code ) for judges in the Public Court, in spite of the fact that the Religious court had been established long before; the religious judges had to resort to numerous yet diverse reference fiqh books in dealing with the legal issues brought up by members of the community. As a result, if often happened that the two similar cases, headed by two different judges with two different books of reference, would result in two different verdicts, which meant that there was no legal

The peculiar situation ended, once again, at the time of the New Order, in the absence of Muslim parties, with the issuance of a joint-decree of the President of the Supreme Court and the Minister of Religious Affairs on the establishment of an Islamic Law Compilation Project.

In December 1987, the project succeeded in completing three draft book of legal references to be used by the religious judges throughout Indonesia. The first book is on marriage, the second one about in Inheritance, and the third one on waqf ( religious endowment ). By the presidential instruction No. 1 of 1991, issues on June 10, 1991 just one week before the President and his family made a pilgrimage to Makkah, those three books were officially sanctioned and ordered to be publicly used.

In the field of education. The Indonesian people has law No. 2 of 1989 on National Education System, in which religious education is affirmed to be a sub-system to the National Education System, and religious instruction is compulsory at all public schools and universities. The law also reaffirmed recognition to the long existing religious education institutions in conformity with the claim of the New Order that the state which, is based on Pancasila is neither a theocratic nor a secular state.

In the relation to houses of worship there has been a sharp increase in the number of mosques and mushalla including over

11 For more detailed in this account, see Nurcholish Madjid, Keharusan Pembaharuan Pemikiran Islam dan Masalah Integrasi Ummat, (Jakarta, Islamic Research Centre, 1970), pp/ 1-12
13 H. Munawir Sjadjali, Muslim’ s Interests Are Better Served in The Absence of Muslim Parties, (Indonesia Experience), Jakarta, m. 1992, p. 2
14 H. Munawir Sjadjali, Muslim’ s Interests Are Better Served in the Absence of Muslim Partie (Jakarta, Department of Religious Affairs, Republic of Indonesia, 1992) p. 3
500 strong and beautiful mosques built by the Yayasan Amal Bhakti Muslim Pancasila (Muslim Charity Foundation) Chaired by President Soeharto.

In the realm of da’wah (Islamic propagation), it is well known that the major weakness of socio-Islamic organizations is a serious lack of financial back up. An international Islamic organization once promised to help the financing of 1000 preachers for the whole country. However, the realization was only for 300 preachers, far below the target, and later the number went down to just a little more than 100. To cope with that unfavourable situation and being fully aware of the urgency for religious guidance in the remote and isolated areas especially in the transmigration locations President Soeharto urged the MUI (Majelis Ulama Indonesia, or The Indonesian Council of Ulama) to prepare 1000 da’i (preachers) for religious duties in transmigration sites. They would receive Rp. 100,000 per month for the period of three years as financial support from the Yayasan Amal Bhakti Muslim Pancasila. The same foundation has also donated financial support for other 1000 imams for transmigration sites channelled through the MDI (Majelis Dakwah Islamiah, or The Council for Islamic Preaching).

During the old order regime under President Soekarno and still more so under the New Order regime of his successor Soeharto, the Indonesian government was directly or indirectly involved in the construction of many mosques and the development of public institutions of Islamic religious education, from the primary school to the IAIN (Institut Agama Islam Negeri, or The State Islamic Institute for Islamic Studies). 16

The new order regime, on order hand, has started for the depoliticization of Islam which was primarily materialized by a ban on political parties based exclusively on Islam or its particularities; it favoured the development of Islamic values in the social, cultural and intellectual spheres of life, in order to create the so-called "ethical" basis of national development.

Up to present time, Islam often functions as a source of motivation for demands of adjustment of different aspects of government policy. In the demands, the Islamic motive is generally combined with other reasons and motives, of a cultural, social, economic or political nature. An example is the movement for the democratization of the political system which has been growing for some years now. Its background is partly based on Islamic values, legal notions and organization.

The Islamic element was still more prominent in the recent campaign for the abolition of the SDSB (Sumbangan Dermawan Sosial Berhadiah, or social philanthropically Contribution with Prizes) lottery, In which formal arguments about Islamic law were combined with the denunciation of growing social and economic disparities. The latter campaign finally attained its goal on November 25, 1993, when minister of social Affairs announced the discontinuation of the lottery. However, at present Islam is seldom a source of criticism of the political system or the public authorities as a whole in the country.

The HMI observed that the view of Munawir sadzali is true in certain aspects of development; but in the other it was insufficient, particularly, in order to develop a democratic political system. The HMI is of the view that the time has come when the need of political reform has become urgent.

It is an interpretation of commitment and responsibility of the HMI as child of the nation as well as an intellectual community.

According to Anas Urbaningrum,17 the national chairman of the HMI in 1995-1997, the reform concerning the main bases of having a society, nation and state should be radical, fundamental and systematic. The main agenda of the Indonesian nation in the years to come is to develop steady and matured social system and structure based on appropriate foundations. The strong and matured system able to anticipate needs in each sphere and demands of smooth social change without much turbulence.

The HMI is of view that the promise of the New Order government to broaden the Pancasila democracy in practical politics is only lip service. The organization considered that political democracy could not be built by political slogan only; it is possible only by way of creating healthy and qualified interaction among all political forces. This need a strong state with an effective government and a strong society with autonomy of people whit character. The effective administration could safeguard the social order and run the public service, while the antonymous people who have character would guarantee the growth of critical participants and emancipators of culture.18

The democratic Tradition that can accord respect to diversity should be tough at practical level. The politics of concentration of power and the policy of incorporation in operation since long should be reviewed. Indeed, the politics of concentration is not only not relevant to the democratic tradition, but is also contrary to the heterogeneous social nature of the Indonesian people. The motto Bhinekka Tunggal Ika or Unity In Diversity, is a cultural treasure of the Indonesian people which quite relevance to be practiced in real practical life. The selection of public service officials should represent and respect this pluralistic society.

The strong demand for democracy and healthy political activity have forced the government to review political life, together with the legislative institutions to review the rules of political game. From time to time the people awareness towards their rights as citizens has increased, including right to politics and implementation of the clean government by the New Order administration.

While speaking in the student study Forum of the HMI in September, 1993, chief of socio-political staff of the ABRI, Lt. General Hariyoto P.S remarked that the ABRI’s interest in the established political system in Indonesia is for the cause of national stability. In stable political system, all kinds of people’s demand could be accommodated properly.19

According to him, stability is always to be associated with public pressure and demand should be implemented with security approach. He recognized the worried of many if the demands are not accommodated properly it would invite mass frustration

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18 Republika, September, 1993
people, and aggressive action by authority, an it turn, would lead to socio-political unrest.

In the last years of Soeharto administration, the political dynamism in the country has increased. After short period of decline following the repression of the Megawati supporter on 27 July 1996, a surge of democratic waves appeared throughout the archipelago. Reminiscent of the last days of Soekarno, the current democracy movements has been championed by the university student who launched their protest in response to the government which is seen as being incapable of controlling the crisis and its negative impacts on the life of the people.

The politics off de-politicization of Soeharto consists of two strategies; the direct and indirect one. The first has been target to the rural masses, which constitute bulk of In Indonesian population (approximately 70 percent). It has taken the form of the so-called “floating mass” policy, the purpose of which is to limit the activities of political parties as far as the district level. The underlying assumption of the particular policy is to protect people from political manipulation by competing parties, which had occurred in the past and engendered political instability and promoted social disturbance.

The second strategy, namely the indirect strategy of de-politicization has been implemented through various mechanisms, most important of which have been the state’s corporatization, co-optation, and ideological hegemony. Through the corporatist mechanism, the state is able to exert systematic control and surveillance over the existing interest groups in society through direct intervention in their existing organizations.

According to the Lt. General (ret.) Rudini, the rise of the people political awareness should be accompanied also with the rise of the government’s role and socio-political structure. It was quite important in order to meet the development demands, their aspirations and aggregation of people’s political interest could be developed to become “affirmation potential”, for sustained national development, not just “trouble-maker potential” which hampers national integration.

Accordingly, the role of the ABRI, the political parties, the Golkar and all the existing mass organization, including youth organizations, should be enhanced maximally so that they could participate to increase the national awareness and to boost national unity in order to realize the national ideals based on Pancasila and the 1945 Constitution.

As custodians of people’s aspirations all political parties and Golkar are expected to serve the interest of the society, the nation and the state properly and consistently. Unfortunately, these political parties, particularly the Golkar as ruling party was regarded as a political vehicle by its leaders for their self-interest, their families and their cronies.

The role of mass organizations as medium to articulate the people’s interest should be advocated and supported continuously. The rise of all social institutions, including youth organizations is quite helpful to enhance the quality of political awareness in support of national unity and integration for better civilized Indonesian people in the future.

There are three Islamic student organizations, namely the HMI (Islamic University Student Association), the PMII (Islamic University Student Movement), and the IMM (The Muhammadiyah University Student Union), and each of them has had form of Cadre Programme through training, usually it was range of training since primary level, mediums and advanced. Only HMI declared itself an independent organization. The other two; PMII and the IMM have been affiliated to the large Islamic religious organizations namely the NU and the Muhammadiyah.

The basis of membership of the HMI is quite unique. The largest section of the HMI membership is in the secular universities and colleges. On the contrary, most of the PMII membership is from Islamic religious colleges, particularly from the IAINs (the State Institutes for Islamic Studies) through the country and higher education institutions run by the private foundations, While those of IMM originated from Muhammadiyah higher education institutions, for instance, the Muhammadiyah universities and the IKIP (the Institute For Teacher and educators) Muhammadiyah.

As most of its members are from general universities; so in cadre formation, the HMI would try to provide sufficient Islamic knowledge for them. While those of them studying in the IAINs has been provided a general knowledge in order to bring them at par with their counterpart in the secular colleges and universities. This programme has been formulated on the beautiful motto i.e to create the “intellectual-ulama and the ulama-intellectual”.

The above motto has been programmed since the birth of HMI in 1947. Its main objective is to fill the vaccum of Muslim young intellectual circle, as ever has been done by the Jong Islamiten Bond (JIB) in Dutch colonial era. The JIB born on January 1, 1925 was dissolved as Japan came and annexed Indonesia.

Therefore, in those circumstances, the establishment of the HMI was in-spired by notion of the JIB with its “Islamic study club”. Hence, it

Several things, the HMI focused its concern on long-term purpose of the JIB, namely it would like to convince the Muslim young intellectual to complete their academic education, they should also understand Islam.

The formulation was a response to the prevailing challenge faced by Muslim university students in the secular universities and colleges. Deliar Noer, ex-national chairman of HMI, observed that the Muslim young intellectuals were keep away the Islamic doctrine by the secular educational system. According to

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20 Megawati Soekarno Putri is daughter of former Indonesia first President, Soekarno. She is also national chairwomen of the PDI Perjuangan, and known as a prominent opposition leader of the couney along with Amin Rais and Abdurrahman Wahid.


him, such a problem had been faced by the JIB and still remained before the HMI. 24

Because secular education which was neutral towards the religious notion, they became alienated spaced from Islam. They tended to ignore the Islamic doctrine and the Shari’ah ( Islamic Law ). More than that the secular educational system created friction among the Muslim youth between those who ignored and those who obeyed the Islamic doctrine. Above all, because in Java island could be found the tendency of religious assimilation , their presence in the secular education affected to deeper friction between intermingle Muslim group and those who desired to purify the Shari’ah ( Islamic Law ) from all kind of derivations.

In order to ever come the above problems, Deliar Noer has given inspiration to develop nationalism based of the deepest religious heritage.

Deliar Noer believes that a nation which has identification with the religion of its majority population is a basic key for national unity and integration. Therefore, the Indonesian strength lay in its identification with Islam, and only Muslim which hardly endeavoured to develop the Islamic basis of nation potential become “ the ulama-intellectual and the intellectual-ulama “. 25

The noble desire, which likely underlined the HMI programmes and activities. Which implemented through series of leadership training, has been going on until today. In each period of chairmanship, such activities tended to become conventional. The platform of the organization almost never changed from year to year, particularly in branch levels, which later occurred routinely and even obstinately.

According to Sudirman Tebba, 26 ex-activist of Ciputat branch of HMI, the programme of HMI is to achieve the objective of ideal man as stated by the government through the improvement measure of religious education in secular universities and syllabus of the IAINs throughout the country. IAlthough its formulation was different from the HMI’s platform, yet as stipulated by the 1983 GBHN (the Guidelines of State Policy) that the objective of national education is the enhancement of faith and devotion to the One and Only God, of intelligence and skill, of character, and of personality and spirit of nationhood and love of homeland.

The above formulation placed the enhancement of faith and devotion to the one only God as the top priority in the national education objective. It was indicated that religious education in secular higher education should get the man concern. One fact of the seriousness is the ongoing perfection of the Islamic religious subjects in the secular higher education.

After long time the religious subject was given in the conventional way, and today in the secular universities, the Islamic concept of any discipline (IDI) was already taught. This indication is one step ahead with relating the process of science and technology to Islamisation. Besides, it has developed many ways to delve deep into Islamic doctrine in various fields like in economics, politics, culture etc.

One the other side, the New Order administration policies generally weakened all Islamic university student organizations. Since its established, the New Order government engaged in bringing about economic development and repressing all political opponents and mass and religious organizations. This phenomenon is peculiar of neo-fascists, not only in Indonesia, but it was also common to several third world countries like Brazil, Argentina and Iran under Syah Riza Pahlavi.27

Although the real political condition was non-conducive for all-political parties and mass organization activists, the HMI remained to serve for the benefits of ummah. Under the real and reasonable approach, according to Adi Sasono, 28 the cadres of HMI whether in infra or suprastructure have made an endless contribution, throughout in the time when the Indonesians people were struggling to defend the State against the colonial effort to reoccupy, or in the period of national character building, and at the time of consolidating the freedom. Because the HMI and the KAMI activist were also thinkers in the development sectors, the contribution is quite valuable. And up to today, the HMI is the largest organization in the campuses of the country.

Each cadre of HMI is expected to be doing something of or the ummah wherever they lived and worked. The cadre outside government structure became writer, columnist, analyst and critic. Their actions are as pure activists functional outside the system, and have a function to remember and put forwarded a healthy norm for national life. This group is usually called ‘ pressure group ‘. 29

Meanwhile, there is also a group who entered the system. This group called institutionalist, which struggled from within the structure. Some of Them succeeded in supporting the processes of change from within the structure. However there was a group disinclined to motivating the change process from within. Beside that, there was professionalist group which was neutral towards power system. They tended to work related to the justice aspect, even distribution and freedom. They have given contribution, but their activities have not influenced to the wider social issues. They worked sectorally in their own field.

Therefore, a novel idea was needed to resume their activities and responsibilities based on professionalism. They did not need to do dichotomy between those worked in the state institutions and outside of it. But, they should develop togetherness in order to realize the sovereignty of the nation effectively.

As the ideal cadres of HMI, they did not get trapped in seminar activity and regarded at as escape from problems faced by the Indonesian society. Also if they worked in government offices, not automatically the ideal job as HMI’s cadre will be over? They needed to be aware that the social change process toward the right direction is quite complicated process requiring

27 Adi Sasono is ex-activist of Bandung branch HMI. Since May 1998 President B. J. Habibie appointed him as minister economic, co-operative and weak entrepreneurship development.


29 HM Yusuf (ed), 50 Tahun HMI Mengabdii Republik,(Jakarta, LSAP, 1977) , p. 156


26 HM Yusuf (ed), HMI Menjawab Tantangan Zaman, (Jakarta, LSAP, 1977) , p. 147

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collaboration with the other side or institutions, which existed in the government institution as well as outside of it. They needed to focus on the mass approach and practical action and more attention to the professionalism in their own field. It was a development of political education agenda.

Democracy is a social process and also a learning one. The social control towards the decision-making which quite often not inclined to justice was also time-consuming. To implement democracy shortcuts and romantic measures are not enough. The idea of revolution which is quite often talked in certain circle, particularly the radical young generation, did not offer the way-out of the ummah problems, because the problems were very complicated and needed to discern the importance off all social forces to operationalise collective awareness.

In this connection, could be seen the role off intellectual organizations like the KAHMI, ICMI or the other, to develop a positive interaction. In order to struggle for justice and even distribution which did not end with lip-service. Slogan and philanthropy programmes inclined to defend status-quo. Theoretically, there is no difference between philanthropy programmes and even distribution one. The gift of philanthropy programmes is to provide a social agenda, but it did not have impact of concrete economic structure. What has been expected by the society is even distribution programmes and has the impact on the productive asset of entrepreneurship.

It is hard to imagine that without support of the KAHMI, the ICMI could play a significant role and become the prestigious organization that it is today. Vast majority of ICMI is also members of the KAHMI. The main job of HMI’s alumnus is to become catalyst of the development for empowerment of the people. This job covered agendas of rapid reform in social, economic and political renewal in the society. The economic and political democracy is a necessity, and the KAHMI has a role to guide and push up the political process within the framework of Pancasila democracy. It is no exaggeration to say that the success of all programmes of ICMI in economic and socio-political fields in the country is caused by the KAHMI’s support as one of the factors, “because both in the centre ( Jakarta ), and in the districts, the majority members of ICMI are members of KAHMI too.

While receiving PB HMI on August 13, 1993, vice President Try Sutrisno said that the globalization era demanded the quite tight competition, more advanced society and openness of action. As the natural resource decreased from time and all sectors needed better management.

In order to response the suggestions, the national chairman of HMI, Yahya Zaini agreed to the call of vice President, and stressed the importance of better political education. According to him, in the frame of political education, the HMI wanted that the following issues must be included namely Pancasila as an ideological foundation, nationhood outlook and religious outlook.

Yayha Zaini remarked that essence of nationalist outlook is the unity and the integration as a motivator, mover and cement in every struggle of the Indonesian people.

Regarding the economic crisis, the HMI through its national chairman, Anas Urbaingrum has expressed its apprehension. According to him, the monetary crisis of the country has given us the most important lessons and it has a bitter impact on the grass-root level people.

The lessons were: First that the innate strength of economic globalization. The foreign debt should be utilized for the maximum benefit of people and their prosperity. Second that a tiny group of society could not develop the strength of economic foundation. Strength of the tiny group caused the collapse of national economy and disrupt distribution.

At the practical level, the above constructive suggestions were not implemented by the government so that the apprehensions appeared and raised a huge social unrest and deep economic crisis in the country.

The deepening economic crisis was being matched by a growing political crisis Soeharto was facing a people who had slowly and painfully begun to recover from the terrible defeat of 1965. The first major sign of the revival of resistance came in 1974 when a million people spilled onto the streets during widespread student protests. Yet they were also brought together as workers, and as “the 1980s progressed they began to use their collective strength to strike for better wages and working conditions with some success.

By 1996 the dissatisfaction against the Soeharto regime was spreading up to sections of the ruling and middle classes, who were being excluded from the profit and corruption bonanza by Soeharto’s cronies. Protests at various levels were mounting throughout th to come. The idea behind creating of the ICMI is not revealed instantly, but it has historically a deep root in the last 30 years.

In the beginning of 1960’s, some of Santri alumnus entered the Universities and Colleges. Seven years later, the boom of educated scholars from the Santri cultural background occurred. After graduation, they became bureaucrats. During developing their career, for few years, they hid their Islamhood and after they occupied an important position, they began to act for “Islamisation ” of offices, departments, or campuses. The managers and the leaders of the office held pengajian or teaching of Islamic doctrines and performed congregation prayers in the place where they worked. And lecturers revived the religious activities in the campus.

The former HMI activists occupied the important positions in the governance, for example, Arifin Sirregar, Hasyirul Harahap, Abdul Ghofur, Azwar Anas, Akbare Tanjung, Mari’

31 HM Yusuf (ed), 50 Tahun HMI Mengabdi Republik (Jakarta,LSAP, 1977), p. 157
33 Pidato Ketua Umum PB HMI pada Dies Natalis ke 51, op. cit., p. 15
34 Kompas, August 14, 1993
35 Kompas, August 14, 1993
37 HM Yusuf (ed), 50 Tahun HMI Mengabdi Republik, , (Jakarta, LASPI, 1977), p.132
38 Jalaluddin Rakhmat, Islam Aktual, Refleksi-Sosial Seorang Cendekiaawan Muslim, cet. IX, , (Bandung, Mizan, 1996, p. 101

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Muhammad and so on. The number of educated Muslims has increased. They needed a container to channel their aspiration. They have an intention to play wider role in contributing to the development process. The role could be effective if they joined hand with the bureaucrats in decision-making. In the bureaucrats should be attracted to join the intellectuals outside bureaucracy, or non-bureaucrat-intellectuals should be called for merging with the bureaucracy.39

The birth of ICMI was expected to determine Indonesian Muslim history in the year to come. Gradually, to fulfill the aspiration of ummah to colour the decision-making, the ICMI would like to become a platform to collect the ideas of Muslim intellectuals. The ICMI is a non-political movement, although it was bound to Islamic commitment, the ICMI was not intended to revive primordialism, because it thought I terms of entire Indonesian people. In Azyumardi Azra’s words, the ICMI will become “brain-trust” of the New Order government in the years to come.40

According to Ridwan Saidi, ex-national chairman of HMI in 1974-1976 the birth of ICMI was an inseparable part of the will Muslim scholars for vertical mobility. Because in the early of 1960s, there were thousands of Muslim scholars and they did not enter party was not likely to recruit a Muslim intellectual in top position. Second, the intellectuals felt that their views were not at home with the existing Islamic parties, because their social origin did not have roots in prevailing Islamic parties.41

In order to resolve the deadlock, they constituted the Persami (The Indonesian Muslim Scholar Union) in 1964. While the New Order came into being, some of Muslim scholars headed by Subchan, Z.E, from NU element withdraw from the Persami, and established ISII (Ikatan Sarjana Islam Indonesia, or Indonesian Muslim Scholar association) affiliated to the NU party. Unfortunately the two Muslim scholars associations never displayed their activities so that even many Muslim scholars did not know them.

When the Parmusi emerged on surface, a lot at Muslim scholars put their hope on it. Some of them joined the Sekber Golkar. Through the Golkar and Parmusi, Muslim intellectuals channelled their vertical mobility. In the 1970 the government restructured political parties and organizations on a large scale. The Islamic political parties were merged in one party. Islamic mass organizations were separated from political organization, and engaged in social activities. In the year 1985, the political renewal and consolidation reached its culmination with the enforcement of asas tunggal Pancasila. Since then, legally there was not any other Islamic party. And then the years after in 1990 established the ICMI that was supported by the New Order government as a viable alternative to channel their socio-political activities. The vast majority of ummah initially welcomed it with respect.

In general, there were different approaches the Muslim leaders to the modern-challenges: legal, cultural, and social transformation. Legalistic approach aimed at revamping the existing order and society under the blur-print of Islamic legal, ritual and formalistic precept. Islamic doctrine and laws to became the sole arbiter and standard of reference in all practices and affairs in the society.

The cultural approach is aimed at distilling methods from Islamic teachings, which are capable of integrating non-religious sphere (secularist part) into a new totality of Islamic framework of development.42 The idea of ICMI that efforts for modernity are efforts to develop parallel institutions (banking, scientific enterprises, economic, politics, etc.) under Islamic teaching.

The transformation approach aimed at seeking solutions to the problems of modernity by avoiding exclusivist attitude both towards neo-orthodox and non-Islamic aspirations. It advocated accommodative attitude and introduced disturbing questions related to the central doctrine of orthodoxy. Therefore the leading advocates of ICMI like H.M Soerhato and Prof. Dr. B.J Habibie would like to mould ICMI on the ideology of Pancasila, close to Indonesian culture, “Modern-Muslim”, and high quality Muslim.

The leading Indonesian Muslim intellectuals like Prof. Dr. B.J Habibie,43 Dr. Nurcholish Madjid, Dr. Amin Rais, Prof. Dr. Quraish Shihab, Prof. Dr. Imaduddin, Prof. K.H. Ali Yafie, Abdurrahman Wahid and others have pursued this transformative strategy, advocating non-confrontational understanding of Islam and modernity, seeking open dialogue with other groups for reaching mutual understanding of problems faced by society in general, and encouraging the ummah to work together with others in resolving such pressing questions as massive poverty, abuses of human rights,44 the stagnation of democratization, etc.

There are several reasons for the HMI andKAHMI to support the birth of ICMI; in various point they have same platforms and purpose to uplift of the ummah’s fate toward better life educationally, culturally, economically, socially and politically. More important than theses that one of the basic purposes of the ICMI is to call Indonesian people, particularly the ummah for the de-militarization of Indonesian politic; to seek democratization; and to create a system of “proportionalization” in which Muslim are represented in the Cabinet, the MPR and the DPR, and so on in accordance with their percentage of the general populations.

Although the ICMI is not a political organization, its basic purpose and objective has political impact. Prof. Dr. B.J Habibie, the general chairman of ICMI, firmly rejected the notion that ICMI is a political organization, and insisted it did not belong to any political group. It was established only to fight ignorance and poverty among Muslims.45

In line with the B.J Habibie’s statement, Soetjipto Wirosardjono and Nurcholish Madjid rejected the thinking of those activists of ICMI whom employed Islamic symbols for

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39 Jalaluddin Rahmat, Islam Aktual, Refleksi Sosial Seorang Cendekiawan Muslim, cet.IX (Bandung, Mizan, 1996) p.101
40 Berita Buana, December 7, 1990
41 Kompas, December 8, 1990
42 Naisibitt John, Megatrends Asia : The Eight Asia Megtrends that are Changing the World, London, 1996, pp. 103-240
43 See, Otokritik Tahun Keempat, Silaturrahmi ICMI, Gatra, No. 9 Tahun I, Jakarta, January 14, 1995, p. 36
45 Merdeka, December 8, 1992 and Merdeka, November 30, 1992
political purpose; including democratization and de-militarization, especially when they did not understand the meaning of religious symbol they manipulated. On the other side, Aswab Mahasin as a “non-active” member of ICMI has expressed his worry that the ICMI has become a “pseudo-political party” and behaves “like a political machine.” For the same reason Nurcholish Madjid and Amin Rais had withdrawn their support from the organization in the years after its establishment, because they observed that the ICMI was too political.

Many in ICMI seek “proportionalisation” or the distribution of appointments to the senior bureaucracy or in the DPR/MPR in proportion to the religious makeup of the population at large. That is, Muslims should hold nearly 90 percent of seats in Parliament and Cabinet positions. Apparently after information of the ICMI, the ummah has been represented in the Cabinet and Parliament. Even 200 members of HMI alumnus became MPs and 9 of them became minister.

Adi Sasono argued that they “key issues” for ICMI are democratization and an eventual reduction in the military’s political role. The problem with ABRI, he noted, is that it was worried about any challenge to it position. Hence, it was understandable that the ABRI expressed its displeasure over the birth of ICMI. Democratization is not the primary goal of many in ICMI, because the main objective of its activities is to “empower the state in order to Islamize society and enact Islamic value based on law and regulations.” Mohtar Mas’oed political scientist at Gajah Mada University argues that Abdulrahman Madjid and the NU on the other hand, “seek to empower the people” and in so doing both Muslim, and non-Muslim Indonesians will be empowered.

How have the ummah and Indonesian people responded to the HMI? Of course it could not be ignored since the organization has from its inception expressed its basic commitment toward the ummah and the nation. The formulation of objectives the HMI at the time of its establishment was obviously revealed in its commitment towards the nation and the Islamic religion, namely:

1. Defending the Indonesia Republic, State and enhanced the dignity of Indonesian people.
2. Enforcing and spreading Islamic religious doctrine.

In the congress of HMI held on 1947, the above two objectives were spelt-out in the platform as below:

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48 Republika, February 5, 1998

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1. Collaboration with Indonesian people in general and the armed forces in particular in defending the Indonesia Republic and State.
2. Collaboration with organizations and Islamic political parties particularly, and those of other parties in general in order to improve political and economic life of Indonesian people in general and of the ummah in particular.

As a logical consequence of the HMI commitment toward the nationhood, the organization was expected to work together hand with the other organizations and institutions. The Islamic youth organization should have a cooperative attitude, toward the fellow Islamic organization like the PMII and the IMM, as well as the non-Islamic ones like Catholic Students Organization, Protestant-Christian Organization and from other religious backgrounds. The HMI collaboration with other such organizations could be seen in the Kelompok Cipayung (Cipayung Group). It consists of the PMII, GMNI, GMKI, PMKRI and Indonesian people in various aspects. They used the medium to strengthen articulation of strategic issue of whole life which arose amidst the society. Beside that the motivation of unity in the Kelompok Cipayung is based on the awareness of better future for Indonesia appropriate to the noble aspiration of Independence. Initially the Kelompok Cipayung has played the role of challenging that, aspiration, social controller and agent of development. Unfortunately, in the years following its formation, the role has been decreasing following the internal and external problems. One of the external problems came from the government which controlled strictly all activities of the organizations and thereby emasculated all political parties. In other words an account of internal and external conditions, Kelompok Cipayung creativity could not develop.

The HMI could play its role maximally as agent of the ummah aspirations if it had at least three things: firstly, independent position and attitude so that there is no over-intervention from outside to curb its freedom and creativity. To attain this was easy because a lot of its alumnus occupied strategic positions, particularly in governance, and influenced NGOs. Secondly, it should have qualified human resource in various skills. The quality of the HMI’s personnel is quite decisive in this regard. Thirdly, the external conditions was favourable. It meant that all programmes of HMI could not work properly unless the external condition is good.

In the years after Soeharto came to power, the ummah felt many obstacles in political field. Moh. Kamal Hassan in his treatise on Muslim intellectual response toward modernization of the New Order in Indonesia, pointed out in 1968 that Muslims and Islamic political party leaders realized the government considered that politically strong Islam will threaten the Pancasila Democracy New Political System of New Order, although the regime did need legitimization from Islam in order

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to make success of the pelita. Even according to Deliar noer, ex-national chairman of HMI (1953-1955 period), the New Order government not merely opposed the Islamic political organizations, but also curbed their efforts which were related directly to the religious issues. For instance, the government ever prohibited the ummah to hold a congress in 1968, and monopolized the management of pilgrims to Mecca in the same year, eliminated school holidays in the month of fasting (Ramzan) and reduced all facilities needed by the ummah in commerce. And then the government introduced a draft marriage bill, which was regarded offensive to Islam.54

In other word, it was obvious that the government needed Islam when it supported the government and gave it legitimacy. Once the government supported establishment of Parmusi, for instance, aimed at countering the force of PNI. On the contrary, the government hampered all activity regarded as competitor with the government power; for instance, the proposal of Mohammad Hatta, former vice President, to establish PDII (Partai Demokrasi Islam Indonesia) was not okayed by the government. Even the creation Parmusi, according to Samson, did not benefit even the Muslim modern group in Indonesia. One of the weakness of the party was its failure to get recognition as a legal and influential political forces, namely possess political power in proportion to the number of its followers.55 The several repressive policies had negative impact for future of Islam, it was more obvious in 1980’s. According to Vatikiotis,56 the government succeed in destroying Islamic parties, with the religious politics of the New Order which emphasized harmony, Muslim community felt it was political chaos. The Islamic political forces had indeed declined.

In the period between 1970-1986, which, in terms of the process of the depolitization of Islam might be called the “period of exorcising “, the regime began to exercise a formal way to the depoliticize Islam by activating national laws obligating all political parties and mass organization to subscribe to the Pancasila as the sole foundation. While the NIJ decided to replace its Islamic foundation with the Pancasila at its congress in 1984 when the draft law was under discussion in the DPR, Muhammadiyah and HMI chose to wait until the draft was legislated.

The Consequence of Politicization of Islam by Soeharto Regime

Many Muslim leaders were concerned that the process of Pancasilaization would mean deislamization. For them, Muslim acceptance of the Pancasila as a national consensus should not be understood as a theological statement, but only as a political one. They referred to President Soeharto’s statement of 1982 that the Pancasila would not become a religion and the religion would not be “Pancasilaified”.

There is a group within the Muslim community responded to the political process in a more reactional way. The emergence of this group, which might be labelled fundamentalist, was a result of an internal dynamic within the Muslim community aimed at protecting Islam and Muslims from the impact of the ongoing political process. The majority of Indonesian Muslims did not support this group. Because, the nature of Indonesian Islam which, following the line of Indonesian culture, is devoted to moderation, tolerance and harmony. Beside this the situational logic of politics, which has created fear and to some extent apathy, within the society would scarce encourage Muslim cadres to initiate political change by attempting to seek justification for Islam.

The Indonesian Muslim intellectual has tried to give answers to the social problems faced by the Muslim community. The answers resulted from two coincidental factors; the real condition of the Muslim community stemming from its struggle in seeking the adequate relationship between Islam and Indonesian culture, and the emergence of a new educated Muslim generation, including the HMI alumnus. Majority of leaders of the new generation are dissatisfied with the ways of old generation who had been attempting to sidetrack the problems and the condition of the Muslim community.

The launching of asas tunggal Pancasila by the government initially got strong reaction from Muslim community of the country. The culmination of the reaction was in a riot in Tanjung Priok, the Jakarta Harbo; area in August 1984, in which hundreds of Muslim died at the hands of the Indonesian army and several prominent figures were arrested, including two members of the petition 50 group; A.M Fatwa and (Lt.Gen.Ret.) H.R. Darsono. The former was a famous Muslim preacher and the latter a famous former commander in Chief the west Java based Siliwangi Division of the Armed Forces. This incident was followed by a series of incidents during the year 1984-1985 that threatened the stability of the governance, such as the explosion at Bank Central Asia (BCA) in Jakarta, the Borobudur Buddhist Temple in Yogyakarta, and the Marine Base in Cilandak, Jkarta. A Muslim group was accused of responsibility for the fist two explosions. For many, these incidents were not unconnected, and were reactions to the regime’s political engineering programmes, which showed the tendency to centralize and accumulate power.

The crisis in the HMI over opposition to the Pancasila as asas tunggal would not only result in a split but eventually lead to the disintegration of the organization. The vast majority of HMI branches throughout the country eventually accepted the government policy over the asas tunggal, because since its creation, the HMI had accepted the Pancasila as the basis of Indonesian state. Even according to Abdurrahman Wahid, President of PBNU for 1980 up to today, the HMI was an University students organization which “more Pancasilaist” among Islamic movement in Indonesia.57 However, viewed from

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the cultural aspects, Islam got support of the government except in political sphere.

In fact, the critical wrestling over asas tunggal within the HMI body was temporary, not quite substantial. Because the asas tunggal was accepted by the HMI after long deliberation at its congress in Padang, north Sumatera. Until today, the HMI-MPO leaders feel that there is no debate on Islam and ideology of Pancasila as an important issue. Most of them joined the society, worked and communicated with those who accepted the asas tunggal therefore, The ideological issue is not relevant to debate while observed that Islam eventually has been accommodated within the state. Fachry Ali, ex-HMI activist of Ciputat branch, said there is no difference as while HMI has its basis of Islam and those who accept Pancasila. The leaders are the same, and ideas are similar.58

The above issues presented a negative image of Islam before the young generation during the New Order era, and also forced their alienation from the government. At this stage, the ummah faced a dilemma. If they were close to the government, it was country to the real condition. If they remained away from the government, it would benefit the anti-Islam groups, particularly Christians. M. Amin Rais saw the former indication. According to that Indonesia is a centre of Christians activities for “Christianization” of the ummah through five strategic steps, namely education; mass media, economic assistance, marriage relationship and political power.59 The crucial condition, ideally, demanded the unity and integration of the ummah to counter any obstacles either from within or outside of the ummah. The expected condition did not develop, and the fragmentation of the ummah occurred, including within the HMI after the launching of asas tunggal.

At the same time, the HMI support to the government policy brought benefits to Indonesian people at large, and the Muslim community in particular. If the policy deviated from the goal, the HMI criticized the government, and gave the necessary suggestion for seeking the way-out, or urged it to review the policy. Although the HMI has been close the government, this extra-Islamic university student Association did not lose sight of the fact that many deviations led to deep crisis. For instance, it was proved while the New Order government was facing a deep economic crisis. At that time, the HMI through its national chairman, Anas Urbaningrum, expressed its apprehension due to the ongoing economic crisis of the country on the occasion of its 51st Anniversary celebration on 22 February 1998 in Depok. Unfortunately, the government did not respond to the criticism and suggestion. The economic condition was worse due to the attitude of the World Bank and the country plunged into deeper crisis. The World Bank admitted that a turned a blind eye to corruption, social unrest and a collapsing financial system during the last years of former President Soeharto’s rule. An internal report said that the Bank staff and managers were aware of the problems but continued to praise the country’s economic performance.60 Some media persons and public figures like Amin Rais and Abdurrahman Wahid has articulated the same views as those the HMI, but the Soeharto and his close aides apparently ruled out the constructive critics and suggestions. The surrant Indonesian malaise illustrate the high political cost excessive authoritarianism imposes upon economic development. The Soeharto regime plainly has overstayed its welcome and built up the people’s frustrations with is failure.

The condition was worse as the growth of corruption in the country under Soeharto regime had become so rampant, that it seems almost old fashioned to mention it. But it can hardly be avoided in a discussion of national level openly and transparently. While for long time, corruption was the whip with which neo-liberals would beat opponents of liberalization, now it is becoming increasingly obvious that there is a close correspondence between liberalization and the scale of corruption. This indeed is now recognized as a global problem.61 The corruption adds to the myopia of private investment decisions, since the commitments and contracts won through corruption are even more vulnerable to political instability. While the number of unemployed is more increasing and dismissal of workers in big factories occurred almost every day and it was quite vulnerable to the social unrest on large scale.

The people’s frustrations reached culmination as the university students throughout the country voiced their suffering via a huge demonstration demanding of President Soeharto to step down immediately. Is was on 21 May 1998. The downfall of Soeharto paved the way to Prof. B.J. Habibie as Vice President to become the third Indonesian President. Unfortunately, the downfall of Soeharto did not mark a complete break with the past. President Habibie has performed better than feared as he has tried to institute changes (such as the election), but remains a Soeharto appointee in his policies. The corruption of the Soeharto years has been white-washed rather than investigated.62

While politicians and academics in Jakarta are preoccupied with political and economic reform, the concern in rural areas is much more down to earth. In the fast few weeks, demonstrations have broken out in at least 50 districts (called regencies in Indonesia) from Sumatera to Nusa Tenggara. Many of the protests are related to disputed land ownership. All fall into the category of what Indonesians call KKN,63 which is fuelling public demands for a full investigation of the Soeharto family’s wealth. One Habibie aide noted “they are like people who have not had oxygen for 32 years”.64

Many sides regarded the Presidential post of Prof. B.J. Habibie as unconstitutional, and hence invited the controversial

58 Lembaga Studi Pembangunan Indonesia, 50 Tahun HMI Mengabdi Republik, op. cit. p. 166
60 “What’s Ahead For Asia”, For Eastern Economic Review, Februari 25, 1999, p. 59
62 The Times of India, May 10, 1999
63 KKN is the local abbreviation for corruption, collusion and nepotism
debate. On the other side, the vast majority of HMI and KAHMI members considered it as legal and constitutional. Therefore, they preferred to let him complete his tenure as transitional President until the new President was selected in the month of September 1999 following the result of the 7 June 1999 general election. Each result, usually, has an advantage and disadvantage, including the policies adopted by the President Habibie. The HMI and KAHMI apparently observed that a number of reform agenda in one of the advantages of B.J. Habibie cabinet. The agenda aimed, among other things, to promote decentralization and reform, guard the country’s interests in era of globalization, and improve links between small enterprises run by indigenous businessmen and large ones, which are usually Chinese-owned.  

Therefore, the HMI and the KAHMI supported the reform agenda of President B.J. Habibie, and they remained of the view that the socio-political change was need of the time, and it should go on gradually, first evolutionally and eventually total.

In brief it can be said that the collapse of Soeharto regime is the logical consequences of his politicization of that non sided to Islam in the real meanings and not for the prosperity of Indonesian people.

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Comparison Degree of Myopia in Senior High School Students in Urban and Rural Area

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Abstract- Objective: To find out the comparison degree of myopia in senior high school students in urban and rural area

Method: This research is prospective observational with cross-sectional study, we observed 220 senior high school divided into 168 senior high students in urban and 52 senior high school students in rural area. Degree myopia of all samples are observed.

Results: The most degrees of myopia is mild myopia 133 students (60.45%) in urban, and 32 students (14.55%) in rural. Began to suffer the myopia of 90 students (40.91%) during junior high school in urban and 24 students (10.91%) during senior high school in rural. History of family members with glasses is 49 students (22.27%) urban area and 17 students (7.14%) in rural area.

Conclusions: There was a difference between degree of myopia in senior high school students compare to urban area, but from the statistically there was no significant differences (p>0.05). Progression of myopia tend to be increased so evaluation of myopia should be intense.

Index Terms- Myopia, Senior high school student, urban area, rural area

I. INTRODUCTION

Myopia is a form of refractive disorder in which the rays parallel to the line of sight in the unaccommodated eye state are focused in front of the retina. Myopia can occur because the size of the eyeball axis is relatively long. It can also be due to a high refractive index or due to refractive index of the lens and cornea too strong, this is called refractive myopia. Myopia usually occurs at the age of children (5-7 years), young age (7-16 years), and adults over the age of 16 years (> 16 years).1,2

The prevalence of myopia is an increasing trend in the ages of children and adults. The prevalence of myopia in the United States at age 5 to 7 years is approximately 3%. While at the age of 8 to 10 years 8%, at age 11 to 12 years 14% and at the age of 17 years about 25%.1 This also happened in Taiwan. The prevalence of myopia in children aged 6 years is about 12% and at the age of 16 to 18 years about 84%. This is also same found in Singapore and Japan.3

In Indonesia, visual impairment due to refractive disorder prevalence 22.1%, a problem that must be handled immediately. About 10% of the 66 million school age children (5-19 years old) suffer from refractive disorders. Myopia is the most refractive error that encountered, at 86% of elementary school students, middle 95%, and senior senior high school 86%.4 Some of the risk factors causing myopia are genetic and environmental factors. Genetic factors are heredity, history of parents and siblings. Some environmental factors that affect the occurrence of myopia include close viewing activities such as reading books, writing, watching television, using computers, playing games, using mobile phones, and others. Activities far looking as playing and exercising outdoors can reduce the occurrence of myopia.

From Bei Lu study in China found condition of a region can affect the rate of myopia. Bei Lu study result that the increasing occurrence of myopia in rural areas of -0.5D. While in urban areas of Singapore increased myopia by -0.75D.5 The same study from Bella increased myopia in children in the urban of 0.83D, and in the rural of 0.61D. The study explains that the increase in myopia is higher in cities than in rural areas. This is because urban areas have more advanced technological and communication facilities, such as television, mobile phones, computers and video games. Thus encouraging more children to use viewing of close activity compared to remote viewing activities. While rural areas with a larger area and a Senior high school population. The development of technology and communication in rural areas is not as advanced in the urban.6

Based on the results study above, the aim of current study to observe the comparison of Degree of Miopia in senior high school students in urban and rural area.

II. METHODS

This research was a prospective observational with cross sectional. Total sample of 220 senior high school students divided into168 senior high students in urban and 52 senior high school students in rural area in April 2015. The study was conducted in accordance with ethical standards of Declaration of Helsinki and approved by Medical Faculty University of Sumatera Utara ethics committee. Degree myopia of the all samples are observed. All students were assessed visual acuity and done the correction of refractive error. Then assessed the degree of myopia.
III. RESULT

The research was conducted on April 1, 2015 until April 4, 2015. Located at Senior High School Negeri 2 Medan (urban) and Senior Senior high school Private Istiqial School Deli Serdang (rural). We got 800 students as participant of research consisting of 400 senior high school students in the urban and 400 senior high school students in the rural. There were 168 students (76.36%) who suffer from myopia in senior high school students in urban area and 52 students (23.64%) suffering from myopia in rural area.

Table 1
Distribution Students Suffered Myopia based to Origin of School

<table>
<thead>
<tr>
<th>Participant</th>
<th>Myopia</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>168</td>
</tr>
<tr>
<td>Rural</td>
<td>52</td>
</tr>
<tr>
<td>Total</td>
<td>220</td>
</tr>
</tbody>
</table>

The highest number of female myopia patients in senior high school students in the urban were 114 students (51.81%), and 39 students (17.73%) in senior high school students in the rural.

Based on the distribution of age in senior senior high school students in urban suffered most myopia in the age group 16-17 years as many as 80 students (36.36%). While in senior high school students in the rural suffered most myopia in the age group 18-19 years as many as 23 students (10.46%). The mild degrees of myopia were found in 133 senior high school students (60.45%), as did 32 senior high school students (14.55%). Shows more father and mother glasses at senior high school students in the urban as many as 49 students (22.27%). While in senior high school students in rural more brother or sister as many as 17 students (7.73%).

At senior high school student in urban began to suffer from myopia most widely encountered as many as 90 students in junior high school (40.91%), in contrast to senior high school students in rural; suffer from myopia more since senior senior high school with 24 students (10.90%).

Based on the time distribution of senior high school students in the urban. Time group 1-2 hours at most used to read (do homework) as many as 117 students (53.18%). Group time of 3-4 hours is most used to watch TV as many as 53 students (24.10%). Group time > 4 hours at most used to use mobile phone as many as 75 students (34.00%).

Based on the time distribution of senior high school students in the rural. Time group 1-2 hours at most used to use computer as much as 35 student (15.91%). The 3-4 hour time group is most used to watch as many as 19 students (8.64%). Group time> 4 hours at most used to use mobile phone as many as 14 students (6.36%).

There are no significant numbers with the time spent reading, watching, using computers and mobile phone on increasing the degree of myopia in senior high school students in the urbanand in the rural.

Table 2
Distribution Senior high school Student Suffered Myopia in Urban and Rural based to Gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>Urban</th>
<th>%</th>
<th>Rural</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>54</td>
<td>24.55</td>
<td>17</td>
<td>8.18</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>114</td>
<td>51.81</td>
<td>39</td>
<td>17.73</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>168</td>
<td>76.36</td>
<td>52</td>
<td>23.64</td>
<td></td>
</tr>
</tbody>
</table>

The highest number of female myopia patients in senior high school students in the urban were 114 students (51.81%), and 39 students (17.73%) in senior high school students in the rural.

Table 3
Distribution Senior high school Students Suffered Myopia in Urban and Rural based to Age

<table>
<thead>
<tr>
<th>Age</th>
<th>Urban</th>
<th>%</th>
<th>Rural</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>14 – 15</td>
<td>69</td>
<td>31.36</td>
<td>18</td>
<td>8.18</td>
<td></td>
</tr>
<tr>
<td>16 – 17</td>
<td>80</td>
<td>36.36</td>
<td>11</td>
<td>5.00</td>
<td></td>
</tr>
<tr>
<td>18 – 19</td>
<td>19</td>
<td>8.64</td>
<td>23</td>
<td>10.46</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>168</td>
<td>76.36</td>
<td>52</td>
<td>23.64</td>
<td></td>
</tr>
</tbody>
</table>

Based on the distribution of age in senior senior high school students in urban suffered most myopia in the age group 16-17 years as many as 80 students (36.36%). While in senior high school students in the rural suffered most myopia in the age group 18-19 years as many as 23 students (10.46%).

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The mild degrees of myopia were found in 133 senior high school students (60.45%) in urban area and 32 senior high school students (14.55%) in rural area, moderate myopia in 30 senior high school students (13.64%) in urban area and 18 senior high school students in rural area, high myopia in 5 senior high school students (2.27%) in urban area and 2 senior high school students (0.91%) in rural area.

The family history shows more father and mother used glasses found at senior high school students in the urban area for 49 students (22.27%), while in senior high school students in rural history of family especially brother or sister for 17 students (7.73%).

At senior high school student in urban area began suffering myopia for 90 students (40.91%) from junior high school (40.91%), compare to senior high school in rural area 24 students (10.90%) began suffering myopia in senior high school.
Based on the study, there are no significant differences in senior high school between urban and rural area from reading, watching, using computers and mobile phone from the degree of myopia (P>0.05).

Based on the senior high school students in urban of 166 students (76.36%) and senior high school students in the rural were 52 students (23.64%). In this study, the comparison of myopia patients in senior high school students in the urban with the rural is 3:2:1.

Based on gender in senior high school students in urban more female students 114 (51.8%) who suffer from myopia than male students 54 (24.50%), with a ratio of 2:1. Similarly, senior high school students in the rural women 39 students (17.73%) and men 13 students (5.91%), with a ratio of 3:1. This is in line with the study Bella, MG, et al, which is done on senior high school students in the urban of Padang by comparison 3:7:1, in Anisa, S, et al study on Temanggung senior high school students with a ratio of 2.5:1.

By age, senior high school students in urban have greater incidence myopia in the age group 16-17 years as many as 80 students (36.36%), in contrast to senior high school students in rural have greater incidence in the age group 18-19 years as many as 23 students (10.46%).

Based on the degree of myopia, in senior high school students in urban have greater incidence is mild myopia as many as 133 students (60.45%). Similar with senior high school students in the rural have total of 32 students (14.55%). There is no comparison of degree of myopia in senior high school students in urban and rural. Although development of technology is further in urban area.

Based on the history of glassed family members in senior high school students in urban greater incidence is the father and mother glassed as many as 49 students (22.27%). While in senior high school students in rural only 5 students (2.27%). In this study, senior high school students in urban of 28 students (12.72%) had no history glassed parent according to the Goss study, where the prevalence of myopia, 6% - 15% did not have myopia parents.

Based on the onset of suffering myopia. In senior high school students in the urban began to suffer the most myopia since sitting in junior high school as many as 90 students (40.91%). And according to research conducted by Saerang, more junior high school students who suffer from myopia than elementary and senior high school students. While in senior high school students in the rural began to suffer myopia when sitting in senior high school as many as 24 students (10.90%).

Based on duration of expose to risk factor. In the time group 1 - 2 hours senior high school students in urban is widely used for reading, while in senior high school student use a lot of computers. In groups of 3 - 4 hours senior high school students in urban and in rural are widely used to watch television. In the time group> 4 hours, senior high school students in urban and in rural often use mobile phones.

Based on Anova test results, there is no significant relationship does not affect the increase in the degree of myopia with the length of time reading, watching TV, using computers and using mobile phone. Only as low as the degree of myopia longer the time to read, watch, use computers and mobile phone both in senior high school students in urban and in rural.

IV. CONCLUSION

Patients with myopia are more often found in senior high school students in urban compared with senior high school students in rural. Genetic, long reading, watching TV and using computers as a risk factor in degree of myopia. So, examine of refractive should be done in children from primary school to protect the myopia.

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Assessment of Communal Irrigation Scheme Management System, In the case of Agarfa Woreda, Bale Zone, Oromia Regional State, Ethiopia

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Abstract- The study was conducted in Agarfa district, Oromia regional state Ethiopia. A total of 120 farmers were selected in the study area. The x^2and t-test were used to analyse the independent dummy and continuous variables respectively. Generally, farmers have showed favorable response in participating in the community managed irrigation scheme utilization and management system. Binary logit model was applied to analyse the factors affecting farmers' participation in communal irrigation management system. . The findings of this study indicate that any effort in promoting communal irrigation scheme management system should recognize the socio-economic, household, institutional, and others factors for better use of community managed irrigation scheme. Taking the specific characteristics of farmers into account in introducing and promoting community managed irrigation scheme projects may help policy makers to come up with projects that can win the hearts and minds of the farmers.

Index Terms- irrigation, farmers, communal management system

I. INTRODUCTION

To feed itself, Ethiopia now a day depends highly on rain-fed agriculture with limited use of irrigation. High variable and inadequate rainfall, highly frequent floods and droughts, and lack of water harvest technology place Ethiopia at risk of drought and chronic food shortages (Darout, 2004) When agricultural production become decrease because of inadequate and unfair distribution of rain fed, it is necessary to maximize the agricultural production in the next coming decades, effective and efficient irrigation would be needed. The water lost is never available for irrigation in places and during times of water scarcity. Irrigation expansion has slowed down drastically over the past two decades and the worldwide emphasis has been on the rehabilitation and management improvement of existing schemes. The potential for irrigation is high, but its potential for negative impact, if mismanaged, is also apparent. Thus, irrigation expansion is needed with effective and efficient utilization (Plusqellec, 2009).

According to Zeleke (2012), community managed irrigation method and water management system consumes much of energy and times to the rural farmers to generate appropriate income and improve rural livelihoods. In Ethiopia, although irrigation has been practice for long at different farm levels, there is no efficient and well-managed irrigation water practice (Mihret and Ermias , 2014) However, the loss of excessive water (amount of water for irrigation use), lack of awareness of water users, absences of the trial site in locality for irrigation utilization and lack of new technology utilization are the great constraints which hinder the improvement of rural farmer’s households to increase income generation and food security (FAO, 2005).

In order to attain sustainable agricultural production from irrigation, it is important to managed and utilize the resources like land , water and others in good manner. According to Mihret and Ermias (2014) state that lack of Integration among socio-economic, existing local community water management practices, institutional, technical and policy weaknesses the communal irrigation practices become inadequate performances. To mange irrigation in appropriate manner, the water needs to be gauged and properly utilized; According to (Mihret and Ermias , 2014) states that both excessive and inadequate water applications have negative effects. Gauging the water and matching the plant water requirement and the amount of water applied were observed as an inevitable operation in some finger-counted highly performing irrigation schemes in the country (Mihret and Ermias , 2014)

The government has allocated considerable amount of resources for the promotion and construction of communal irrigation scheme structures in the study area. In spite of the investments from the government in community managed irrigation scheme utilization, there is no a decision making factor on the farmers’ side. The end users were not involved in verifying and evaluation of the performance of the community managed irrigation scheme utilization as well as to foster awareness and to reduce economical risk and undesirable consequences of wide application of the common pool resources. Here the use of common pool resource has to be operationally explained as the decision to use the resources judiciously and need based (FDRE 2009). That aspect is not studied in detail. Therefore, the overall objective of this study was to assess the communal irrigation management system in the study area. Consequently, the result of this research would be expected to fill a research gap on community managed scheme management system in Bale Zone.
II. METHODOLOGY

2.1. Description of the Study Area

Agarfa district is one of those 18 districts is found in Bale zone of the Oromia National Regional State. The district has 19 kebeles and also known by community managed irrigation activities. The District were exists between Latitude 7017’N and Longitude 39°49’E Physically, It was bound by Genale river basin to the South, South East and South West, and Wabe Shabele river basin in North and North West. In addition, there are numerous tributaries of the two river basins. (AWARDO, 2014).

2.2. Study Design

For the successful accomplishment of the study in three Districts, Cross-Sectional Research Design was implemented. Therefore, primary data regarding the communal irrigation scheme management system were collected from the respondents to achieve the study objectives.

2.3. The Sample size and The Sampling Technique

The sampling procedure applied to this study was multi-stage sampling procedure. At the beginning, from the total 18 districts of Bale Zone, Agarfa District was purposively selected because, it is one of the areas that manifested with many problems concerning communal irrigation management system, which impede the progress of addressing rural farmers in the zone. In the first stage, out of 19 rural kebeles and two urban kebeles of Agarfa district, 3 kebeles were selected purposively based on their irrigation potential, large number of community managed irrigation utilization. In the second stage, households from selected kebeles were stratified in to two strata, community managed irrigation users and non users. In the third the households from selected as users again stratified in to two strata, continuously utilizing irrigation system and dropout to use now. In the fourth stage, simple random sampling was used to select the respondents and the key informants were selected from kebeles purposively. Finally, the 118 sample size were determined using the formula given by Yemane (1967) in drawing an adequate sample size from a given population at 95% confidence level, 0.09 degree of variability and 9% level of precision.

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

Where; \( n \) = sample size
\( N \) = population size (total household size),
\( e \) = level of precision

The respondents were selected for each kebele by using proportional methods.

2.4. The Data Sources and the Methods of Data Collection

Both primary and secondary sources of data were used in the process of the study. Primary data was collected from sample respondents through structured interview schedule using face to face interview, which was designed to generate data on social, institutional and economic aspects of the households. In addition, primary qualitative data were collected through focused group discussions from six groups of households from sampled respondents and the twelve key informants' information were selected and discussion were collected through a checklist. To supplement the primary data, personal observation of physical features, and informal discussions with experienced farmers, kebeles officials, water user association, committee members, Development Agent's and Woreda irrigation sectors bureau were made discussion. Secondary data were collected from published and unpublished documents, Bale Zone and Agarfa district Agricultural and Rural development Bureau, Books, Journals, Government reports and other relevant information sources.

2.5. The Methods of Data Analysis

Descriptive statistics were used to assess the collective management efficiency in communal irrigation managed system. The specific methods of data analysis were involved which included the descriptive statistics such as sample mean, sample standard deviation and percentage were applied to treat the data from the respondents. In addition, the SPSS software was employed in order to analyze the data collected. The collected and analyzed data were presented using tables and graphs. The qualitative data were gathered and analyzed through narrating and documenting. The inferential statistics like chi-squared and t-test were used for dummy and continuous variables respectively. They used to determine the relationship, cause-effect, significant differences between communities managed irrigation users, and dropout to use communal irrigation managed system in the study area.

2.6. Econometric model

Importance of Econometric Analysis at Community Level

To analysis the common property resource management at individual level can be too difficult because, the common properties resource cannot be owned by an individual at household level rather than at community level. In other way the collective of individual may be uses the common properties resources together but, not allowed to use individually. Therefore, the econometric analysis was employed at community level. With regard to these concepts, there are at least two reasons why collecting survey at community level is appropriate a, as compared to individual level. The first reason is that the when small number of social unit was formed; they built capacity to govern the administration and utilization of the common pool resource by themselves-like irrigation water. Secondly, when communal managed irrigation water has the attribute of a common pool resource without inclusion of farmers within the command area it is difficult to manage easily and the resource will become exhausted. Thus, in arranging collective action is important to manage common pool resources like communal irrigation. However, there are two main problems faces in order to manage common pool resources like irrigation water; these are problem of provision and appropriation. A provision problem arises from facilitating in construction and maintenance of its canals and secondly the problem of appropriation may arise from water distribution arrangement. Thus, the adequate structural communal irrigation water management could be the collective practices of farmers in the group rather than any single household irrigated farm.

III. RESULTS AND DISCUSSION

3. 1. Management Systems in Communal Irrigation Schemes

3.1.1. Structural administration of irrigation water
There are a number of factors that organization covers in order to managed irrigation water such as managerial skill, farmers commitment, institutional structures (regulatory apparatus, conflict resolution mechanisms and profit distribution etc).

3.1.1. Organizational Framework
Organizational framework of irrigation water sector in Ethiopia can be briefly described by key actors playing different roles at the national, at regions and at household level.

At national level the government Ethiopia provides strategy with adequate experts to monitor and identify gaps in order to construct communal irrigation water and financial support within identified key areas.

Regional Water Resource Bureau (Oromia) provides oversight of the irrigation sites. It also provides financial support for maintenance at the outlet and system level like canals, with the assistance of the community and other local non-government. Similarly, the woreda agricultural office with irrigation and water resource office provider of technical assistance for beneficiary farmers at large.

3.1.2. Collective Action nature irrigation use- as a common pool resource
3.1.2.1. Members Participation
As focused group discussed with the respondents, like in any other common pool resource, collective action arrangement in irrigation water use has two form the first one is about water user association (beneficiaries) and the second one is the water user committee (management class). In communal irrigation management system the water users were participate in the following activities. These are cleaning irrigation canals (the main canal, lateral and sub-lateral canals), decide water distribution program, discussion over contribution (in cash, incentives and labour), when and how irrigation water distribution may takes place in intervals. The role of water user committee is to facilitate each household water distribution program, to submit water user contribution, to manage if conflict happened, to report any activities related to communal irrigation management system to the districts of irrigation and water resource office.

Participation of Members in Meetings- According to focused group discussion with key informants farmers themselves directly solve problems in their group discussion once in the months at farmers level and water user committee at fortnight to discuss over the problem and set solution for identified problems. However in practice it is very difficult case. Only in occasion farmers and water user committee try to discuss over the issues like when they clean canals, when they contribute for water distributors, when negotiation comes for the problems related to communal irrigation and what action needed for identified problems.

All farmers are equally participate in the meeting, specially for problem identification and solution to be taken, the water user committee only facilitate the discussion and decide the final solution. In the most of the time the farmers may represent their family can be allowed for meeting. In addition, all members of water users association (women and men) have equal right to vote and to be elected to serve as an water user committee, as water distributor or as block leader.

3.1.2.2. Water Distribution System
In the selected areas, the irrigation water can be distributed in rotational system. Rotational water distribute means the application of irrigation water for the beneficiaries in a given amount, at the given time and in proper order for all farmers with enough water to irrigate their fields at intervals. The distribution of irrigation water design may vary according to existing system layout and actual topographic conditions. So that rotational irrigation water can be delivered into each block or group accordance with pre-decided programs. Thus why dividing each group of farmers land in to different blocks in communal irrigation site is important to distribute in intervals. But in actual practices the water distribution may handle only based on the number of complaints and counts the programme set but, not on the requirements of the water by the plants. Also the water distribution may varies from season to season, especially during winter the amount of the water become decrease and the amount of water in stored reservoir become limited, therefore the water distribution intervals may become extended from three –seven days. This may damaged their irrigated crops and exposed for extra expenditure. In the selected three kebeles, efficient and effective use of river is an important source of irrigation water namely weib and shaya rivers. Another problem related to water user in communal irrigation is that they lack water requirements rates for irrigating their plots. Thus as some respondents discussed in the focused group discussion, they believed that more water gets more product but, the application of water did not consider types of crop grown, soil type, stage of crop to be grown etc.

3.2. Indicators of collective Action to Manage the Irrigation Schemes
Table 1, show that indicators of collective action in communal irrigation management system in the selected kebeles helps to identify whether the farmers are communal irrigation users or dropout to use communal irrigation scheme. The average area of irrigated in communal irrigation scheme per households is 2.99 ha/household, this may be due to high population exists in the area, especially potential area for agricultural production like wheat, barley and horticultures. To manage the communal irrigation system and to pay the salary by cash, labour and other kind contribution. In addition all Farmers (water user) must contribute the annual total average value of contribution per household for the resource management that is nearly 150 Birr. The most common members’ contribution is in the form of cost sharing about 50%, labour contribution about 15%, and 35% others kind, that members clean and maintain canals collectively in a number of times in a year.

As group discussion made with key informants, participating in cleaning, maintenance and minor construction of canals, water gates and spill ways were the obligation of all of the beneficiaries in irrigation user. The most favorable time and months to clean the canals are in September and February. This can be done by classifying the size they clean and maintain by the water user committee. If the group can’t agree on time and size they work, then the group will be punished either by cash or labour or in a kind.

In most of the developing country like Ethiopia the government ability to provide cost recovery is the most important

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(FDRE 2009). As respondents discussed in focus group discussion the beneficiary charge for canal construction nearly zero charges. However, they only collected money to cover some operations and maintenance costs and payment for guards and water distributor. Water user committee may organize community participation for minor maintenance.

In the district, the interview and discussion with the district experts reveals the contribution of beneficiary in labour for cleaning canals and for mobilizing resources are no more problems with farmers. But the informal discussion with beneficiary may make participation tail-enders which mean more labour contributions on beneficiary than head-enders.

According to focused group discussion made by beneficiaries, Farmers can be clean the canal from two-four times in a year for preparation of the next irrigation season mostly in dry. As respondents revealed that in the group discussion in most case the cleaning canals start from upper stream and then continue to the lower stream with water user labour contribution. The water user committee facilitate the beneficiary and follow-up the activities.

Table 1: The Indicators for collective action to manage the irrigation schemes

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Continuously Participate</th>
<th>Dropout</th>
<th>χ² value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area of irrigated land per household (ave)</td>
<td>2.66 (YES) 2.34 (NO)</td>
<td></td>
<td>0.010**</td>
</tr>
<tr>
<td>If there is formal written rule (Yes/No)</td>
<td>71 (YES) 4 (NO)</td>
<td>40 (YES) 3 (NO)</td>
<td>0.132NS</td>
</tr>
<tr>
<td>If there is contribution (Yes/No)</td>
<td>42 (YES) 1 (NO)</td>
<td>75 (YES) 0 (NO)</td>
<td>113.72* **</td>
</tr>
<tr>
<td>What kind of contribution? (cash, labour, kind)</td>
<td>2 (YES) 41 (NO)</td>
<td>75 (YES) 0 (NO)</td>
<td>3.876NS</td>
</tr>
<tr>
<td>Are you benefiting from CMI? (Yes/No)</td>
<td>0 (YES) 43 (NO)</td>
<td>75 (YES) 0 (NO)</td>
<td>10.196* *</td>
</tr>
<tr>
<td>Is there a guard? (Yes/No)</td>
<td>40 (YES) 3 (NO)</td>
<td>72 (YES) 3 (NO)</td>
<td>93.517* **</td>
</tr>
<tr>
<td>Got equal distribution of water? (Yes/No)</td>
<td>3 (YES) 40 (NO)</td>
<td>72 (YES) 3 (NO)</td>
<td>93.517* **</td>
</tr>
<tr>
<td>Are you contributing to water distributor? (Yes/No)</td>
<td>1 (YES) 42 (NO)</td>
<td>75 (YES) 0 (NO)</td>
<td>113.72* **</td>
</tr>
<tr>
<td>Do you believe you get enough water? (Yes/No)</td>
<td>28 (YES) 15 (NO)</td>
<td>52 (YES) 23 (NO)</td>
<td>0.223NS</td>
</tr>
</tbody>
</table>

Source: own survey result, 2017. NS- Not significant, ** and *** significant at 5% and 1% probability level

3.3. Water use Rights

The importance of water rights are the mechanism to allocate and provide accountability for the user to decrease the conflict among households and resource scarcity among water user communities. However, As key informant discussed in Ethiopia unfortunately, there is no legal framework for irrigation water use rights. But conventionally the individual who are access to the water may have the rights to use for their irrigation purpose.

3.3.1. Legal framework

Respondents revealed in the focus group discussion, in the study area, for several decades traditional institution have been managed water for irrigation purpose by diversions rivers and user in manual to harvest irrigation water for their crop specially during spring. To manage the irrigation water the institution have it own roles. Especially the institutions are form informal customs and convention in order to share the water their responsibility and benefits among community based irrigation water management. However, as respondents discussed in focused group discussion now a day the government of Ethiopia attempts to give special emphasis by making integration among formal and informal institution arrangement to provide valuable insights for irrigation water management specially designing organizational arrangement to fill the institutional gaps that exists at grassroots’ level.

Key informant respondents state that the communal irrigation water utilizes for a long periods of time before modern irrigation comes in to the districts. For likes the rivers Weib river, Zambaba, Hinzena, Jamjam, Hursa, Wabe, etc are the rivers that have been used for long period of time with indigenous knowledge and without professionalism on how to utilize effective and efficient. It is a recent phenomenon that farmers in the wereda have begun to cultivate cash crops such as onion, cabbage, tomato, carrots, garlic, ginger etc.

Communal irrigation water management system can be practiced in beneficiary are collectively prepare some agreements and decide to agree on the rules to be set out which makes the water user make arrangements of the water user in their plots. Sometimes the rules may restrict beneficiaries from access to the water use. The rules to be agreed may be executed by the water user committee.

As respondents states that the existence of formal written rules, 94% of the sampled kebeles in the wereda have formal written rules. These rules and regulations uses to operate communal irrigation water management system by the beneficiaries in collaboration with wereda agricultural office and irrigation and water resource sector. But as respondents discussed in focus group discussion revealed that these formal arrangement rules and regulation are only documented at wereda agricultural offices and irrigation and water resource sector.

As Ostrom, (1994) in her research of governing the commons in Kenya, Guatemala, Nepal, Turkey, and Los Angeles stated that there are eight principles helps to managed communal resources such as: define clear group boundaries; match rules governing use of common goods to local needs and conditions; ensure that those affected by the rules can participate in modifying the rules; make sure the rule-making rights of community members are respected by outside authorities; develop a system, carried out by community members, for monitoring members’ behavior; use graduated sanctions for rule violators; provide accessible, low-cost means for dispute resolution and build responsibility for governing the common resource in nested tiers from the lowest level up to the entire interconnected system.
However, in the woreda, in all the irrigation schemes the components have the rule and regulation (by the law) they vary from one scheme to another. In general the following are some of the common formulated written by-law constitutes, which have three parts. The first is the obligation of the of the beneficiaries are the following: the water beneficiaries should abide by the stated rule and regulations; the beneficiaries should use irrigation water for crop cultivation; beneficiaries should leave appropriate borders/ roads to transport fruits and vegetables; acrossing on the farmers land with cattle is strictly forbidden; every farmers should have responsibility to for maintaining and keeps from live stocks; all beneficiaries should pay contribution on time for guard and water distributors.

Secondly, there are a number of rights those beneficiaries’ attempts to gain. These are all water user have rights to cultivate any crops based on their preferences; all farmers should sell their products to any markets either local or unions; they also have rights to vote and selected in the committee and finally each beneficiaries may raise any issues related to communal irrigation water and comment on the rule and regulation.

Thirdly, there are a number of penalties that takes places when the beneficiaries are not abiding by the rule and regulations. These are all beneficiaries should take advice before cultivating any types of crops; all beneficiaries should leave border for the road, if not the beneficiary may punish in cash by the water user committee, if it is beyond water user committee, the case shall be posted in to local court; the plants like eucalyptus and cactus trees are not allowed, if it planted the case attempts for penalty; all beneficiaries should participate in canal cleaning and maintenance, if not penalty may raise; all beneficiaries should pay annual payment 150 birr and contribution for guards and water distributors (in cash, labour or in kinds) on time, if not penalty may arise; if guards are fail to protect the site as well as water distributors did not distribute in fair the penalty should followed etc.

IV. CONCLUSIONS AND RECOMMENDATION

4.1. Conclusions

In spite of being the dominant sector of the Ethiopian economy, agriculture in the country is characterized by low productivity in general and low yield per unit area in particular. Many people attribute the problem to the growth of population-at a rate faster than what the means of sustenance would guarantee- to drought, environmental degradation, poor cultural practices, limited accessibility and the use of improved technology, insufficient infrastructure and ill-thought-out policies. This low performance of the agricultural sector, coupled with rapid population growth, has had an impact on household food insecurity and profound effect on per capita food production. There is, therefore, a desperate need for increasing productivity of Ethiopian agriculture, since its effect is reflected in the overall economy of the country. More recently, Ethiopia is trying to expand small scale irrigation schemes, especial those that can be constructed and managed at community levels. Among the means to accomplish this objective is promoting community managed irrigation practices at community levels. However, there is no study as such which can indicate the status of promotion and use of community managed irrigation scheme works across potential users.

4.2. Recommendations

Some implications of this study were found to be relevant. The importance of expanding small scale irrigation schemes at community levels for sustained development of the agricultural sector becomes growing especially at the concerned experts and political leaders level. The results of this study have shown that the socio-economic, institutional, and others factors are responsible for the current sub-optimum for farmers participation in community managed irrigation scheme utilization. The following recommendation are forwarded based on the finding of the study.

Farmers should participate in community managed irrigation scheme management system such as participating users in training, farmer's field day, field visits, visits to other villages and other community managed irrigation scheme and experiential sharing related issues of community managed irrigation scheme management system are essential element to modify farmers' participation in community managed irrigation scheme managed positively. To accomplish this responsibility, the government has to first equip the pertinent experts who are working specially at kebeles, district and regional levels with the necessary technical knowledge about the uses and means of implementing community managed irrigation scheme management system. Moreover, the individuals, groups as well as policy makers should work towards making the people aware of the uses of water harvesting activities to fight against drought and food shortages.

Community managed irrigation scheme utilization involves the use of different practices which require knowledge and skill of application and management system. Participating in the community managed irrigation scheme utilization, as it increases the probability of behavioral change of individuals and thus enhances ability to acquire and use information required for production and marketing.

Based on the result of the model and different group interview & focus group discussions, the major problem facing communal irrigation scheme users were non functional rule and regulation and conflict resolution methods. Hence the concerned bodies should give emphasis to organize to rule and regulation to sustain community managed irrigation scheme management system.

Lack of irrigation water, as a result of lack of appropriate management & technical problems in relation to the way the head works and channels are constructed was also another problem, hence efforts should be made to find better way to manage the water, so that it will be possible for farmers to use the water uniformly and thus it will be used efficiently. Moreover, farmers must be involved in the design process particularly in decisions about boundaries, the layout of the canals, and the position of outlets and bridges to make the use of the structures sustainable and cost effective, in addition timely maintenance is very crucial. Purposive intervention should be made to increase the participation of farmers, specifically female households in the management issues and other related activities regarding water use. The other major constraints were lack of availability of inputs on time, so that it will give the needed
service in providing inputs on time as well as relevant and timely information.

Finally, it would be necessary to indicate a farmers' participation in community managed irrigation scheme utilization based on the characteristics of a plots. As plots vary in various biophysical factors, the adoption decision of farmers among farmers participation in community managed irrigation scheme utilization groups also vary following the variation in characteristics of plots. Therefore, experts and policy makers should consider developing and community managed irrigation scheme utilization with structured groups focusing on the characteristics of a particular area and locality.

Finally the researchers recommended that further research should be done on examining the extent of farmers participation in communal irrigation management system and the extent to which socio-economics, institutional (such as credit service, land size, extension services, etc), and other factors affect the intensity of farmers' participation in communal irrigation management system decision using time series data.

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Structural Equation Modeling on Likert Scale Data With Transformation by Successive Interval Method and With No Transformation

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I. INTRODUCTION

Many researches in economy, social, education and psychology, as well as medical field generally involve multi variables and multi relations. The variables in these fields of study are usually qualitative in nature, such as attitude, motivation, performance, commitment, satisfaction, behavior, strategy, loyalty, and so forth, and therefore, they are observable. In order to reach a reliable result, a method of data analysis which is simultaneous and integrated is necessary. SEM (Structural Equation Modeling) is a multivariate analysis which is able to be applied in multivariable and multi relations data simultaneously, and able to test complicated relations between variables. The relationships can be built between one or more dependent variable and one or more independent variable. From each variable, factor can be built (a construct built from some indicator variables). In addition, SEM is also a measurement model which can be used to test validity and reliability of an instrument.

One of the requirements in using SEM is the data should have interval scale. In many fields of study, the data are often in the form of Likert scale. Some researchers assume that Likert scale data is interval data, yet many others assume that it is ordinal data. Joreskog (1994) states that ordinal data describes multi-level category like Likert scale. Meanwhile, Deny (2007) mentions that Likert scale can be analyzed parametrically. This is due to the fact that Likert scale can be taken as interval data, in which the range between points is the same, and therefore Likert scale should be arranged so that the data can be categorized as interval data. This is supported by Clason & Dormody (2004) stating that 5-point Likert scale can be categorized as interval scale. This paper will discuss further whether or not there is a difference between SEM analysis using questionnaire data which employs Likert scale without transformation and the one with transformation.

II. THEORETICAL FRAMEWORK

Measurement Scale

If the respondents are the data source, we need a scale that can measure an attitude becoming characteristics of a population. There are two types of scale measurement based on social phenomenon, namely a scale to measure attitude and personality (scale for morale, the result of character test, social participation) and the scale for measuring other cultural aspects and social condition. According to Riduwan and Kuncoro (2007), alongside the development of sociology and psychology, research instrument is now focusing on measurement.

Researches in social studies use some measurement scale such as Likert, Guttman, semantic differential, Rating, and Thurstone.

1. Likert Scale

This scale is used to measure psychological attitudes to be measured mathematically. Riduwan and Kuncoro (2007) explain that the Likert scale is used to measure the attitude, opinion and perception of a person or group of people about social phenomena. On the Likert scale, the variables to be measured are translated into variable indicators. Each answer is related to a question or attitude support expressed in words, for instance, for positive statements: Strongly Agree (5), Agree (4), Neutral (3), Disagree (2) and Strongly Disagree (1); or negative statements: Strongly disagree (1), Disagree (2), Neutral (3), Agree (4) and Strongly Agree (5).

The Likert scale is easy to create and implement, and there is freedom to include questions in the questionnaire, as long as it is still in the context of the problem.
2. Guttman Scale
This type of measurement scale has two possible firm answers of a question: ‘yes’ – ‘no’ so that it can produce interval or rational dichotomy data.

3. Semantic Differential Scale
This scale contains a set of bipolar characteristics (two poles) used to measure attitudes, only the form is neither multiple choice nor checklist, but is arranged in a continuous line whose "very positive" answer lies at the right of the line, and the "very negative" answer lies in the left side of the line, or vice versa. The resulting data is an interval scale.

4. Rating Scale
The raw data obtained in the form of numbers is then interpreted in a qualitative sense. In Rating Scale, respondents choose one of the quantitative answers that have been provided. Therefore, Rating Scale is more flexible, not limited to attitude measurement but to measure respondent’s perception of other phenomena, such as scale to measure socioeconomic status, knowledge, ability and others. Rating Scale should be able to interpret every number given in the answer of each question. Answer number 2, by a certain person is not necessarily meaningful to another person who also chooses answer 2.

5. Thurstone Scale
Thurstone-scale data are obtained from respondents who are asked to select an approved answer from several different statements. In general, each question has an association of values between 1 to 10, but these values are unknown to the respondents. The scoring is based on the specified number of statements selected by the respondent regarding the question.

Method of Successive Interval (MSI)
Analysis of quantitative data that is often encountered in exact sciences is so far more well known. Social research uses a lot of qualitative data as a reflection of abstract concepts, or cannot be measured directly. Therefore, the analysis used is limited to descriptive analysis or non parametric analysis. Today, research in the field of social science has been developed and many quantitative analyses has been done, yet qualitative variables that produce Likert scale are classified as ordinal data (Waryanto and Millafati, 2006).

Deny (2007) suggests using Method of Successive Interval (MSI) to transform ordinal data using Likert scale into interval data for regression analysis to be applied.

A list of questions answered with a Likert-scale approach will yield ordinal data that does not show a comparison of one answer with the other answer to the same question. In the interval data, the comparison between the actual answers will look sharper so it can be processed to obtain the value of the respondent’s answer (Sukawati, 2007).

According to Riduwan and Kuncoro (2007), transforming ordinal data into interval data is useful to meet some requirements of parametric analysis. The steps of transforming ordinal data into intervals using MSI are as follows:
1. On each point of the answer, the calculated frequencies are scored 1, 2, 3, 4, and 5
2. Each frequency is divided by the number of respondents, the result is called proportion
3. The cumulative proportion value is determined by summing the proportions in sequence per score column
4. Normal Distribution Table is used to calculate the Z value of each cumulative proportion
5. The high density for each value of Z is then determined (using the High-Density table)
6. Scale value (NS) is determined with this formula:
   \[ NS = \frac{(\text{Density at Lower Limit}) - (\text{Density at Upper Limit})}{(\text{Area Below Upper Limit}) - (\text{Area Below Lower Limit})} \] (2.1)

   7. Transformation value (Y) is determined by this formula:
   \[ Y = NS + \left[ 1 + \left| NS_{min} \right| \right] \] (2.2)
   in which \( NS_{min} \) is minimum scale value.

Path Analysis
Path analysis is used to determine the direct influence of a number of variables based on cross coefficients. Path analysis is not a method for finding causes, but only testing the theoretical truths that have been theorized. In the path analysis, it can be drawn conclusions about which exogenous variables have a strong influence on endogenous variables.

According to Riduwan and Kuncoro (2007), the assumption of path analysis is as the following:
1. The relationship between variables is linear and additive.
2. There is only a one-direction causal flow system, which means no direction of causality is reversed
3. Minimum response (endogenous) variable in the interval scale
4. The variables studied can be observed directly
5. The model analyzed is correctly specified based on relevant theories and concepts that means theoretical models are examined or tested based on a particular theoretical framework that is able to explain the causal relationship between the variables studied.

Simple path diagrams can be described as follows:

![Figure 2.1 Simple Path Diagram](http://dx.doi.org/10.29322/IJSRP.8.5.2018.p7751)
correlated. Figure 2.1 explains that two correlated exogenous variables (X₁ and X₂) predict Y₁, and can be written in the equation:

\[ Y₁ = b₁ X₁ + b₂ X₂ \]

Path analysis allows researchers to use simple correlation coefficients between the variables involved to predict the magnitude of the causality relationships b₁ and b₂ (Hair, Anderson, Tatham & Black, 2006). The correlation coefficient between two variables X and Y (ρ) is assumed by the correlation coefficient of example r, i.e.: (Walpole, 1988)

\[ \rho = \frac{n \sum X_i Y_i - \left( \sum X_i \right) \left( \sum Y_i \right)}{\sqrt{n \sum X_i^2 - \left( \sum X_i \right)^2} \sqrt{n \sum Y_i^2 - \left( \sum Y_i \right)^2}} \]  
(2.3)

A is the correlation between X₁ and X₂, B is the effect of X₁ in predicting Y₁ and C is the effect of X₂ in predicting Y₁.

\[ \rho_{x₁x₂} = A \]  
\[ \rho_{x₁x₂} = B + AC \]  
\[ \rho_{x₁x₂} = C + AB \]

**Confirmatory Factor Analysis**

Factor analysis is one of interdependence analysis between variables. The general purpose of factor analysis is to reduce the variables, so that the information contained in the origin variable can be explained by the variable resulting from the reduction which has less number (Hair, et.al., 2006).

An example of a factor analysis model is presented in Figure 2.2.

![Figure 2.2 Factor Analysis Model (Sharma, 1996)]

The Factor analysis model in Figure 2.2 can be written in the following equation:

\[ X₁ = \lambda₁₁ \xi₁ + \lambda₁₂ \xi₂ + \varepsilon₁ \]  
\[ X₂ = \lambda₂₁ \xi₁ + \lambda₂₂ \xi₂ + \varepsilon₂ \]

where

\[ \xi₁, \xi₂ \] are the latent variable to -p or can also be referred to as the P-th factor

\[ \lambda_{ij} = \text{loading from -i variable to -j variable which shows the importance of j-factor in the composition of the i-th variable} \]

\[ \varepsilon_p = \text{error} \]

The Factor Analysis Model is:

\[ X₁ = c₁₁ F₁ + c₁₂ F₂ + c₁₃ F₃ + \ldots + c₁m F_m + ε₁ \]  
\[ X₂ = c₂₁ F₁ + c₂₂ F₂ + c₂₃ F₃ + \ldots + c₂m F_m + ε₂ \]  
\[ X₃ = c₃₁ F₁ + c₃₂ F₂ + c₃₃ F₃ + \ldots + c₃m F_m + ε₃ \]  
\[ \ldots \]  
\[ X_p = cₚ₁ F₁ + cₚ₂ F₂ + cₚ₃ F₃ + \ldots + cₚm F_m + ε_p \]

or

\[
\begin{bmatrix}
X₁ \\
X₂ \\
X₃ \\
\vdots \\
X_p
\end{bmatrix} =
\begin{bmatrix}
c₁₁ & c₁₂ & c₁₃ & \cdots & c₁m \\
c₂₁ & c₂₂ & c₂₃ & \cdots & c₂m \\
c₃₁ & c₃₂ & c₃₃ & \cdots & c₃m \\
\vdots & \vdots & \vdots & \ddots & \vdots \\
cₚ₁ & cₚ₂ & cₚ₃ & \cdots & cₚm
\end{bmatrix}
\begin{bmatrix}
F₁ \\
F₂ \\
F₃ \\
\vdots \\
F_m
\end{bmatrix} +
\begin{bmatrix}
ε₁ \\
ε₂ \\
ε₃ \\
\vdots \\
ε_p
\end{bmatrix}
\]

\[ (p \times 1) \]  
\[ (p \times m) \]  
\[ (m \times 1) \]  
(2.4)

X= c F + ε

where,

X₁, X₂,..., Xₚ are origin variables

F₁, F₂,..., Fₚ are common factors
cᵢⱼ is the loading of the origin variable i on the j-th factor

\[ \xi₁, \xi₂ \] is error

The prediction method of loading in factor analysis, among others, is the main component method. The input data can be either a correlation matrix or a covariance matrix. From the covariance matrix (S) or the correlation (R), \( \lambda_j \) (eigenvalues) and \( a_j \) (eigen vectors) are obtained. Loading factor is:

\[ c_{ij} = a_{ji} \sqrt{\lambda_j} \]  
(2.5)

**Matters relating to factor analysis (Soemarno, 2003):**

1. Variety of Origin Variables (X)

Variety of X variables is divided into two components, namely communal (hᵢ²) and φᵢ. The variance of X is divided into two components, namely communal (hᵢ²) and φᵢ.

\[ \text{Var}(X_i) = c_{i1}^2 + c_{i2}^2 + \ldots + c_{im}^2 + \phi_i \]  
(2.6)

or

\[ \text{Var}(X_i) = h_i^2 + \phi_i \]  
(2.7)

The \( h_i^2 \) component is called a communality which denotes the proportion of variance X that can be explained by the common factor p. The component \( \phi_i \) represents the proportion of the range of X caused by either a specific factor or an error.

The magnitude of the variety of Xᵢ that can be explained by Fᵢ is:
2. Factor of Significance
The factor that is considered significant is if the value is larger than one ($\lambda > 1$) or the cumulative diversity is approximately 75%.

3. The Covariance between X and F
The covariance between $X_i$ and $F_j$ is as follows:
$$\text{Cov} (X_i, F_j) = c_{ij}$$
(2.9)

Factor loading is used to interpret every significant factor. Factor with large loading means it is the largest constituent component of a variable, while the sign (positive and negative) indicates the direction. Thus, the factor as a new variable that is unobservable can determine the origin of variable $X$.

4. Factor Rotation
Where significant factors are significant, it is often found that interpretation of factors as new or unobservable variables is difficult. This is due to the overlap of factors that exist as components of the compiler of variables $X$. To overcome this, factor rotation is applied.

5. Factor Score
Often, factor analysis is a preliminary analysis of a problem in a research, namely the effort to get a new variable or unobservable variable. Thus, the new variable must have data, which is the factor score. If the input matrix is a covariant matrix $(S)$, the factor score is calculated by the formula:
$$S - \text{Fa} = c' S^{-1} (x_j - \bar{x})$$
(2.10)

However, if the input matrix is the correlation matrix $(R)$, the factor score is calculated by the formula:
$$S - \text{Fa} = c' R^{-1} Z_j$$
(2.11)

According to Sharma (1996), in the confirmatory factor analysis, the structure of the factor model has been underlined by a theory. Therefore, the number of factors that are formed is already known in advance. This is in contrast to exploratory factor analysis, where the previous researcher did not have a theory or hypothesis that made up the factor structure. Confirmatory factor analysis is a continuation of exploratory factor analysis. In this case, once a researcher finds new variables resulting from exploration of variables owned before, the researcher need to confirm the new variables to check the validity and reliability. The factor as a new variable resulting from exploratory factor analysis process is unobservable, and it is often called latent variable. This factor cannot be observed directly by researchers because it is a collection of several sizes or observations.

**Simultaneous Equation Model**

The simultaneous equation model is a model containing more than one dependent variable and more than one equation. This model is useful for predictions as in regression. The typical feature of the simultaneous equation model is that the dependent variable in an equation may appear as a variable explaining in other equations in the model. In this model, a number of equations form a system of equations which describes the dependence among the variables in the equations. Before completing the simultaneous equation model, the equations contained in the model must be shown first that they have satisfied the proper identification conditions.

The identification for the function of a simultaneous model is (Imam, 2000):
1. if $K - k > m - 1$, the function is overidentified.
2. if $K - k = m - 1$, the function is just identified.
3. if $K - k < m - 1$, the function is underidentified.

where $m$ is the number of endogenous variables in a particular single function
$k$ is the number of exogenous variables in the simultaneous model

$$\sum_{j} c_{ij}^2 = \frac{\text{Var} (X_i)}{\sum_{j} c_{ij}^2} \times 100\%$$
(2.8)

$$\text{Cov} (X_i, F_j) = c_{ij}$$
(2.9)

$$S - \text{Fa} = c' S^{-1} (x_j - \bar{x})$$
(2.10)

$$S - \text{Fa} = c' R^{-1} Z_j$$
(2.11)

According to Sharma (1996), in the confirmatory factor analysis, the structure of the factor model has been underlined by a theory. Therefore, the number of factors that are formed is already known in advance. This is in contrast to exploratory factor analysis, where the previous researcher did not have a theory or hypothesis that made up the factor structure. Confirmatory factor analysis is a continuation of exploratory factor analysis. In this case, once a researcher finds new variables resulting from exploration of variables owned before, the researcher need to confirm the new variables to check the validity and reliability. The factor as a new variable resulting from exploratory factor analysis process is unobservable, and it is often called latent variable. This factor cannot be observed directly by researchers because it is a collection of several sizes or observations.

**Structural Equation Modeling (SEM)**

SEM is a statistical technique used to construct and test a causal model. SEM is a technique that includes confirmatory aspects of factor analysis, path analysis and regression that can be considered a special case in SEM. From the definition, it can be said that SEM has characteristics that as are analytical techniques to be more confirm than explanation, meaning that SEM is more suitable to be used to determine the validity of a model than to use it to find a model fit, although SEM analysis also includes elements for explanation. The most critical error in model development is the existence of specification error, that is when one or more predictor variables is not involved.

There are two models in SEM that are structural model and measurement model. The structural equation is formulated as a means to express the relationship of mutuality between constructs with the following guidelines:

**Endogenous Variables = Exogenous Variables + Endogenous Variables + Error.** The general structural modeling equation can be written as follows (Hayduk, 1987 in Wijayanto, 2008):

$$\eta_1 = \beta_2 \eta_2 + \beta_3 \eta_3 + \ldots + \beta_m \eta_m + \gamma_1 \xi_1 + \gamma_2 \xi_2 + \ldots + \gamma_n \xi_n + \zeta_1$$

$$\eta_2 = \beta_1 \eta_1 + \beta_3 \eta_3 + \ldots + \beta_m \eta_m + \gamma_1 \xi_1 + \gamma_2 \xi_2 + \ldots + \gamma_n \xi_n + \zeta_2$$

$$\ldots$$

$$\eta_m = \beta_1 \eta_1 + \beta_3 \eta_3 + \ldots + \beta_m \eta_m + \gamma_1 \xi_1 + \gamma_2 \xi_2 + \ldots + \gamma_n \xi_n + \zeta_m$$

Or (in matrix):

$$\eta = \mathbf{B} \eta + \begin{bmatrix} \xi_1 \\ \xi_2 \\ \vdots \\ \xi_m \end{bmatrix} + \zeta$$
(2.12)

where:

- $\eta$: eta, matrix (sized $m \times 1$) endogenous latent variable (dependent)
- $\mathbf{B}$: beta, matrix (sized $m \times m$) coefficient of the influence of endogenous variable toward other endogenous variables
\( \Gamma \) : gamma, matrix (sized m x n) coefficient of the influence of exogenous variable toward endogenous variable

\( \zeta \) : zeta, matrix (sized m x 1) structural error

\( \xi \) : matrix (sized n x 1) exogenous latent variable

Measurement model for exogenous variable can generally be written as:

\[
x_1 = \lambda_1 \zeta_1 + \delta_1 \\
x_2 = \lambda_2 \zeta_2 + \delta_2 \\
\vdots \\
x_q = \lambda_q \zeta_q + \delta_q
\]

Or in matrix it is written:

\[
x = \Lambda \zeta + \delta
\]

(2.13)

where:

\( x \) : matrix (sized q x 1) indicator of exogenous variable

\( \Lambda_x \) : matrix (sized q x n) loading factor of exogenous variable

\( \delta \) : matrix (sized q x 1) measurement error

Measurement model for endogenous variable can generally be written as: (Hayduk, 1987 in Wijayanto, 2008):

\[
y_1 = \lambda_1 \eta_1 + \varepsilon_1 \\
y_2 = \lambda_2 \zeta_2 + \varepsilon_2 \\
\vdots \\
y_p = \lambda_p \zeta_p + \varepsilon_p
\]

Or in matrix it is written:

\[
y = \Lambda_y \eta + \varepsilon
\]

(2.14)

where:

\( y \) : matrix (sized p x 1) indicator of endogenous variable

\( \Lambda_y \) : matrix (sized p x m) loading factor of endogenous variable

\( \varepsilon \) : matrix (sized p x 1) measurement error for endogenous variable

The three stages of SEM are: a) examining of the validity and reliability of the instrument (confirmatory factor analysis), b) testing the relationship model among the latent variables to determine the determinant factor (path analysis), c) the acquisition of a useful model for prediction equivalent to the structural model or regression (Sarwono & Narimawati, 2007).

The terms of SEM are as the following:

1. Large sample size

Sample size plays an important role in the estimation and interpretation of SEM analysis results. There is no single criterion explaining how many sample sizes are required in SEM. However, for estimation using maximum likelihood, the recommended sample size ranges from 100-200. If the sample size exceeds 400, the possibility of goodness of fit will indicate a model mismatch.

2. Continuous measurement scale (interval)

The scale of measurement of variables in SEM analysis is the most controversial and much debated. This controversy arises because the treatment of ordinal variables is considered a continuous variable. Generally, the measurement of indicators of a latent variable uses 5-point Likert scale, namely strongly disagree, disagree, neutral, and strongly agree, which actually is the ordinal scale (rank). Many researchers change this ordinal Likert scale into an interval scale with successive interval (MSI) methods.

The assumptions in SEM are as follows (Hair, et. al., 2006):

1. All relationships are linear

Examining the linearity of relationship can be done with the Curve Fit approach and applying the principle of parsimony, i.e. when all models are significant or non-significant, the model chosen is the simplest model that is linear (Ljung, 2003).

2. Normality

Basically the normality assumption for using SEM analysis is not very critical when the observation data reaches 100 or more because based on the Central Limit Theorm of a large sample size can be generated average samples close to normal distribution. (Mendenhall, et.al., 1981).

3. Data does not contain outliers

Univariate outliers and multivariate outliers must be examined. For univariate outliers, observations with z-score ≥ 3.0 will be categorized as outliers, and for large samples above 80 observations, evaluation guidelines are the threshold values of z-scores ranging from 3 to 4 (Hair, et. al., 2006). As for multivariate outliers, it can be detected by the distance of Mahalanobis. The Mahalanobis distance between the i and j-individuals is expressed by equations (Senior, 2000):

\[
d_{ij}^2 = (\bar{x}_i - \bar{x}_j)^T S^{-1} (\bar{x}_i - \bar{x}_j)
\]

(2.15)

\( d_{ij}^2 \) : Mahalanobis distance between the i- and j-individuals

\( \bar{x}_i \) : average vectors of i-individual observation

\( \bar{x}_j \) : average vectors of j-individual observation

\( S^{-1} \) : inverse of covariance matrix

The test of outliers is done by looking at the value from Mahalanobis distance, with the hypothesis:

\( H_0 \) : there is no outliers

\( H_1 \) : there are outliers
If $d_{ij}^2 < \chi^2_{p}(\alpha)$, where $p$ is the number of indicators, then it is concluded that there are no outliers.

According to Bollen and Long (in Wijayanto, 2008), SEM modeling is made through several stages:
1. Model specification
2. Identification
3. Assumption
4. Evaluation
5. Re-specification

One of the evaluation criteria model is RMSEA (Root Mean Square Error Approximation), which can be calculated by the formula 2.16 for interval data and 2.17 for ordinal data.

RMSEA for ordinal data

\[
RMSEA = \sqrt{\frac{F(S, \Sigma(\theta)) - 1}{db \left(\frac{N}{N-1}\right)}}
\]

RMSEA for interval data

\[
RMSEA = \sqrt{\frac{\chi^2 - db}{(N-1)db}}
\]

where $\chi^2 = (N-1)F(S, \Sigma(\theta))$

III. RESEARCH METHODOLOGY

The data used in this study were secondary data from the research result of a student of Faculty of Agricultural Technology Universitas Brawijaya entitled “Analysis of the Relationship between Productivity and Quality to Internal Company Business Process with Structural Equation Modeling (SEM) Method” (Pramudiya, 2006). The variables in this study are:

<table>
<thead>
<tr>
<th>Latent Variable</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Productivity</td>
<td>X11. Workers’ productivity</td>
</tr>
<tr>
<td></td>
<td>X12. Extra value</td>
</tr>
<tr>
<td></td>
<td>X13. Operation level</td>
</tr>
<tr>
<td></td>
<td>X14. Machine error</td>
</tr>
<tr>
<td></td>
<td>X22. Product error</td>
</tr>
<tr>
<td></td>
<td>X23. Customers’ claim</td>
</tr>
<tr>
<td>3. The Process of Company’s Internal Business</td>
<td>Y1. Innovation process</td>
</tr>
<tr>
<td></td>
<td>Y2. Operation process</td>
</tr>
</tbody>
</table>

Method

The stages in this research are:
1. Transforming data by MSI method
2. Applying SEM (Structural Equation Modeling) on data without transformation and with transformation with the following steps:
   a. Estimating model parameter with maximum likelihood method using Equation 2.16
   b. Evaluating the whole model through the Root Mean Square Error of Approximation (RMSEA) criterion, using Equation 2.16 for interval data and equation 2.17 for ordinal data
   c. Comparing the model of SEM analysis results from data without transformation and data with transformation using the RMSEA goodness of fit criteria

IV. RESULTS AND DISCUSSION

The comparison of two or more estimation models can be performed if the quantities used as comparators are the same. In order to compare the two models, the RMSEA criterion is used in this study. Therefore, in the first step it is necessary to prove that the RMSEA of the model generated from ordinal data is the same or equivalent to RMSEA for the model generated from interval data.

Analysis of RMSEA

According to Joreskog (1994), RMSEA for ordinal data is

\[
RMSEA = \sqrt{\frac{F(S, \Sigma(\theta)) - 1}{db \left(\frac{N}{N-1}\right)}}
\]

Meanwhile, RMSEA for interval data is (Scermelleh & Muller, 2003):

\[
RMSEA = \sqrt{\frac{\chi^2 - db}{(N-1)db}}
\]

Substitution $\chi^2 = (N-1)F(S, \Sigma(\theta))$ which is one of the statistical analysis of the goodness of fit into RMSEA as a model of ordinal data will result in:

\[
RMSEA = \sqrt{\frac{(N-1)F(S, \Sigma(\theta)) - db}{(N-1)db}}
\]

which is also the formula for RMSEA for interval data. Therefore, RMSEA can be used as a comparison factor for the obtained model from ordinal and interval data.

The Results of Parameter Estimates and RMSEA on Data With and Without Transformation

The summary of parameter estimation results in data without transformation is presented in the following table.

Table 4.5 The Results of Parameter Estimates on Data Without Transformation with Standardized Loading Factor

<table>
<thead>
<tr>
<th>Loading Factor</th>
<th>Estimates</th>
<th>p</th>
</tr>
</thead>
</table>

http://dx.doi.org/10.29322/IJSRP.8.5.2018.p7751 www.ijsrp.org
The result of conversion of line diagram into structural model is

$$\eta_1 = 0.453 \xi_1 + 0.213 \xi_2 + 0.127$$

in which
- $\eta_1$: internal business process
- $\xi_1$: productivity
- $\xi_2$: quality

The biggest contribution to internal business processes is given by productivity variables. This can be seen from the value of the standardized coefficients for productivity variables is the largest, which is 0.45 (Table 4.5). Both productivity and quality variables contribute positively to internal business processes. The model analyzed is a recursive model (there is no reciprocal relationship). From the analysis, it was obtained $\chi^2_{hitung} = 21.257$ and $p$-value = 0.678, meaning that at the error rate of 5%, the hypothesis stating that the model is in accordance with empirical data, is received. RMSEA value obtained for data without transformation is 0.000 (Figure 4.5), which is included in the close fit category. The result of parameter estimation for data with transformation is presented in Table 4.7.

### Table 4.7 The Results of Parameter Estimates on Data 2 With Transformation with Standardized Loading Factor

<table>
<thead>
<tr>
<th>Loading Factor</th>
<th>Estimates value</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business process internal &lt;- Productivity</td>
<td>0.450</td>
<td>0.352</td>
</tr>
<tr>
<td>Business process internal &lt;- Quality</td>
<td>0.374</td>
<td>0.242</td>
</tr>
<tr>
<td>x14 &lt;- Productivity</td>
<td>0.134</td>
<td></td>
</tr>
<tr>
<td>x13 &lt;- Productivity</td>
<td>0.659</td>
<td>0.388</td>
</tr>
<tr>
<td>x12 &lt;- Productivity</td>
<td>0.446</td>
<td>0.350</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Productivity</th>
<th>x11 &lt;- Productivity</th>
<th>0.311</th>
<th>0.419</th>
</tr>
</thead>
<tbody>
<tr>
<td>Productivity</td>
<td>x23 &lt;- Productivity</td>
<td>0.281</td>
<td></td>
</tr>
<tr>
<td>Quality</td>
<td>x22 &lt;- Productivity</td>
<td>0.186</td>
<td>0.348</td>
</tr>
<tr>
<td>Quality</td>
<td>x21 &lt;- Productivity</td>
<td>0.568</td>
<td>0.431</td>
</tr>
<tr>
<td>y1 &lt;- Business process internal</td>
<td>0.684</td>
<td></td>
<td></td>
</tr>
<tr>
<td>y2 &lt;- Business process internal</td>
<td>0.546</td>
<td>0.038</td>
<td></td>
</tr>
</tbody>
</table>

From the overall model evaluation, it was obtained RMSEA for Data 2 With Transformation of 0.000; and because the RMSEA is less than 0.05, it is included into the close fit category.

### Comparison of RMSEA Value

The statistical value of RMSEA for each data, with and without transformation can be seen in Table 4.9.

#### Table 4.9 RMSEA for each data

<table>
<thead>
<tr>
<th>Without transformation</th>
<th>With transformation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Table 4.9 shows that RMSEA value for the data without and with transformation is included into close fit data, in which both shows RMSEA<0.05.

### V. CONCLUSION

Based on the results of this study, it can be concluded that there is no difference in the SEM analysis result in the questionnaire data in Likert scale with and without transformation. This is shown by the RMSEA value in both data which come into the same conclusion in testing model suitability.


AUTHORS

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Abstract- The main purpose of this paper is to investigate the effect of wadiah and mudharabah third party as well as management commitment on profit and loss sharing financing. Data have been obtained from annual reports of full-fledge shariah banks and shariah business unit in conventional banks which reported their annual report from 2011 until 2016. Generalized linear model is used to analyzed the effect of the variables on profit and loss sharing financing. This model is usually used for non normal data. The research findings affirmed that three variables effected profit and loss sharing financing. Mudharabah third party and management commitment have positive effect on profit and loss sharing financing, while wadiah third party has negative effect. This paper offers useful information that reserve relevant guidelines to policymakers and practitioners for future development of profit and loss sharing financing. The paper provided fresh data and important informations relating profit and loss sharing and effected variables.

Index Term- Wadiah, Mudharabah, Management Commitment

I. INTRODUCTION

Muslims have established Islamic banks as a form of piety to Allah SWT. These banks became a solution for Muslims around the world to free from interest mechanism in banking system because the interest or riba is forbidden in Islamic law. Furthermore, Islamic banks are established not only to avoid bank interest, but also to avoid unethical practices and actively participate in achieving the goals and objectives of Islamic economics (Ahmed, & Barikzai, 2016).

Islamic banks must implement basic principles of Islamic finance. The first basic principle is risk sharing, where each participant in a transaction must share the profit or risk of loss from a transaction. Percentage of profit or loss sharing to each party has been determined in advance. The second basic principle is no exploitation. No participants in transactions should be exploited in the banks operations (Bakar and Ali, 2008). It means the operations must be interest-free (usury), contains no uncertainty (gharar) and contains no gambling elements (Rosly, 2005; Siddiqui, 2008). The third basic principle is not to fund prohibited activities according to Islamic principles (Rosly 2005; Siddiqui, 2008; Bakar and Ali, 2008).

Three basic principles of Islamic finance are served as a guide for Islamic banks in determining various financing products. Financing products are grouped into two methods: fixed mark up method and profit and loss sharing method. This classification is based on profit and risk sharing. Islamic banks tend to apply fixed mark up finance. They predetermine margin of the value of the transactions performed. The banks do not charge certain interest rates to its borrowers, but in practice interest remains a consideration to maintain the competitiveness of Islamic banks against conventional banks (Masnidar, 2009). This finance is basically acceptable in Islamic law or the shari'ah, (Khan, 1983, Hanif and Iqbal, 2010) but is similar to the debt contract feature of conventional banks (Ismail and Ahmad, 2006). Fixed marked up finance products consist of Murabahah, Salam, Istisna and Ijarah.

Profit and loss sharing finance is applied by not charging interest on the value of capital. Islamic banks will receive revenue from certain
percentage of profit earned from funded partners (Ahmed, 2008). If banks’ partner get loss, they are willing to bear all losses and divided to depositor as a portion of equity ownership (Siddiqui, 2008) Financing products using this method are mudharabah and musyarakah.

Ideal Islamic banks financing products is based on profit and loss sharing (Ascarya and Yumanita, 2005, Rosly 2005, Chong and Liu, 2009, Hanif and Iqbal 2010, Saad and Razak, 2013, Azmat, Michael and Kym, 2015). Beside that, profit and loss sharing financing also has the ability to bring economic benefits by promoting the growth of the real sector (Abduh and Omar, 2012; Saad and Razak 2013). In addition, this financing also benefits Islamic banks. Jaurino and Wulandari, 2017 has conducted research on the effect of mudharabah financing and musyarakah financing on bank profitability. The results obtained by SEM-PLS analysis showed the influence of mudharabah financing on the profitability of sharia banks.

Bank management still tends to sharia-compliant products. This phenomenon makes customers or prospective customers have no good reason to choose Islamic bank or move from conventional bank to Islamic bank. The market share of Islamic banks which is an indicator of public confidence can only reach 5.3% by the end of 2016 (Sharia Banking Statistics, 2016).

Profit and loss-sharing financing faces agency problems inherently (Sarker, 1999, Dar and Presley, 2000). Agency problems arise when there is a difference interest between two parties, principals and agents, banks and users of funds, in which each party seeks to maximize its profits. Principals and agents tend to take action for their own benefit, at the expense of the interests of others (Jensen and Meckling, 1976). Information asymmetry will arise as an agency problem. Companies using bank funds have more information about the company’s operations, whereas banks have limited access to such information. Given the asymmetry of this information the bank must conduct more rigorous and costly monitoring of this financing.

Banks should prioritize the interests of stakeholders of Islamic banks. They should be aware that their stakeholders have different characteristics from the stakeholders in conventional banks. Their stakeholders keep religious values behind their business activities.

Stakeholders of Islamic banks not only want a financial profit only. Dusuki (2008) has studied on 1541 stakeholders of Islamic Banks in Malaysia. His research results affirmed that stakeholders expected Islamic banks to prioritize the promotion of Islamic values and a way of life to staff, clients and the general public in an effort to contribute to the social welfare of communities, promote sustainable development projects and alleviate poverty.

The results of this study also explained the expectations of all stakeholders in Islamic banks in Malaysia. Judging from its expectations, the stakeholders of Islamic banks split into two groups. The first group consisted of the users of funds, depositors, employees and local communities. This group consistently expected Islamic banks to choose ideal financing in the form of profit and loss-sharing financing. The Second group consisted of bank managers, sharia supervisory boards and regulators. This group expected Islamic banks to maintain their continuity and endurance of the business so each bank can become a competitive bank. The results of this study illustrated the existence of different expectations and interests between agents with principals on Islamic banks. According to agency theory (Jensen and Meckling, 1976) these differences of interest motivate agents or bank managers to act differently from their principal interests.

Although they also face agency problems such as companies in general, Islamic banks have Islamic values that become unique identities and become unifying stakeholders in achieving business goals and worship purposes (Al-shamali et al., 2013). Stakeholder Theory explained that all of stakeholders together contribute to providing the resources they have to the selected companies to achieve common goals (Freeman, 2010). The management of a trusted company should be the protector of their interests. The attention and protection of the company on the interests of all parties must be balanced, so that no major stakeholders benefit more than other stakeholders (Donaldson et al., 1995).

Depositor is one of bank stakeholders contribute to bank through third party funds. John (2014) has examined the relationship of deposit funds as a variable determinant of bank loan volume. The results of his research on 22 conventional banks in Nigeria in the period 2006-2012 proved a significant positive effect of the volume of deposit on the volume of loans issued by banks.

Third party funds in conventional banks differ from third party funds in Islamic banks. All third party funds in a conventional bank will get the result of its deposits in the bank, ie interest. While the third party funds deposited by syariah banks from depositors are grouped into two groups, namely wadiah and mudharabah deposits.

Wadiah deposits are third party funds in the form of lodge or leave (Qaed, 2014). According to Maliki and Shafi'i sects, on a wadiah contract, a depositor represents certain asset preservation to others in a certain way, so that the person who entrusts the asset feels comfortable and does not
worry about the security of his assets (Afif, 2014). In an Islamic bank, on the deposited asset, the bank asks the authority to use the asset, as long as the asset is in the bank. All benefits for the use of the asset are owned by the bank. Banks provide compensation in the form of grants to depositors of wadiah (Mahbub & Shammo, 2016).

The second Islamic bank deposit is mudharabah. In mudharabah agreement depositor agree to finance banks’ project or contract by sharing certain percentage of profit or loss (Hilman, 2016). Othman and Masih (2015) had studied mudharabah implementation in Financial Intermediation Theory framework. They observed the effect of mudharabah deposit on profit and loss-sharing financing at Islamic banks in Malaysia. This study used dynamic ordinary least squares (DOLS) analysis techniques, fully modified ordinary least squares (FMOLS) and generalized method of moments (GMM). The results showed that there is a positive relationship between mudharabah deposits on mudharabah and musyarakah financing, but not causality relationship.

Implementation of Financial intermediation Theory in Islamic banks and in conventional banks is different. Investors and depositors in Islamic banks are not only investing for financial gain, but also to achieve the common goal of shari'ah obedience. Khalid and Bachtiar (2015) examined the influence of mudharabah deposit on Islamic bank maqasid performance. They stated that mudharabah deposit in Islamic banks in Indonesia have a positive effect on maqasid performance.

Othman and Masih's research (2015) and Khalid and Bachtiar's research (2015) focus on third-party mudharabah funds as a source of funds entrusted by depositors to banks for bank use in performing their intermediary functions, while wadiah deposit is not taken into account. Though third party funds Wadiah is one source of Islamic bank funds that can be used by banks without the obligation to provide results to depositors (Qaed, 2014).

Ghoniyah and Wakhidah (2012) investigated the effect of deposits on musyarakah financing in Islamic Commercial Bank and Sharia Business Unit (UUS) in Indonesia. By using multiple linear regression method, the researchers concluded that there is a significant positive influence of wadiah and mudharabah deposits on Musyarakah financing.

Profit and loss-sharing financing is a unique financing that is not owned by a conventional bank. However the existence of these financing risks creates reluctance of Islamic banks to run this financing. The Banks tend to concerned about customers' funds and bank profits safety. Islamic banks have to share the risk to their business partners, but this risk has a negative impact on the earnings of banks and depositors.

The willingness of banks to implement profit and loss-sharing financing is expected only if the banks have strong management commitment. Several studies have proven the role of management commitment within the company. Management commitment has driven the company to achieve the company's goals and business success. Several researchers have studied the impact of management commitment on corporate goals. Pourkiani and Tanabandeh (2016) obtained research findings indicating a positive relationship between management commitment and service quality. Javed (2015) describes a moderate relationship between management commitment and quality management. Cooper (2006) affirms the relationship of the impact of management commitment on employee behavior. Nurhayati and Mulyani (2015) obtained the findings of management commitment and other variables have significant influence on the implementation of accounting information system.

The above studies show that high management commitment can improve the company's ability to achieve various corporate goals. A similar study was also conducted on sharia banks. Ascarya (2010) also observes management commitment as one of the variables that can encourage the improvement of profit and loss sharing. The results of his research confirmed the lack of implementation of profit financing and loss sharing in Indonesia due to the lack of management commitment to support this financing.

Based on the phenomenon of previous research and related to situational background, it is suspected that wadiah and mudharabah deposits as well as management commitment have a positive effect on profit and loss-sharing financing.

II. LITERATURE REVIEW

Islamic banks have specific philosophy and objectives. These banks are responsible for Allah SWT. Accountability to Allah SWT is realized by implementing Islamic values. Some research about public perception about the implementation of Islamic values have studied in Islamic Banks.

Dusuki (2008) had investigated seven stakeholder groups at Bank Syariah Malaysia Berhad and Bank Muamalat Malaysia Berhad on the philosophy and objectives of sharia banks that occur in countries that use dual banking system. These stakeholder groups are users of financing facilities, depositors, branch managers, employees, sharia supervisory boards, bank regulators and local communities who have no relationship with any sharia bank. The findings of this study suggested that respondents view sharia banks as an institution that must uphold
social goals and promote Islamic values to staff, clients and the general public.

In line with that research, Agriyanto (2015) had studied on differences of stakeholder opinion regarding the objectives of Islamic banks in Indonesia. Stakeholders selected in this study are customers, depositors, communities, bank managers, employees, regulators, and sharia supervisory board. According to public perception, Islamic banks should have greater social objectives than their commercial goals. Islamic banks should promote Islamic values and way of life to staff, clients and the general public, contribute to social welfare, reduce poverty, promote sustainable development goals rather than focus on profit-seeking only. In contrast, sharia bankers in Indonesia are employees, managers and regulators are still concerned with the commercial purpose of maximizing profits, minimizing operational costs, improving the quality of goods and services and offering products that are able to survive and competitive.

Ahmed and Barikzai (2016) conducted a study of employee perceptions on five Islamic banks in Pakistan against the achievement of three main objectives. These goals consisted of religious objectives, social goals and economic goals. The results show that Islamic banks in Pakistan have different characteristics than conventional banks. Respondents of this study also stated that as interest-free banks, Islamic banks can also play a role to provide services to the community. Islamic banks are also considered to be financial institutions that have ethical norms. As one of financial institutions, these Islamic banks are accountable to God and their community, and have the task of being transparent in all their activities. Prior researches show that Islamic banks should prioritize religious objectives and social goals that economics goals.

Ascarya (2010) conducted a study on the factors that led to the lack of PLS financing in the Sharia Bank. This research uses Analytic Method Network Process (ANP) is to understand and imagine the problem thoroughly. Researchers describe the problem and disseminate questionnaires and in-depth interviews to academics and practitioners of sharia banks. After obtaining the answer, the researcher evaluates and measures the pair-wise comparison model and then synthesizes the problem to find a solution. The results show that the lack of profit and loss-sharing financing is due to two aspects, namely internal and external aspects. The internal aspect relates to the lack of information technology, standard operating procedures and management commitments. While external aspects that also lead to this lack of financing are lack of government commitment and legislator support and low trust and widespread public understanding of these financing.

Ascarya research result (2010) is the answer that clarified the results of research Dusuki (2008) and Agriyanto (2015). Managers tend to avoid profit and loss-sharing financing and prefer fixed-based marked up method financing. Some of the reasons of choosing this financing are the awareness of the lack of syariah bank information technology and standard operating procedures to support the monitoring borrower activities.

Using quantitative data, (Bahari, 2009) conducted a study of changes in the structure of Islamic bank products in Malaysia. The results show that in the period 2006 to 2009, financing is still dominated by debt-based financing. On the contrary, profit and loss-sharing financing is still a minority financing that is less than 10% of total financing.

In Pakistan, Farooq & Ahmed (2013) also conducted research on musharaka financing. The researchers conducted a survey on Islamic bank employees in the second level position and above. Researchers also conducted a survey of lecturers teaching Islamic Banking and Islamic finance courses. In addition, to complement the results of its research, annual report data and quarterly reports are also used. The results show that some of the factors that cause the musharaka financing to grow slowly are the lack of interest in management of this financing. The bank's management also have no sufficient expertise to support financing with a partnership contract like musharaka. In addition, customer characteristics also do not fully support this financing. The low commitment, honesty and expertise make this financing difficult to develop. This financing requires honest, expert and high customer commitment, so that both the banking objectives and the customer's objectives can be achieved. Another factor that does not support the growth of this financing is the low level of government support for this financing.

Musharaka financing is an interesting financing to be studied. Abdalla Ahmed, (2008) conducted a study of the factors that hindered the distribution of musharaka financing in Islamic banks in Sudan. Researchers collected survey data from investment department employees at 9 sharia banks in Sudan. The results show that banker deficiencies who understand the selection, evaluation and favorable project management are a significant cause for the lack of musharaka financing.

John (2014) has studied the effect of third party fund volumes on the behavior of bank loans. Researchers used data from 22 banks operating in Nigeria. Data obtained from the annual report in the period after the consolidation from 2006 to 2012. The analysis technique used is regression analysis. The result of the research shows that there is a significant positive correlation between variable of
third party fund volume to loan volume at selected bank. The greater the amount of third party funds deposited by the depositors, the greater the amount of loans disbursed by the bank to the users of the funds.

Amelia and Fauziah (2017) studied some variables affected mudarabah financing. The variables are third party funds, capital adequacy ratio, inflation, exchange rate and profit sharing. The data used in this study are monthly time series data from June 2009 to June 2015. The results of data analysis with multiple linear regression model shows that third party funds and exchange rate have a positive effect on mudarabah financing, while the capital adequacy ratio variable has negative effect on this dependent variable. In contrast, inflation and profit-sharing variables did not affect mudarabah financing.

In Malaysia, Othman and Masih (2015) not only examined mudarabah financing, but also examined the musharaka financing. Researchers investigated the linkage of third-party funds to mudarabah and musyarakah at Bank Syariah in Malaysia. Appropriate analytical techniques used are dynamic ordinary least squares (DOLS), fully modified ordinary least squares (FMOLS) and generalized method of moments (GMM) systems for estimation and causality analysis. The data used are monthly panel data from January 2010 until January 2015. The result of cointegration and causality panel stated that total investment of deposit did not affect mudarabah and musyarakah financing offered by sharia bank. The results tended to indicate a long-term and short-term positive relationship between the total investment of deposit with mudarabah and musyarakah financing, but not a causal relationship.

Kholid and Bachtiar (2015) conducted research on the influence of temporary syirkah funds and good corporate governance on the performance of Islamic Banking in Indonesia. The study was conducted on all sharia commercial banks in Indonesia. The sample is selected using purposive sampling method with criteria has published annual report and financial report between year 2010 and 2013. Another criterion is sample research have published report of good corporate governance in the same period. The results obtained by using multiple regression method, showed the syirkah fund variable have a positive effect on maqasid performance.

Various problems that may be faced by banks in implementing profit-based profit and loss sharing can be ignored if sharia banks have strong management commitment. Several studies have proven the strength of management commitment can drive the company to achieve the business goals of the company. Keramati and Azadeh (2007) have conducted research on the importance of management commitment in achieving the success of knowledge management. Knowledge can be an experience, a concept, a value or a belief that enhances an individual's ability to take effective action. Measurement of management commitment is done through strategic planning, communication and training. By using semi-structured interviews, the results of this study show that management commitment influences the success of knowledge management, while compensation, reward and performance appraisal are weaker than other measures of management commitment.

Tzempelikos (2015) conducted a study aimed at testing the role of management commitment to management involvement and key management accounts. The first key management account under study is the relational quality consisting of satisfaction, trust and commitment. While the second key management account is a financial performance consisting of sales value, profitability, market share, and ROI. Data from 304 suppliers were collected through interviews using a structured questionnaire. By using structural equation Modeling as hypothesis testing tool, researcher find some research result, that is management commitment influence management involvement. Management involvement mediates the effect of management commitment on relational quality and relational quality affects the company's financial performance.

Another study about top management commitment has been conducted by Babakus et al. (2003). They investigated top management commitment through front-line employee perceptions of the services provided by management at banks in Turkey. The research model is derived from attitude theory. Researchers choose training, authority and rewards as an indicator of the variable of top management commitment. By using questionnaires in data collection, researchers obtained some research findings. Management commitment significantly affects organizational commitment and job satisfaction. Through organizational commitment management commitment influences company performance.

Furthermore top management commitments can also be measured by quality promotion by top management, policy quality as an integral part of the group, quality policy communications to members, objectives and processes, and resource allocation aimed at evaluating quality improvement, and hierarchical formation of committees to ensure improvement of quality services. Caroline, Harriet and Anne (2016) studied influence of top management commitment to the success of small and medium enterprises by using those indicators. The results show the commitment to ensure all...
efforts are directed to the orientation of quality and consumer orientation.

III. METHOD

Research object of this paper is thirteen fullfledge Islamic banks and twenty one Sharia Business Units in Indonesia. This research observed the effect of wadiah deposit, mudarabah deposit, and management commitment on profit and loss sharing financing.

Types and data sources

The data required for this study are secondary data derived from Indonesian Banking Statistics issued by the Otoritas Jasa Keuangan, the annual report of all fullfledge Islamic Banks and annual reports of conventional banks that have Sharia Business Units. Data collection techniques used in this study is documentation of annual reports documents of sharia commercial banks and conventional banks. Researcher have determined only Islamic banks and sharia business units have published annual reports from 2011 to 2016 selected to this study. So there are nine fullfledge Islamic banks and sixteen shari’a business unit which became research sample. The data obtained on each related banking website.

wadiah and mudarabah deposit variables are indicated by the amount of wadiah and mudarabah deposits at the end of the year, while profit and loss-sharing financing variables are shown by the amount of mudarabah financing and musyarakah financing at the end of the year. The variable of management commitment is indicated by management communication and training showing management commitment ranged from 2 to 101 times. The last variable is profit and loss sharing financing variable. The amount of this financing ranged from 1 billion rupiahs to 22,066 billion rupiahs.

The results of this study also shows the relationship between independent variables and dependent variable. Two of the three independent variables consisting of mudarabah deposits and management commitments have a significant effect on profit and loss sharing financing, while the wadiah deposit does not affect this financing.

V. Conclusion

Based on the background, problem formulation, hypothesis development and related theories and data analysis results that have been discussed in the previous chapters then the conclusions of this study are as follows:

Wadiah, mudarabah deposit and management commitment have positive and significant influence simultaneously to profit and loss sharing financing. This shows the greater the wadiah deposit and mudarabah deposits, and management commitment, the more profit and loss sharing financing is channeled by sharia banks and sharia business units. This indicates that all syariah bank sharia bankers and sharia business unit contributed to the bank to become the ideal bank. Partially, management commitment, mudarabah deposit and capital provide significant and real contribution to banks to channel profit and loss-sharing financing.

All stakeholders in sharia commercial banks and Islamic business units play a role to contribute to increasing the ideal Islamic finance channeling, namely profit and loss-sharing financing.

References


ION: AND IMPLICATIONS.


Catheter ablation for Atrial Fibrillation: Techniques and Exiting Devices


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I. INTRODUCTION

Atrial fibrillation is the most common sustained heart abnormality and play a crucial role in the prevalence of morbidity and mortality. AF is related proportionally with aging and structural heart diseases such as hypertension, valvular heart disease or coronary artery disease. According to the World Health Organization (W.H.O), around 2% of people with age less than 65 have experienced the AF before, while the ratio increases sharply to reach 9% of people older than 65 years. For example, in United States of America the estimation shows that between (2.7 to 6) million people have atrial fibrillation. A study published in 2014 by Chugh and his team focused on the global distribution ratio of atrial fibrillation, showed that about 0.5% of population around the world producing more than 33.5 million people around the world suffering from atrial fibrillation, the study predicted that in 2050 the number of person in USA who are suffering from atrial fibrillation will increase rapidly to reach 8 million [1].

Atrial fibrillation characterized by supraventricular tachyarrhythmia with nonorganized and ineffective atrial contraction leading blood flow from atria to ventricles to be irregular and chaotic. Electrocardiogram (ECG) shows the deficiency of p-wave and irregular ventricular contraction (QRS) which can aggregate some blood in atria without pumping into the ventricles due to faulty electrical signal suddenly start firing at the sinoatrial (SA) node being at another part of atria or beside the pulmonary veins, as a result atrioventricular (AV) node flooded with these electrical pulses can’t send them to ventricles as fast as they arrive, producing the atria and ventricles to beat more fast than normal but in unsynchronized way. Therefore loss of atrial activity can significantly reduce the cardiac output and increase the filling pressure [2]. Consequently, AF can be classified based on episodes’ duration; Paroxysmal AF starts suddenly without any indications and terminate spontaneously or with intervention in less than week, while Persistent AF and Longstanding persistent AF can be reoccurred for more than one week up to 12 months, but in case of permanent AF continues renewing despite the treatment and intervention.

Researches and studies have identified various risk factors associated to atrial fibrillation. Structural remodeling is the most noticeable change occur into atrial tissues properties such as fibrosis and atrial size, these changes in atrial structure may refer to myocardial cell stretch, neurohumoral activity and oxidative stress [3]. These types of changes promote the abnormality of atria structure leading to defects in electrical conduction predominantly contributing to reentry and rotor formation. Also, electrical remodeling shows a significant profile to generate atrial fibrillation by changing ionic current, variation of Ca²⁺ can develop AF, studies such as (Shan et al.2012) have demonstrated the relation of altered Ca²⁺ controlling and delay after depolarizations which influence the formation of electrical impulses disorder [4]. While increased K⁺ current alert resting potential producing reduction in atrial refraction and wavelength, this mechanism has supported by in vitro research achieved by (Pandit et al. 2005) and his team [5]. On the other hand, genetics and mutation play a role to influence the incidence of atrial fibrillation, where the independent risk of AF in the offspring was significantly increased for parents who had at least one of them with previous AF [6]. Mutation leading to increase channels activity including potassium and accessory proteins channels are linking to AF which may reduce the duration of action potential and refractoriness in the atria leading to early after depolarization[7]. Currently, management of atrial fibrillation include the use of anticoagulant medications, cardiac catheterization and ablation as well as surgical interventions.

Cardiac catheterization and ablation principles

Cardiac catheterization is an invasive medical procedure for diagnoses and treatment of heart problems. Typically, cardiac catheterization take place under local anesthetic, while Cardiologists insert long, thin and flexible wire or tube called catheter through artery or vein at patient’s arm, neck or groin to reach the heart under the guide of fluoroscopic X-ray combined with injected of certain type dye known as contrast medium enabling the visibility of blood stream into the blood vessels to detect any narrowing or blocking. Cardiac catheterization is useful to correct hear diseases; coronary heart disease can be treated by placing a stent guided by the catheter and tiny balloon, which prevent obstructive or narrowing of the artery and support blood flow, heart valves can be replaced or repaired by catheterization. Also, cardiac catheterization as diagnoses procedure can provide a significant medical information about the heart including internal pressure measurement and oxygen concentration, check the pumping efficacy of heart, take biopsy and diagnoses of congenital heart defects [8].

On the other hand, treatment of heart arrhythmia including atrial fibrillation achieves by a medical technique known as catheterablation which is based on the fact that each arrhythmia related to critical anatomic area generate or propagatenonorganizedimpulses required to sustain and initiate the arrhythmia. Selective destruction of desired region of
myocardial tissue using local heating or freezing such as radiofrequency energy, cold laser or nitrous oxide can be applied through catheter tip inserted and threaded into a groin or neck to cardiac tissue, sometimes irregular electrical impulses originated at pulmonary vein causing atrial fibrillation. Cardiac ablation mechanism can reroute or reorganized irregular electrical impulses or ablate certain region of heart tissue or pulmonary vein generating abnormal cardiac rhythm. Catheter ablation technique for the treatment of atrial fibrillation can be categorized regarding the technology and principles of operation. Radiofrequency ablation can be described as an electrical current at frequency ranged from (300-1000) kHz generate a heat at catheter tip used to ablate certain area of heart tissues or isolate the pulmonary vein. The magnitude of heating energy is proportional to power density into cardiac tissue which inversely depend on the radius of catheter tip, therefore small area of heart tissue heated directly by the catheter tip while the reaming tissue heated by conduction. Unipolar radiofrequency catheter has a wild range of available probes used during the cardiac ablation for different area of heat tissue, but it was observed that the available resulting is less efficient and produce more thrombogenic behavior in the creation of scar tissue with heat and is often irrigated to provide a more even distribution of heat and prevent charring[9]. Bipolar radiofrequency ablation use a jaw clamping tip provide an impedance measurement of cardiac tissue to support real-time assessment during heating cardiac tissue until irreversible protein denaturation occur. The outcomes of using bipolar radiofrequency technique for atrial ablation demonstrate that is safe, more efficient and doesn’t develop collateral destroy to surrounding tissue, also has better results in performing transmurally with shorter procedural time[10]. Many studies and researches have investigated the factors affect cardiac ablation, experimental studies explained the association of catheter tip with higher temperature and larger radius works more effectively and developed larger lesion size. Other research achieved by Sunil Nath and coworkers demonstrated the effect of temperature into myocardial tissues, the electrode temperature above 50C° is necessary for irreversible cardiac injury, while the 100C° temperature promotes coagulation of tissue and increase the electrical impedance, therefore it is essential tooadjust the radiofrequency to certain value of power developing temperature less than 100C°[11]. In addition to that, duration time of radiofrequency energy is significant for lesion formation and should be applied for 45 s at least. Pulsed delivery energy may show more advantages because of surface cooling by convention at catheter tip point is faster than conduction with tissue, thus 100C may be reached at 3 mm without boiling happened at the contact point between tip and tissue[12]. Many limitations may appear in conflict differences between the recorded temperature and the true value at the tip to cardiac tissue due to non-close contact at the targeted site, or in other cases the electrode tip become parallel to targeted tissue rather than perpendicular causing accessory pathway ablation through trans septal approaches and reducing the ablation efficiency. Therefore, the continuous temperature monitoring via thermistor ablation catheter will promote safety, effectiveness and allow operator to evaluate tissue heating and catheter stability. Increasing the size of electrode or catheter tip will directly affect the temperature distribution at the tip, creating a phenomenon known as edge effects where the temperature at the edge exceed the core electrode[13]. Furthermore, radiofrequency ablation catheter develops relatively small size lesion due the fact that the lesion size increases until reaches a particular plaque. In vivo experimental have demonstrated that in radiofrequency ablation, lesion size increases within the first 30 seconds, but the rate of enlargement sharply reduced with continuous power delivery[14].

Cryoablation is unique invasive treatment procedure for cardiac arrhythmia by freezing targeted area of heart tissue generating defective electrical impulses, during cardiac cryoablation nitrous oxide or halocarbon gas refrigerated at high pressure delivered from a special tank toward the catheter tip, when it sprayed at the tip it starts to evaporate and absorb heat from targeted tissue, after that the warmed gas is vacuumed back through coaxial tube attached to the catheter tip. One benefit of cryoablation is that enabling ice mapping to evaluate aim tissue at temperature between -28C° to -32C° before performing irreversible phase, tissue destruction process start at -60C° for at least two minutes’ duration. In vitro and in vivo investigation showed that heart tissues are more sensitive to enhance cell death by freezing rather than other type of human tissues[15]. Weimer et al 2007 used a cryoablation at -20C° to freeze heart tissue and the outcomes of his work was confirmed when applied for longer duration. Freezing rate is an important factor for cell destruction including slow rate which lead to develop extracellular ice harming closely packed cells, attached tissue to cryoablation catheter tip freezing rapidly while the cooling rate at adjacent tissue slows as the volume of frozen tissue enlarged, blood flow can perform heat exchange equilibrium in 10 to 15 min[16]. A significant reason for enhanced cell death by repeating freezing procedure is the increment of freezing rate at the second cooling stage occurred by pre-freezing surrounding tissue decreased heat associated to first cooled tissue, leading to more extensive intracellular ice crystallization[17]. Over time the lesion become sharply noticeable from adjacent tissue and replaced by fibrosis and fatty tissue which is main indication for a cut cell death. The lesion of cryoablation showed less thrombogenic behavior compared with radiofrequency ablation as a result of the preservation of endothelial cells and tissue ultrastructure[18].

Furthermore, high intensity focused ultrasound (HIFU) is a new ablation technique based on a high frequency acoustic wave propagates across tissue, the ultrasound wave develops a mechanical vibration of particiules within tissue medium which absorbing the energy of the waves and coverts it as dissipated heat causing thermal injury for targeted tissue, further tissue destruction occurred due to the acoustic cavitation developing microbubbles by propagated ultrasound waves. Microbubbles improve the effect of HIFU by generating non-absorbable medium which increase the acoustic impedance[19]. Ultrasound energy can be focused at narrow beam using acoustical or electrical focusing technique producing rapid increment of temperature up to 80 C° within 60 seconds creating thermal damage into limited volume without direct interaction between probe and tissue [20]. Clinical investigations have performed in vitro and in vivo to show the successful results of using HIFU for treatment of atrial fibrillation. Ninet et al. 2005 and his team achieved a multicenter study including 5 heart center in Europe, follow up patients with paroxysmal AF and had treated by HIFU.
found that 85% of the patient were free from atrial fibrillation after six months [21]. Other studies declared that the lesion size is dose dependent and proportionally related to the duration time and the power of ultrasound wave. The lesion deep may be reached up to (11 mm) and demarked with normal surrounding tissue [22]. The therapeutic application of HIFU for atrial fibrillation is considerably limited due to critical complications such as pulmonary embolism, phrenic nerve damage and even mortality compared with radiofrequency and cryoablation [23].

Therapeutic Approaches for Atrial Fibrillation

Recently the management of atrial fibrillation includes the use of rate and rhythm control strategies in parallel with surgical interventions. treatment strategies diletver to pathophysiological mechanism developing structural changes essential to prevent occurrence and reoccurrence of atrial fibrillation.

Rate control

It is useful approach in older patients above 65 years of age with chronic situation, suffering from limited symptoms as they control cardiac ventricular rate by targeting the atrioventricular node (AVN) which is responsible to transmits electrical signals from the atria to the ventricles including β-adrenergic receptor blockers, calcium channel blockers and digitalis glycosides. Therapies for rate control included adjusted doses of beta-blockers with digitalis to achieve the targeted heart rate which prolong AVN refractoriness (reduce conduction velocity) by eventually reducing sympathetic tone or voiding Ca²⁺ overload to slow ventricular rate at relax and during exercise without converting the heart to a regular rhythm [24]. Combinatorial uses of β blocker or calcium channel blockers have established basic indication and cardiomyopathy associated with a rapid heart rate but can also relieve heart failure symptoms by lengthening diastole [25]. However, some complications related to control drugs can slow the heart beat too much developing sinus bradycardia and heart block. Patients experienced these symptoms may need surgical interventions such as implantation of pacemaker or ablation for AV node to reorganized ventricular rate [26].

Rhythm control

Rhythm control approach seek to find cardioversion by converting the heart inti sinus rhythm through antiarrhythmic medication in combined with direct electric current. Clinical evaluation proved it is favorable strategy for patients intolerant to rate control or younger patients with limited heart disease complications. Direct current cardioversion is essentially used to restore sinus rhythm, especially for rapid tachycardia and hemodynamic instability. Patients suffering of atrial fibrillation treated with anticoagulant therapies are subjected to electrical currents (monophasic or biphasic waveforms) via metal pads or patches that are synchronized with the R wave to depolarize the atrial tissue that initiate the reentrant circuits. Consequently, the circuits no longer generate or propagate because the atria essentially become refractory. Clinical researches have demonstrated the advantages of biphasic cardioversion, low-energy, current flows in both directions producing greater efficiency shock with less energy compared with monophasic [27]. Furthermore, rhythm control can be performed by invasive ablation procedures, especially for patients who are intolerant to conventional rhythm control approaches or when medication show ineffective or toxic.

Commercial catheter ablation devices

Several commercial systems and devices are available to support and treat patients suffering from atrial fibrillation. Stryker corporation have a radiofrequency generator called MultiGen which have the ability to support 4 lesion simultaneously with independent control which can significantly reduce the overall procedure time, also it can support monopolar and bipolar catheter at the same time. Medtronic as a leader company develop Cool Tip RF Ablation which is a unique radiofrequency system based on internally circulated chilled water into the catheter tip to cool the surrounding tissue around the target area, this allow to decrease treatment time where 6 lesion can be performed into 16 min. The RF source contain exclusive feedback algorithm to monitor tissue impedance and automatically adjust out deliver power through a thermocouple at the catheter tip which can measure tissue temperature. Switching controller allow to use three electrodes at the same time with different power setting [28]. Furthermore, RF 3000™ Radiofrequency Generator manufactured by Boston scientific company to support 4 different type of catheters, Chilli cardiac RF catheter with closed loop cooling system prevent fluid infusion to the patient, thus will not cause any saline clouds interference. While Blazer II XP temperature ablation catheter has unique clinical results with outstanding safety profile, simplicity using and temperature control. In addition to that, IntellaTip MiFi XP uses MiFi sensor based on new technology of high resolution catheter for ablation. It is designed to support highly localized electricity of unsurpassed clarity to make clinical see the critical information in real time [29].

Cryoconso is cardiac ablation system found by Medtronic corporation stores and controls the delivery of the liquid (N₂O) through the coaxial tube to the catheter, recovers the refrigerant vapor from the catheter under constant vacuum, and disposes of the refrigerant through the hospital scavenging system. While the AtriCur medical company have a cryoICE BOX V6intuitive and reliable cryosurgical treatment of cardiac arrhythmias supported a wild range of cryoablation catheters. Boston Scientific and AtriCor have signed an agreement to improve and develop a CryoCor console to deliver cryo energy to Boston Scientific's proprietary cryo catheter and balloon [30].

St. Jude Medical developed HIFU systems; UltraCinch enables creation of a uniform, continuous, linear lesion during cardiac ablation. It can be placed securely around the patient’s atrium while transducers apply HIFU energy safely and precisely through the targeted tissue. The UltraCinch device is offered in seven sizes to accommodate varying patient anatomies. Also, the UltraWand handheld ablation device using the same transducer technology as in the UltraCinch device, the UltraWand allows complimentary linear lesions to be created during cardiac ablation procedures. This provides physicians with the flexibility to create the lesion set that is most appropriate for each patient. The Epicor Positioning and Sizing (PAS) System is dual-purpose designed to indicate the proper UltraCinch device size.
and act as a guide for simple, accurate placement of that device. It is designed to track smoothly through the cardiac anatomy, and to facilitate less invasive approaches. The tourniquets ensure secure placement of devices on the patient’s heart[31].

REFERENCES


A Literature Review of Impacts of Climate Change and Urbanization on Water Resource Management; an Asian Perspective

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Abstract- Urbanisation and climate change are directly linked to each other. This is because urbanisation accelerates human activities that result in emission of greenhouse gases which are a major cause of climate change. Both climate change and urbanisation have catastrophic impacts on natural resources, especially water resources; whereby affecting the management of the same. The impacts of climate change and urbanisation on water availability and water quality affect many sectors, including energy production, infrastructure, human health, agriculture, and ecosystems. The impacts of these two phenomena on water resources management are also similar; and or linked to each other.

Index Terms- Urbanisation, Climate Change, Water resources, Asia

I. INTRODUCTION

Urbanisation is defined as the increase in the proportion of people living in towns and cities. It can also be defined as the process whereby a society changes from a rural to an urban way of life. (MeSH, 2017). People move from rural areas to urban areas for various reasons such as escaping from poverty, seeking employment and desire to live a better and modern life. The reasons vary depending on the country and other factors. The urbanisation trends are changing the landscape of human settlement, with significant implications for living conditions, the environment and development in different parts of the world; it is clear that Urbanization and growth go hand in hand, and no one can deny that urbanization is essential for socioeconomic transformation, wealth generation, prosperity and development. Climate change on the other hand is described as the change of weather conditions which is attributed directly or indirectly to human activity that alter the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods. This is manifested in unpredictable weather conditions throughout the year; that may go to extremes.

Water is one of the most importance resource in the world. Human, animal and plant life depend on it. Not all the available water is useable, but only the freshwater which according to (USGS, 2016) is just 2.5% of the Earth’s water. Human beings need freshwater for domestic, agricultural and industrial use. The availability of water therefore is vital to human, animal and plant survival. On the contrary, availability of too much water causes catastrophic impact on human, animal and plant life. Thus Water resources are important to both society and ecosystems. We depend on a reliable, clean supply of drinking water to sustain our health. We also need water for agriculture, energy production, navigation, recreation, and manufacturing. Many of these uses put pressure on water resources, stresses that are likely to be exacerbated by climate change and urbanisation. There is therefore need to have particular attention on all the world phenomena that contribute to availability of either too much or too little water resources.

Climate change and urbanisation affect each other in many ways and as well pose similar or related impacts on water resources management. This paper reviews the impact of climate change and urbanization on water resources management.

II. The Status and Trend of Urbanisation, Climate Change and Water Resource

A lot of research and reviews have been done and documented on the impact of Urbanisation and Climate change on water throughout the world. This is mostly because the two are threatening the availability and quality of one of the most important resource on earth, water. Both climate change and urbanisation are equally imposing mainly negative impact on water resources management. Climate change, water, poverty and livelihoods are intimately intertwined in the developing world where climate change is likely to be experienced primarily as increased variability in rainfall and availability of water.
Particularly vulnerable to these climatic changes are the rain fed agricultural systems on which the livelihoods of a large proportion of the region’s population currently depend. As agricultural livelihoods become more precarious, the rate of rural–urban migration may be expected to grow, adding to the already significant urbanization trend (Serdeczny et. al., 2017). It is no coincidence therefore that climate change has become a pressing international development agenda simultaneously with urbanization, offering many opportunities for climate change adaptation, mitigation and disaster risk reduction. Between 1950 and 2005, the level of urbanization increased from 29 per cent to 49 per cent, while global carbon emissions from fossil-fuel burning increased by almost 500 per cent (World Cities Report, 2016).

There are many ways in which urbanisation affect water and the Environment as a whole. Urban populations as a result of urbanisation, interact with their environment. Urban people change their environment through their consumption of food, energy, water, and land. And in turn, the polluted urban environment affects the health and quality of life of the urban population. (Torrey B., 2004). Urbanization, according to (Torrey B, 2004), also affects the broader regional environments. Regions downwind from large industrial complexes also see increases in the amount of precipitation, air pollution, and the number of days with thunderstorms; which in turn has a great impact on the water levels and quality.

Urbanisation is also to an extent an effect of increased population around the world. Across Africa, the United Nations is projecting a population increase from about 1 billion in 2011 to over 2 billion in 2050 and over 3 billion in 2100 (UN, 2011). With this increased population, one implication of the changing climate is that rising temperatures will not only increase food and water stressors but also increase broader population scale water insecurity. Again an increase in human population leads to a rise in human encroachment into flood plains; this coupled with and lack of flood response plans increase the damage potential. The observed increase in precipitation intensity and other observed climate changes, e.g., an increase in westerly weather patterns during winter over Europe, leading to very rainy low-pressure systems that often trigger floods (Kron and Berz, 2007), indicate that climate change might already have had an impact on the intensity and frequency of floods. Changes in rainfall variability over space means that although some areas will experience increases in rainfall, many will receive it in the form of intense precipitation events, especially in tropical and high-altitude regions (Bates et al., 2008).

### III. Impacts of Climate change on Water Resources Management

Climate change affects water resources management in a sense that it leads to either too little or too much water. In many areas, climate change is likely to increase water demand while shrinking water supplies. This shifting balance would challenge water managers to simultaneously meet the needs of growing communities, sensitive ecosystems, farmers, ranchers, energy producers, and manufacturers. The impact of climate change on water resources management therefore include Drought, floods and reduced groundwater levels, water pollution and increased water demand.

**Drought**

Climate change has over the years led to extended dry spells in otherwise rain season. This leads to general shortage of water for Agricultural, industrial as well as household use. Since fresh water bodies are not evenly distributed world over, drought causes a major disturbance for communities that reside in areas far away from the major water bodies. Such communities start scrambling for the little available water or they resort to migrating to other places where there is water. In the same line climate change increases the evaporation rate as a result of extended sunny days leading to loss of even more water. Increased evaporation rates are expected to reduce water supplies in many regions. The greatest deficits are expected to occur in the summer, leading to decreased soil moisture levels and more frequent and severe agricultural drought. More frequent and severe droughts arising from climate change will have serious management implications for water resource users. Drought can cause coastal water resources to become more saline as freshwater supplies from rivers are reduced. Water infrastructure in coastal cities, including sewer systems and wastewater treatment facilities, faces risks from rising sea levels and the damaging impacts of storm surges (CCSP 2008).

Drunken leads to water shortage. The Indian water crisis in 2016 is a good example. 330 million people were affected in India in 2016 (BBC, 2016). India is heavily dependent on monsoon rains, which had been poor for two years in a row.
Tankers and trains were used to deliver water to the communities to save their lives.

**Floods**

Due to climate change, surface temperatures are expected to increase the proportion of winter precipitation received as rain, with a declining proportion arriving in the form of snow. A variety of climatic and non-climatic processes influence flood processes, resulting in river floods, flash floods, urban floods, sewer floods, and glacial lake outburst floods (GLOFs) and coastal floods. These flood-producing processes include intense and/or long-lasting precipitation, snowmelt, dam break, reduced conveyance due to ice jams or landslides, or by storm. Floods depend on precipitation intensity, volume, timing, phase (rain or snow), antecedent conditions of rivers and their drainage basins (e.g., presence of snow and ice, soil character and status (frozen or not, saturated or unsaturated), wetness, rate and timing of snow/ice melt, urbanisation, existence of dykes, dams and reservoirs). Floods in both rural and urban areas cause destruction of human, animal and plant life. Floods among other things destroy water conservation structures such as dams, wells and pipes. This therefore shows that floods due climate change render the management of water resources very difficult.

**Reduced groundwater levels**

Due to extended dry spells in the rain season as a result of climate change, the ground water is not recharged for a period of one year or more. This means that water table levels keep on decreasing; as such some existing wells will not be deep enough to get water and might run dry.

Additional effects of global climate change that have important implications for water resources include increased evaporation rates, a higher proportion of precipitation received as rain, rather than snow, earlier and shorter runoff seasons, increased water temperatures, and decreased water quality in both inland and coastal areas. Reduced groundwater levels mean that the water becomes inaccessible for human, animals and plants; hence making survival difficult. Governments around the world it this situation thus find it difficult to supply water to their citizens, as a result of the depletion of the main source; groundwater. A good example is China; it is said that he most developed Chinese cities rely on groundwater, which is being overexploited by 22 billion cubic meters per year. (Batemane, 2014)

**Water Pollution**

Climate change also greatly compromises water quality. Water quality suffers in areas experiencing increases in rainfall. For example, in the Northeast and Midwest increases in heavy precipitation events could cause problems for the water infrastructure, as sewer systems and water treatment plants are overwhelmed by the increased volumes of water. (USGCRP, 2014). Heavy downpours increase the amount of runoff into rivers and lakes, washing sediment, nutrients, pollutants, trash, animal waste, and other materials into water supplies, making them unusable, unsafe, or in need of water treatment.

**Increased Water Demand**

Climate change also leads to increased temperatures. As temperatures rise, people and animals need more water to maintain their health and thrive. Many important economic activities, like producing energy at power plants, raising livestock, and growing food crops, also require water. The amount of water available for these activities may be reduced as Earth warms and if competition for water resources increases. This poses a huge challenge to water managers.

**IV. Impacts of Urbanisation on Water Resource Management; a case of Shanghai City in China**

Just like Climate change, Urbanisation also has great impact on water resource management. The interesting part is that urbanisation also contributes to climate change in some way. The impact of urbanisation on water resources management thus include leading to water scarcity, water pollution, urban
waterlogging and waterway flushing. All these make it difficult to manage this precious resource, water.

**Water resource Scarcity due to Increased Demand and Consumption**

As earlier defined, Urbanisation simply means people moving from rural area to live in an urban area. Thus it result into having a much higher population in the urban areas; towns and cities than in rural areas. The tricky part is that when the people come in to live in the urban area, they do not bring with them such important resources as water; thus they increase the competition for the available resources. In so doing, they make it difficult for the authorities in the urban areas to provide water to all the people. This therefore puts pressure on the ground water resources as too much of it is used and hence depletion. For example a study by (Maotian et al., 2017) shows that in the past three decades, water consumption has greatly increased in Shanghai city as a result of continued urbanisation. This is showed in the two graphs below.

**Graph A**

A graph showing Shanghai population from 1978 to 2012. (Maotian et al., 2017)

**Graph B**


The two graphs show that as the population of Shanghai City has been increasing, the water demand and consequently consumption has also been increasing.

**Water Pollution**

An increase in the number of people living in one area; urban area means an increase in the amount of waste being released. This happens in both urban residential areas and in the streets. The too many people living in one area renders it difficult to do waste management, the waste that’s end up in rivers and streams, making the water unsafe to use.

Again when rain water comes in contact with urban surfaces such as roofs, roads and footpaths, it becomes contaminated with oil, metals, litter and other pollutants. This consequently contaminate main water bodies such as lakes.

Water pollution also results from poor sewage facilities and disposal of industrial heavy metals into waterways. As a result of urbanisation, production industries boom, resulting into production of even more wastes than before. This puts factory owners under pressure to meet the increasing demands and then they end up neglecting waste management regulations. They thus resort to dumping the untreated wastes into water ways. The wastes dumped in rivers, apart from making the water unusable, they also produce a foul odour. The good example in Shanghai is the Suzhou River where many people along it sold their land and relocated to other places because the smell was becoming unbearable. This clearly shows that polluted water is difficult to manage and pose a health risk to people living near or around the polluted rivers.

**Urban Waterlogging and Floods**

Urbanisation greatly contributes to the growth of the towns and cities; new buildings are constructed at a very high rate in an effort to providing necessary services to the ever increasing population but also to make the area modern. This makes the whole area almost covered by buildings leaving so
empty space for water infiltration. During heavy rainfall events, large volumes of stormwater collect on sealed surfaces and flow into the stormwater drainage network. Flooding can occur when the volume of stormwater exceeds the capacity of the stormwater drains. This can cause flooding in areas not necessarily close to waterways. Since urban areas are greatly constructed, they reduce the infiltration of water and lower the water tables; water does not infiltrate through impervious surfaces. As the urban area grows, there is also an increase in the proportion of the impervious surface (Wang et al., 2017). Table 1 bellow shows that as the City of Shanghai grows, there was an increase increased proportion of impervious surface from 2002 to 2013.

<table>
<thead>
<tr>
<th>Year</th>
<th>Downtown</th>
<th>Pudong</th>
<th>Minhang</th>
<th>Baoshan</th>
<th>Jiading</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>55.66%</td>
<td>17.98%</td>
<td>34.03%</td>
<td>49.47%</td>
<td>18.89%</td>
</tr>
<tr>
<td>2007</td>
<td>83.95%</td>
<td>43.69%</td>
<td>62.03%</td>
<td>70.21%</td>
<td>47.08%</td>
</tr>
<tr>
<td>2013</td>
<td>82.68%</td>
<td>45.02%</td>
<td>62.11%</td>
<td>72.13%</td>
<td>47.21%</td>
</tr>
</tbody>
</table>

Table 1. Proportion of imperious surfaces in Shanghai from 2002 to 2013

The more the impervious surface increases in the urban areas, the less the water infiltrates into the soil and the more waterlogging occurs. This means that runoff occurs more rapidly with greater peak flows. Flood volumes increase, as do floods and water pollution downstream. Waterlogged urban areas does not only make it difficult for authorities to manage the water resources, it also prevents recharging of groundwater. As illustrated in the graph below; urban runoff and flooding increase and urbanisation increases.

Waterway flushing
When it rains, the volume of stormwater entering the waterways in urban areas increases. Water that would usually soak into the ground floods into the stormwater drainage network, where it is transported directly to our waterways. This again poses a challenge to water resource managers as sometimes the waterways are destroyed.

V. Conclusion and Recommendations
Climate change and Urbanisation are some of the most popular phenomena in the current era of development. Almost all governments in the world are fighting to developing theirs countries. On the course of development comes urbanisation whose effects greatly contribute to climate change. Both Urbanisation and Climate change have a great impact on natural resources such as water, air, trees, soil, animals; etc. This paper has highlighted some of the impacts of Urbanisation and Climate Change on water resources management. The impacts among others include; water scarcity, floods, reduced groundwater levels, drought, pollution and urban waterlogging. All these pose a big challenge to managing on of the most precious resource world over, water. Water is one of the most important resources for human, animal and plant survival. There is a great need therefore to sustainably manage this resource which is already scarce and unevenly distributed.

There is need for strong rules and regulations to curb the effects of urbanisation and climate change; and above all there is need to establish measures that will prevent people from migrating to urban areas such as by establishing industries within the rural areas to create employment. The impacts of Both Climate Change and Urbanisation can be reduced by adoption of Green technology such as Sponge City concept of constructing the
urban structures as well as adoption of clean energy such as solar energy; but also controlling population.

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**REFERENCES**


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Assessment of Rainwater Harvesting Technologies in The Upper Takatu-Upper Essequibo Region of Guyana.

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Abstract- Water scarcity severely impairs food security and economic prosperity in many countries today. The scarcity of water is directly linked to climate change, and its impact is clearly visible given the temperature and rainfall variability, and occurrences of drought that have increased and intensified over the last two decades. Rainwater harvesting (RWH) is listed among the specific adaptation measures that the water sector can use to cope with water scarcity due to climate change. However, there is limited application of RWH, despite its high potential for alleviating the impacts of climate change. Region # 9 or the Upper Takatu-Upper Essequibo Region of Guyana experiences erratic rainfall and hence often fails to support rain-fed agriculture due to recurrent droughts and flooding resulting in persistent crop failure and subsequent food shortages in the district. As a result, the Government of Guyana intervened to address the water deficit issues in some communities in Region 9 by implementing some RWH schemes/projects. This paper thus seeks to review how RWH systems have been applied in other regions in the world. The present investigation also proposes an analysis of Guyana’s rainwater situation in aspects such as the cost analysis and the capacity depending on specific areas of this study, more over it indicates the necessity of further exploration, for different parameters to determine the optimum water capacity of the implemented systems.

Index Terms assessment, rainwater harvesting, technology, agriculture, Guyana, climate change,

I. INTRODUCTION

Water availability is crucial for the global economy since it is a vital resource in many forms of industry including agriculture, electric power generation and industrial manufacturing[2] [3–5]. However, in recent times water is becoming scarcer globally and it is becoming more apparent that it will become even more so in the future [3], [4]. Expected future population changes will, in many countries as well as globally, increase the pressure on available water resources thereby impairing food security and economic prosperity in many countries globally. The scarcity of water is directly linked to climate change, and its impact is clearly visible given the temperature and rainfall variabilities, and occurrences of drought that have increased and intensified over the last two decades. It has been estimated that about 70% of water used worldwide is used for agriculture with developing countries presenting the highest percentage as a result of growing population. The reduced water availability is already impacting food commodity prices, as shown by last year’s sharp increase in global rice prices triggered by a drought-induced collapse of rice production in Australia. This prevailing situation has thus made it imperative to come up with alternative water supply measures to help deal with the scarcity of this vital resource.

Rainwater harvesting (RWH) is listed among the specific adaptation measures that the water sector can use to cope with water scarcity due to climate change. However, there is limited application of RWH, despite its high potential for alleviating the impacts of climate change. RWH is a general term which describes the concentration, collection, storage, and use of rainwater runoff for both domestic and agricultural purposes [6] [7]. Besides its application to agriculture, RWH may be developed to provide water for human consumption, other domestic activities, environmental purposes, and a number of small-scale productive activities [6] [8]. Other than large reservoirs, small on-site rainwater harvesting systems (RHSs) have been successfully implemented as alternative water supply
sources in some countries like Japan, India, Singapore, Zambia, South Africa and the United States [8]–[12].

There are three major forms of RWH, namely In situ RWH, External water harvesting and domestic RWH [13]. In situ RWH is collecting the rainfall on the surface where it falls and storing in the soil. External water harvesting is collecting runoff originating from rainfall over a surface elsewhere and stored offside, both are used for agricultural RWH. Domestic RWH (DRHW) is where water is collected from roofs and street and courtyard runoffs [13]. Examples of these techniques include tied ridges, infiltration pits and fanyajuus which are all aimed at achieving sustainable agriculture [14].

II. RAINWATER HARVESTING FOR DRINKING PURPOSES

In Zambia, a study was conducted to investigate the applicability of rainwater harvesting in urban areas [15]. The concept of rainwater harvesting has been in use before in Zambia but mainly in rural areas. There was need to investigate what style of rainwater harvesting was suitable, the quality of harvested water, affordability of the system by utilizing local materials and skill, and economic and socio-cultural aspects. Two areas were selected based on the degree of water scarcity. The results of a survey indicated that water was among the two main agendas by the Residential development committee [8]. Design of the systems was based on the mass curve analysis for storage and rational formula for the gutters. Samples from the roof water system showed that the water can be used for drinking [15]. Although one cannot draw conclusions on the water quality based on one sampling, the indication was that the water which would be harvested from the pilot stations could be used for drinking purposes [15].

On the basis of hydrological and technical as well as social and cultural conditions, appropriate solutions for RWH were developed and evaluated in central northern Namibia [12]. Two small-scale RWH systems are examined: roof catchments using corrugated iron roofs as rain collection areas and ground catchments using treated ground surfaces. The feasibility of the RWH systems was assessed in relation to local socio-economic conditions. The calculations reveal that it is economically feasible to apply decentral techniques of RWH in terms of the roof catchment systems. Moreover, the proposed technologies provide comparable benefits to the public water supply. The ground catchment system, however, needs moderate subsidies to obtain the same benchmark.

Rainfall harvesting from rural/urban catchments has not received large attention in Jordan [16]. In the absence of run-off sewer systems in most Jordanian rural and urban areas, rainfall harvesting from roads, parking lots and rooftops can increase water supply for various domestic uses and help combat the chronic water shortages in the country. The Main aim of this paper is to measure the potential effects of using rainwater in residential areas of 12 Jordanian areas and to provide recommendations to improve and enhance the process of rainwater harvesting. Results show that a maximum of 15.5 Mm3/y of rainwater can be collected from roofs of residential buildings provided that all surfaces are used and all rain falling on the surfaces is collected. The potential for potable water savings was estimated for the 12 governorates, and it ranged from 0.27% to 19.7%. Analysis of samples of harvested rainwater from residential roofs indicated that the measured inorganic compounds generally matched the WHO standards for drinking water. On the other hand, fecal coliform, which is an important bacteriological parameter, exceeded the limits for drinking water [17].

Recent severe droughts, concerns over the environmental impact of storm water runoff and increased water demands have generated interest in rainwater harvesting systems in humid, well developed regions, such as the southeastern United States. To study the use of rainwater harvesting in the region studies were conducted at three rainwater cisterns in North Carolina. Computer model simulations were conducted for 2081 rain barrels and larger cisterns. Results of the monitoring study showed that the rainwater harvesting systems were underutilized, which was suspected to result from poor estimation of water usage and public perception of the harvested rainwater. The computer model simulated system performance by evaluating a water balance using historical rainfall data and anticipated
usage. Simulation results showed that a rain barrel was frequently depleted when used to meet household irrigation demands and overflowed during most rainfall events. Simulations also illustrated the improved performance of large systems while providing an indication of diminishing returns for increased cistern capacity increase in agricultural productivity, and improving environmental management through water conservation, reduction of soil erosion and resuscitation of wetlands in the study area. However, the major constraints facing technology adopters were water distribution problems, labour shortage, and water logging during periods of high rainfall.

Since 2006, around 600 rainwater harvesting systems have been constructed for agricultural irrigation in Beijing. A study was done to analyze economic and financial performance of the constructed rainwater harvesting systems in rural areas of Beijing through the method of cost benefit analysis [20]. The results showed that the rainwater harvesting systems are economically feasible. However, the financial feasibility of rainwater harvesting systems depends on the charge for groundwater and on the size of the rainwater harvesting systems [20].

A field study was conducted to determine the effect of a combination of ridge and furrow method of in-situ rainwater harvesting with gravel mulch on corn production, soil moisture storage, and water-use efficiency in the dry semi-arid region of China [21]. Results showed that plastic-covered ridges had an average runoff efficiency (runoff/rainfall) of 87% as compared to 7% for bare ridges and could generate runoff at a threshold value of 0.8±0.2 mm rainfall. The plastic-covered ridge and gravel-mulched furrow method of rainwater harvesting was effective in conserving moisture and increasing yield and water-use efficiency. The grain yield under this system was 1.9 times that of the conventional flat soil cultivation, and the water-use efficiency was 1.8 times that of the control, which is attributed to the better utilization of light rains, improvement of infiltration in the root zone, and suppression of evaporation losses [21].

### III. Rainwater harvesting for agricultural purposes

In India, a study was undertaken to propose an economic analysis of water harvesting structures for the Soan catchment [18]. The Soan river catchment in the northwest Himalayas is fed only by rainwater [11]. Hence, a strategy of rain fed agriculture had to be developed through water conservation and storage techniques. The purpose of the investigation was thus to see if they could control erosion and conserve water to meet the requirements of supplemental and pre-sowing irrigation for major cereal crops in the area and to maximize agricultural productivity. Benefit/cost ratios ranging from 0.41 to 1.33 were obtained for water harvesting structures of different sizes with estimated life of 25 and 40 years respectively, by taking into account different crop return from maize and wheat [11].

A study was carried out at three sites in Communal Lands of Zimbabwe with the objective to evaluate and recommend rainwater harvesting techniques that ensure effective capture and utilization of rainfall for sustainable crop production [19]. This was achieved through monitoring residual moisture, after every rainfall shower, and determination of maize yields of maize from the different tillage treatments. Tied ridges were ranked in retaining moisture compared to all the other treatments in the season under consideration. The farmers who practiced tied ridges realized yields of about 3 t/ha compared to conventional tillage treatments whose yields were about 1.5 t/ha. Yields were statistically significantly different for the different treatments, with the final recommendation being for the farmers to adopt the tied ridges system in areas that receive marginal rainfall and experience mid-season droughts [19].

Another study examined the contribution of RWH technologies to sustainable agriculture and rural livelihoods in Zimbabwe [14]. The methods employed included a questionnaire survey; key informant interviews and field observations. The main benefits of RWH technologies found in the study were an

### IV. The case of Guyana

Region # 9 or the Upper Takatu-Upper Essequibo Region of Guyana is made up of the Kanuku and Kamoa highlands, and the vast Rupununi savannahs. Located in the south, it is the largest region in Guyana at 57,790 square kilometers and is classified as one of

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the 4 hinterland regions of Guyana. The Upper Takatu–Upper Essequibo region experiences approximately 1500mm to 2000mm of rainfall per annum. However, this rainfall is erratic and unreliable hence often fails to support rain-fed agriculture due to recurrent droughts and flooding resulting in persistent crop failure sand subsequent food shortages in the district. Despite this, rain-fed farming continues to be the principal livelihood activity for most farmers who practice subsistence agriculture. The El Niño episodes of 1997/98 and 2015/16 resulted in water shortages throughout the country. The situation was most severe in the Region # 9, which is generally speaking the driest part of the country. This resulted in the residents of the Region suffering losses in crops and livestock and experiencing severe hardship due to impacts on their livelihoods and welfare.

The information required for evaluating the sustainability and applicability of individual water harvesting techniques is lacking in many settings. Some information is available in peer-reviewed literature and in the reports of government agencies, institutes, and NGOs that implement water harvesting projects [24]. Despite a plethora of studies modeling the feasibility of the utilization of rainwater harvesting (RWH) systems in particular contexts, there remains a significant gap in knowledge in relation to detailed empirical assessments of performance [25]. In light of this shortage of information, we then decided to assess some of the rainwater harvesting systems that have been setup and Region # 9 (see Table 1) and evaluate the cost analysis based on the design and the water capacity in the communities they were setup in.

**Farming activities and water sources.**

In the communities visited, each household had at least one hand dug well that is used for domestic and for irrigation purposes. However, during the months of February to April some of these wells become dry. Some persons are left with no other choice but to source water from their neighbours drilled well or invest in drilling their own deep well.

At Nappi and Annai, subsistence crop farming is mainly practiced for the cultivation of cassava (bitter) manihot utilissima for the production of farine, cassava bread, casareep and other dietary needs. Crop farms are located in close proximity to the mountain foot and forest where rainfall is more frequent. These farm locations can be miles away from the community in some cases at least 8 miles away. Crop production is dependent on rainfed irrigation.

Some of the Annai farms are located in the village of Wowetta in close proximity to the forests and the Kanuka mountain range as a good vantage point to receive rainfall during the dry months. They are also springs located in the mountains that provide water for the farms. However, during the wet season (May to September) these farm locations are affected by flooding that contributes to crop loss. Hand dug wells and existing creeks provide water for a cluster of 8 to 10 farmers to wash and process cassava on their farm locations.

At Aranaputa, Central Lethem and Central Rupununi commercial mixed farming is practiced for the production of vegetables, fruits, grains, legumes, pasture grass, eggs, chicken, duck, pork, mutton, beef and fish. Crop and livestock production are dependent on various sources of water that includes combination of rainfall, hand dug and drilled wells, water catchments, rainwater reservoirs, creeks and rivers. Wells are usually generated by solar, wind and fuel pumps. Each commercial farm location possesses at least two wells (one hand dug and one drilled). The drilled wells serve as a reliable source of water during extreme dry months when the hand dug well fails. At some farm locations where a creek or river is located water is pumped to supply the crops and livestock during the wet season and early dry season (September to February) while the drilled wells are used for the late dry season (February to April).

Pasture and Orchard cultivation are irrigated by rainfall while Plant Nurseries, vegetable crops cultivated in Shaded culture and open fields are irrigated by hand dug and drilled wells and creeks. Rice cultivation is irrigated by river.

**Rainwater harvesting projects**

These projects were implemented to counter the effects of climate change, the Government of Guyana has invested heavily in smart Agriculture which is an approach that seeks to address both food security and climate change. Some of the objectives the Government seeks to achieve is increase in farm income, investment in climate resilient food crops and reduction of greenhouse gas emissions from

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agriculture. One of the ways is through sustainable management of natural resources and expansion of Environmental services i.e. Stewardship of natural patrimony. The Inter-American Institute for Cooperation on Agriculture (IICA) have made funds available to work in collaboration with the National Drainage and Irrigation Authority (NDIA) of the Ministry of Agriculture to develop a number of water catchment ponds in communities of Toka, Rupertee, Annai,Wowetta, Aranaputa, and Massara. The water catchment ponds provided water for livestock and crop production.

Fig 1. Map of Upper Takatu–Upper Essequibo showing the locations of rainwater harvesting projects.

The projects that were assessed mainly consisted of construction of reservoir dams and expansion of natural existing ponds created by the topography of the lands, which are fed by springs and creeks that included Nappi Reservoir, Annai Itch Pond, Massara Pond and the Aranaputa Cattle Pasture Pond. This water harvesting projects have inexpensive earthen lining to aid in sealing the cap.

Table 1: shows a general description of a list of water projects located in the Upper Takatu–Upper Essequibo.

<table>
<thead>
<tr>
<th>Name of Project</th>
<th>Owner</th>
<th>Year Completed</th>
<th>Pond Size (ft x ft)</th>
<th>Total Depth (ft)</th>
<th>Capacity (ft³)</th>
<th>Cost (US Dollar)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nappi Reservoir</td>
<td>Public</td>
<td>2017</td>
<td>1476 x 18</td>
<td>272</td>
<td>4500000</td>
<td>1.250,000</td>
</tr>
<tr>
<td>Annai Itch Pond</td>
<td>Public</td>
<td>2017</td>
<td>380 (dia)</td>
<td>6</td>
<td>20000</td>
<td>31000</td>
</tr>
<tr>
<td>Aranaputa Cattle Pasture Pond/Reservoir</td>
<td>Public</td>
<td>2017</td>
<td>200 x 100</td>
<td>12</td>
<td>8557</td>
<td>22000</td>
</tr>
<tr>
<td>Massara Pond</td>
<td>Public</td>
<td>2017</td>
<td>55 x 40</td>
<td>8</td>
<td>4228</td>
<td>18000</td>
</tr>
</tbody>
</table>

Sourced:[22]

**Nappi Reservoir**
This reservoir was completed in August 2017 and is situated in the village of Nappi. Nappi Village is located on top of a hill three miles away from the base of the Kanuka Mountains With a population size of 719 persons, farming and eco-tourism is done to support the livelihood of the village. Cassava farms occupy an average of forty acres while 280 heads of cattle are owned by individual farmers and or household. The Reservoir water will benefit approximately 3,000 residents for drinking purposes, agriculture, aquaculture, and assist nearby communities[22] The Nappi Reservoir dam was completed in 2017 with a dimension of 450 x 5.5 meters and has the capacity to hold 4.5 million cubic meters of water. It’s equipped with a culvert and a spill weir 35 meters in width.

**Annai Itch Pond**
This pond was completed in September 2017 and is situated in the central village of Annai. Annai Village is located on top of a hill three miles away from the base of the Kanuka Mountains (Guyana Government Ministry of Agriculture, 2016). Annai Itch Pond was developed in the vicinity of an active spring which is the main water supply. This was a joint collaboration with the National Drainage and Irrigation Association (NDIA) of the Ministry of Agriculture and International Institute on Cooperation for Agriculture (IICA). With a population size of 543 persons, farming is the main activity done to support the livelihood of the village. Farms of Cassava (bitter) manihot utlissima occupy an average of seventy-five acres while Bananas, Peanuts and Citrus combined occupy a total of fourteen acres. Approximately 300 heads of cattle are owned by individual farmers and or household. The Reservoir water will be available for agricultural purposes. Presently there is no farming activity being conducted around the pond. Livestock and wild animals source their drinking water from the
pond. However the village plans to cultivate cassava with the use of a drip irrigation system.[23]. The pond size estimates to an average 380 ft in diameter with an average depth of 6ft. The total storage capacity amounts to 26,180ft³ [22]It was recommended that this pond can supply water for 10 acres of land for cultivation[1]

**Massara Pond**
This pond was completed in April 2017 and is situated in the village of Massara which is located in the south east of the Georgetown Lethem roadway and the Rupununi River. This was a joint collaboration with the National Drainage and Irrigation Association (NDIA) of the Ministry of Agriculture and International Institute on Cooperation for Agriculture (IICA). With a population size of 424 persons, farming and cattle rearing is the main activity done to support the livelihood of the village farms of cassava (bitter) manihot utilissima farms occupy an average of sixty acres. Approximately 150 heads of cattle are owned by individual farmers and or household. Currently there is no farming activity being conducted around the pond, however the village plans to cultivate the cassava crop. Livestock and wild animals source their drinking from the pond during the season from October to April. The pond size estimates to an average dimension of 55ft X 40ft with an average depth of 8ft. The total storage capacity amounts to 4,228ft³. [22]This expansion will supply water for the cattle and the farm lands [23].

**Aranaputa Cattle Pasture Pond**
This pond was completed in December, 2017 and is situated at the base of a mountain with a gentle sloping plain where the pasture will be established. An existing spring about 100ft up the slope of the mountain that presently supplies water [23]The Guyana Livestock Development Authority identified the location for the pond while the development was realized as a joint collaboration with the National Drainage and Irrigation Association (NDIA) of the Ministry of Agriculture and International Institute on Cooperation for Agriculture (IICA). With a population size of 604 persons, farming and cattle rearing is the main activity done to support the livelihood of the village. Farms of cassava (bitter) manihot utilissima farms occupy an average of eighty acres. Approximately 875 heads of cattle are owned by individual farmers and or household. This pond was developed to supply water to pasture lands and for local livestock. The Aranaputa Cattle Pasture Pond was developed where it is fed by an active spring located in the mountains. The pond size estimates to an average dimension of 200 ft X 100 ft with an average depth of 12ft. The total storage capacity amounts to 11,193ft³[22] This expansion will supply water for the cattle [1]

The information required for evaluating the sustainability and applicability of individual water harvesting techniques is lacking in many settings. Some information is available in peer-reviewed literature and in the reports of the government agencies, institutes, and NGOs that implement water harvesting projects [24]. Despite a plethora of studies modeling the feasibility of the utilization of rainwater harvesting (RWH) systems in particular contexts, there remains a significant gap in knowledge in relation to detailed empirical assessments of performance [25].

**V. CONCLUSION AND RECOMMENDATIONS**
Water harvesting is a suitable strategy for adapting to water shortages caused by climate change and applicable as an alternative approach to source water in cities across the world [5], [13], [26], [27]. In contrast to water-abundant developed countries, where rain water harvesting is prevalently considered as a backup supply source, very often systems for rainwater harvesting are a primary source of fresh water in several developing and drought-prone developed countries. Constraints such as local regulations and costs of implementation and maintenance play a key role in the system penetration rates and used technology in the various continents.

Historically, challenges to the social acceptance of rainwater harvesting technologies have focused on water quality, risk perception, health risk, as well as financial viability [6], [12], [15], [17]. Despite some households being resistant to using rainwater indoors, it is now acknowledged that rain water harvesting is an acceptable source of non-potable water compared
to other types of water reuse for non-potable purposes.

There have been many studies that assessed the financial viability of rain water harvesting systems [13], [17], [18], [28], [29]. Many of these studies make use of simple tools to match costs and benefits of system implementation. Various results have been obtained on the different level of viability of rain water harvesting systems with regard to the system size [6], [17], [25], [28]. Consequently, future research is expected to provide the streamlining of financial analysis of rain water harvesting systems including multiple beneficial aspects under complex engineering, hydrological, economic and social settings.

New approaches to focus on how to best represent rain water harvesting at larger scales need to be tested in different countries with different climatic conditions. Furthermore, more field data on rain water harvesting systems is required. There is a particular need to dedicate additional efforts to the monitoring of available pilot installations in order to improve quantification and types of rainwater uses [28].

The adoption of rain water harvesting technologies in sustainable agriculture has shown that there is an increase in agricultural production, improvement of people’s standard of living and reduces environmental degradation. However, governments, agencies and donors wishing to advance agricultural development must consider local circumstances and indicators of social and economic conditions when evaluating rain water harvesting technologies.

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A Review Study on Power System Blackouts

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Abstract—The blackouts occurring in a power system is one of the most significant problems which is dealt by the supply utilities in today’s power system networks. A lot of factors lead to the occurrence of blackouts; overloading of transmission lines, ice coating on them, protection and control system failures being the most prominent ones. Adoption of certain control strategies like N-1 contingency, maintaining load generation balance and cascade to more fault contingencies can be very effective to reduce power system blackouts. The following paper puts forward a review study about blackouts from different countries, their causes and their solutions. The following paper can provide important references to grid protection strategies.

Keywords—blackouts; N-1 contingency; cascade efficiency; power system; grid protection

I. INTRODUCTION

The most prominent blackouts occurring in the recent past happen to be the North American blackout in 2003, the European blackout in 2006 and the famous Indian blackout of 2012. Apart from financial crisis, these blackouts caused a great inconvenience to the citizens of the country. The prominent reasons being the tripping and overloading of the transmission lines, protection and control system failures, collapse of voltage, cyber attacks and many others. The experiences learned from these blackouts can prove to be significant references to improve the present existing power grids. The following paper provides a review study on the current scenario of power system blackouts in the world and the reasons that caused them. This paper also discusses certain improvement techniques that can be implanted in order to avoid them. The main purpose of this review study is to obtain potential protective mechanisms against power system blackouts in order to design power system protection plans.

II. HISTORY OF BLACKOUTS IN THE WORLD

A detailed description of the various blackouts that has occurred is being described this section. The Greek island of Kefalonia saw an unlikely blackout on 24th January, 2006. [1] The deposition of loads of ice on the transmission lines and collapsing of transmission towers due to that has been the main reason for this blackout. A 15cm thick ice sleeve covered the conductor surface of the high voltage tower. The region saw the cut in electricity by 300MWh. Since, the blackout, Kefalonia island commissioned an additional number of substations to cope with such a situation in the future. Moreover, the distance between the towers has been re-established in order to endure the climatic changes. Certain anti-icing methods have been derived and implemented on the new and existing lines since then so that power system blackouts can be avoided in the near future.

A series of cascade blackouts occurred throughout New York, Massachusetts, Ohio, Connecticut, Canada, Ontario, Vermont, New Jersey, Pennsylvania and Michigan on August 13, 2003 [2]. A loss of 61,800 MW lasted for almost a week before the power was fully restored thereby affecting 50 million people. After the blackouts, the key causes surfaced out, prominent among which were the failure of the automation system. For instance, the contingency of the Midwest ISO ad the State Estimator were not fully automatic. Moreover, increasingly limited generation, poor management in load rising and imbalance in the reactive power were very much inadequate in the Midwest ISO. In order to avoid short circuits, trees around the high voltage lines are trimmed of at a certain distance. Sometimes, uneven trimming of trees can also cause such kind of blackouts. After this accident, the grid has been upgraded to modern smart grid technologies. The older power systems used system control and data acquisition systems (SCADA). But SCADA is inefficient when it comes to large power system networks as the coordination is very slow and the reliability of the system communications is based on telephone calls. Moreover, smart grid technologies provide monitoring and pervasive control, advanced communications and digitalized systems. But, smart grid technologies even after having advanced control and monitoring systems, the system operators face cyber security issues.

On July 30\textsuperscript{th} and 31\textsuperscript{st}, 2012 India faced two subsequent blackouts affecting 620 and 700 million people respectively. The blackout of 30\textsuperscript{th} July was due to the overloading of the 400KV Gwalior-Bina double transmission lines as one of the double lines was under maintenance. This overloading caused a
series of tripping throughout the network thereby causing a generation shortage of 32 MW. The higher demand due to the lack of required output and poor response to the already then existing issue caused a serious blackout on the next day, i.e. 31st July, 2012. Following reasons were anticipated for the blackouts of 30th and 31st July, 2012:

1. Improper and unplanned maintenance work.
2. Weather forecasting is not appropriate.
3. Inadequate control mechanisms for stabilizing HVDC lines in power grids like the absence of static and dynamic reactive power controls.
4. Improper response to control the voltage and frequency by the State Electricity Boards.
5. Malfunctioning of distance relays due to transmission congestion.

Outage system, peak load and inadequate management of the power quality were the forerunning factors for the great Indian blackout. The Indian Power Grid measured the system parameters y installing Remote Terminal Units (RTUs). The real time monitoring must be changed from RTU to Phasor Measurement Unit (PMU) so that the power system measurements can be monitored at a fast rate. RTU measurements are generally slow, provides RMS values with no phase angles and there is no time correlation for various RTU measurements unlike the PMU measurements. Distributed energy sources can be integrated to prevent such kind of blackout accidents. In order to prevent power losses due to blackouts, small distributed generations can be used.

Vietnam on May 22nd, 2013 saw a severe blackout due to the tripping of the 500 KV line thereby separating the Southern grid from the Central and the Northern grid system of the country. The reason for the blackout happens to be a moving truck which while moving a true got itself bumped into the 500 KV line. This incident caused a series of tripping in the generators and transmission lines thereby isolating the southern grid from the central and northern grids of the country. After this incident, new strategy in developing certain relay systems has been proposed and successfully implemented. Out of step relays, under frequency load shedding relays, over current relays, over excitation limiter relays ad distance protection relays have been successfully implemented since then [4].

Collapse in the voltage is one of the most important reasons for power system blackouts in the world [5,6]. If the lines, generators, transformers or any other power system element fails, other system elements will be overloaded thereby causing low voltage level at the system buses. This causes tripping of distance relays on the transmission lines. Moreover, those components which are overloaded will be tripped thereby propagating the overload problem to other elements of the power system. The lack of reactive support becomes more urgent as more elements are tripped leading to the tripping of the over excitation limiter relay of the generator thereby aggravating the low frequency problem. Depending upon the system strength, voltage collapse takes more time than seconds to occur thereby providing enough time to respond to this voltage collapse.

Bangladesh Power System (BPS) underwent a nationwide blackout on 1st November, 2014. Response failure of the spinning reserve and sudden outage in a HVDC station coupled with the generator maintenance in the western part of the BPS led to this nationwide blackout [7]. As the frequency fell to 48.9 Hz, the load shed happened to e 69MW instead of 25 MW. Five load shedding stages were preceded before the blackout. The under frequency protection scheme must e improved by improving the rate of change of frequency, improving the critical operating inertial reserve to more than nine seconds and certain grid island techniques must be implemented in order to control and establish the Bangladesh Power System.

Smart grids have been developed by several power systems including the function of peak curtailment, two way communications, load balancing, demand response support and sustainability. Following advancements make the grid easily controllable and reliable. Security issues are the only challenges that these power systems face. The personal databases are floated and stored in the internet which becomes an easy prey for the hackers to breach the internet and get through these personal details. Breaching the internet protocols and performing a cyber attack was the main reason for the famous Ukrainian blackout that happened on 23rd December, 2015 affecting 225000 customers for several hours. The cyber attackers attacked the security and breached the protocols thereby attacking the SCADA network of the country’s power system. These attackers uploaded false and junk data into the system thereby creating a collapse. The attackers were thorough in their knowledge of the power system parameters, their features, metering measurements, network topology, and specifics of SCADA network devices including other related data detection schemes. The proper solution in this regard is to strengthen the already defensive system to prevent blackouts or any kind of attacks that can ignite a cyber attacking strategy. Ukrainian power system deployed some of the most unique features in their cyber schemes to prevent any such kind of blackouts in the future [8,9].

San Diego on 8th September saw a blackout due to an outage in the Pacific Southwest which triggered a power cut for twelve hours affecting 1.5 million customers of the region, including some parts of southern California, Arizona and Baja California affecting a total of 2.7 million customers to face the blackout. Line tripping due to peak load has been sighted as the foremost reason for this outage. The transmission line of southern California and Arizona was designed to withstand a single line trip of 500KV. 500 KV Hassayampa North Gila line (H-NG) is a major transmission line that connects Arizona to San Diego area via the Imperial Irrigation District (IID). During the peak load, it caused the surrounding lines to get overloaded and caused a major trip leading to a blackout. The main reason for this blackout has been due to the insufficient load shedding [10].

III. POWER SYSTEM BLACKOUTS IMPROVEMENT SCHEMES

Different models and systems have different optimization techniques to prevent blackouts. Many new control schemes have been adopted by various power grids to prevent such kind of outages in such a way that the installation of new components could revise the grid codes and the original protection schemes already existing in the grids. Basically
periodic supervision of the load shedding mechanisms, relay systems, coordination processes of the grid, special protection system and control systems must be ensured for smooth running of the power system networks. Moreover, the increasing trend of renewable energy usages for power generation must also be taken into consideration by implementing certain protection strategies of grid integration by renewable energy sources. The general causes of power system blackouts can be summed up to be multiple tripping of overloaded lines, static and dynamic stability loss, and voltage instability in transmission networks, inappropriate load shedding and many others. Following improvement schemes can be implemented in order to avoid power system blackouts:

I. Reactive power optimization and voltage control
II. Installation of new and improved control systems
III. Reinforcement of the grid
IV. Re-designing of load shedding strategies
V. Suitable locations for new generators
VI. Automatic operations and alarms during severe incidents
VII. Using more number of tie lines
VIII. Installation of advanced protection relays

The modern day power system should be self sustainable while dealing with blackouts. It should have the facility for automatic re-closing of transmission lines and re-integration of the components. Restoration of a power system after a blackout has to be automatic and quick. The present day power systems can employ sensors and products, special protection schemes, high voltage direct elements and state of art controllers can help the system to be more stable thereby avoiding blackouts.

IV. CONCLUSION

The following paper reviews the power system blackouts that affected Greece, North America, India, Bangladesh, Vietnam and Ukraine. All the countries had a separate unique reason for their failures. The significant conclusion that can be drawn from the failures in these countries is that if power system can be improved and the series of tripping failures can be predicted beforehand, then the blackout can be avoided. Enhancement and prediction lowers the probability of blackouts to a great extent. The general causes of power system blackouts can be summed up to be multiple tripping of overloaded lines, static and dynamic stability loss, and voltage instability in transmission networks and inappropriate load shedding. Moreover, this work also summarizes the important steps that have to be taken in order to make the power system more stable in relation to blackouts.

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We wish to acknowledge the significant contributions of the department of Electrical, Power and Energy of University of Petroleum and Energy Studies to provide us a platform to perform the review study on such an important and useful topic to aware and let other people know about the impacts and remedies of power system blackouts.

The study would not have been successful if our respected guide and head of the department wouldn’t have come forward and given me the opportunity to put up a review study on power system blackouts.

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A correlative study between NEOFFI and newly constructed MESPA Self Rating Scale along with standardization

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ABSTRACT
There is a need for preparing new rating scale which can measure 5 aspects of human beings like Mental health, Emotional intelligence, Self esteem, Personality and Achievement motivation. This rating scale has a great significance in the study of correlating parenting styles with all these 5 dimensions of adolescents and also important in clinical and research settings with children suffering from poor self esteem, mental health disorders and personality problems.

KEY WORDS
Mental health, Emotional intelligence, Self esteem, Personality, Achievement motivation

INTRODUCTION
In this study NEOFFI with 60 item is used for the correlative study with MESPA self rating scale. NEOFFI is used to measure only five factors of personality. Psychometric Properties of the NEO Five-Factor Inventory Costa and McCrae’s (1989, 1992) NEO Personality Inventory (NEO PI), Revised NEO Personality Inventory (NEO PI-R). NEO Five-Factor Inventory (NEO FFI) were developed with the aim of assessing the five domains of the FFM: (1) neuroticism (N), the tendency to experience negative emotions and psychological distress in response to stressors; (2) extraversion (E), the degree of sociability, positive emotionality, and general activity; (3) openness to experience (O), levels of curiosity, independent judgment, and conservativeness; (4) agreeableness (A), altruistic, sympathetic, and cooperative tendencies; and (5) conscientiousness. But newly constructed MESPA can measure five dimensions of a person like Mental health, Emotional intelligence, Self esteem, Personality and Achievement motivation.

REVIEW OF LITERATURE
Holden & Fekken,( 1994) & Parker (1998) have served as a catalyst for studies attempting to resolve these undesirable results. For instance, McCrae and Costa (2004) responded to Egan et al. (2000) by evaluating each NEO FFI item and replacing those that consistently performed poorly in PCA and EFA. Schmitz, Baldini, and Tress’s (2001) CFA of the NEO FFI in a sample of German outpatients with psychosomatic complaints found that two-, four-, and five-factor models failed to result in adequate fit (e.g., goodness-of-fit index = .82 to .84, root mean square residual = .12 to .16). Church & Burke (1994) & Parker (1993) criticise about the lack of psychometric support for the NEO FFI. Parker et al., 1993 & McCrae et al. (1996) argued that “there is no theoretical reason why traits should not have meaningful loadings on three, four, or five factors”. (Hu & Bentler, 1999) find others have contended that these guidelines may be overly restrictive. Marsh et al. (in press) conclude that traditional CFA models are not appropriate for the NEO FFI and that ESEM should be used in its place to utilize the benefits of confirmatory models (e.g., adjustment for measurement error). Although the findings of Marsh et al.’s (in press) ESEM support the factor
structure of the NEO FFI in normative samples, no study has yet existed for measure Mental health, Emotional intelligence, Self esteem, Personality and Achievement motivation at a time.

**METHOD**

64 Participants in this study were of the adolescents between the age group of 12 to 18. Mean age of participants was 15. The gender of the participant was unequal. MESPA Self Rating scale with 45 items were employed here. Reliability for MESPA Self Rating scale is completed. Split half reliability and item analysis is find out by using participants of this study. Validity was examined through a comparison with the NEOFFI. 5 Personal aspects like Mental health, Emotional intelligence, Self esteem, Personality and Achievement motivation are embedded here in a random order. 1,4,10,14,19,24,28,32,37,41 are mental health items. 8,17,26,35,44 are items of emotional intelligence. 7,16,25,34,23 included under self esteem. 2,11,20,29,38 are personality extraversion items. 3,12,21,30,39 are personality openness items. 5,13,22,31,40 are personality agreeableness items. 6,15,23,33,42 are personality conscientiousness items. 9,18,27,36,45 are items of achievement motivation

**RESEARCH HYPOTHESIS**

1. There will be consistent personal dimensions across ages as reported by adolescent subjects with age group twelve, fifteen & eighteen.
2. There will be relatively high positive correlation between NEOFFI Extraversion, Openness, Agreeableness, Conscientiousness and MESPA Extraversion, Openness, Agreeableness, Conscientiousness.
3. The Item analysis of Reliability Coefficient will be greater than .70 for the MESPA SELF RAING SCALE

**RESULTS**

**TABLE 1**

<table>
<thead>
<tr>
<th>Reliability-NEW</th>
<th>Cronbach's Alpha</th>
<th>N of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>MESPA</td>
<td>0.990</td>
<td>45</td>
</tr>
<tr>
<td>NEOFFI</td>
<td>0.961</td>
<td>60</td>
</tr>
</tbody>
</table>

TABLE 1 shows reliability is .99 for the MESPA and .96 for NEOFFI. So we can say this newly constructed MESPA Self Rating Scale has very strong internal consistency.

**TABLE-2**

Means, Standard Deviation and F value for Age- NEOFFI

<table>
<thead>
<tr>
<th>Variable</th>
<th>Age</th>
<th>N</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>F</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neurotic</td>
<td>12 years</td>
<td>22</td>
<td>24.82</td>
<td>15.09</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15 years</td>
<td>22</td>
<td>25.82</td>
<td>18.41</td>
<td>0.018</td>
<td>0.982</td>
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<tr>
<td></td>
<td>18 years</td>
<td>20</td>
<td>25.30</td>
<td>19.11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extraversion</td>
<td>12 years</td>
<td>22</td>
<td>38.36</td>
<td>20.96</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15 years</td>
<td>22</td>
<td>38.77</td>
<td>21.61</td>
<td>0.150</td>
<td>0.861</td>
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<tr>
<td></td>
<td>18 years</td>
<td>20</td>
<td>41.70</td>
<td>21.36</td>
<td></td>
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</tr>
<tr>
<td>Openness</td>
<td>12</td>
<td>22</td>
<td>35.36</td>
<td>21.05</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

http://dx.doi.org/10.29322/IJSRP.8.5.2018.p7757  www.ijsrp.org
<table>
<thead>
<tr>
<th>Variable</th>
<th>Age</th>
<th>N</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>F</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mental health</td>
<td>12 years</td>
<td>22</td>
<td>16.55</td>
<td>11.04</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15 years</td>
<td>22</td>
<td>16.77</td>
<td>10.91</td>
<td>0.210</td>
<td>0.811</td>
</tr>
<tr>
<td></td>
<td>18 years</td>
<td>20</td>
<td>18.60</td>
<td>11.55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotional intelligence</td>
<td>12 years</td>
<td>22</td>
<td>8.41</td>
<td>5.59</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15 years</td>
<td>22</td>
<td>8.50</td>
<td>5.71</td>
<td>0.041</td>
<td>0.960</td>
</tr>
<tr>
<td></td>
<td>18 years</td>
<td>20</td>
<td>8.90</td>
<td>6.36</td>
<td></td>
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<tr>
<td>Self esteem</td>
<td>12 years</td>
<td>22</td>
<td>8.23</td>
<td>5.73</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>15 years</td>
<td>22</td>
<td>8.77</td>
<td>5.55</td>
<td>0.256</td>
<td>0.775</td>
</tr>
<tr>
<td></td>
<td>18 years</td>
<td>20</td>
<td>9.45</td>
<td>5.30</td>
<td></td>
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<tr>
<td>Extraversion</td>
<td>12 years</td>
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<td>7.82</td>
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</tr>
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<td></td>
<td>15 years</td>
<td>22</td>
<td>8.59</td>
<td>5.76</td>
<td>0.421</td>
<td>0.658</td>
</tr>
<tr>
<td></td>
<td>18 years</td>
<td>20</td>
<td>9.45</td>
<td>5.52</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Openness</td>
<td>12 years</td>
<td>22</td>
<td>3.91</td>
<td>4.36</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15 years</td>
<td>22</td>
<td>5.41</td>
<td>5.50</td>
<td>0.981</td>
<td>0.381</td>
</tr>
<tr>
<td></td>
<td>18 years</td>
<td>20</td>
<td>3.45</td>
<td>4.35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agreeableness</td>
<td>12 years</td>
<td>22</td>
<td>3.86</td>
<td>5.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15 years</td>
<td>22</td>
<td>5.18</td>
<td>5.76</td>
<td>0.721</td>
<td>0.490</td>
</tr>
<tr>
<td></td>
<td>18 years</td>
<td>20</td>
<td>3.35</td>
<td>4.44</td>
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<td></td>
</tr>
<tr>
<td>Conscientiousness</td>
<td>12 years</td>
<td>22</td>
<td>8.27</td>
<td>5.58</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The results of the ANOVA test depicted in Table 2 reveals that statistical value is greater than 0.05 for all the variables. So we conclude that the mean score of different variables does not differs with age.

**TABLE-4**

<table>
<thead>
<tr>
<th>Correlation-</th>
<th>Correlation</th>
<th>Low bound</th>
<th>Upper bound</th>
<th>Z</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL</td>
<td>MES-NEO</td>
<td>0.899</td>
<td>3.088</td>
<td>0.91</td>
<td>16.1</td>
</tr>
<tr>
<td>Age = 12 years</td>
<td>Correlation</td>
<td>0.944</td>
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<tr>
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<td>0.908</td>
<td>0.88</td>
<td>0.93</td>
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<tr>
<td>Age = 18 years</td>
<td>Correlation</td>
<td>0.842</td>
<td>0.79</td>
<td>0.88</td>
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A positive correlation exist for the variables of new and old scales as in this case the correlation coefficient has value greater than 0.5 and p value less than 0.05.

**TABLE-5**

<table>
<thead>
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<th>Variables</th>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
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<th>p value</th>
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</tr>
<tr>
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<td>High</td>
<td>16</td>
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<td>Hig 16 3.00 0.00</td>
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<tr>
<td>MES11</td>
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<tr>
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<td></td>
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<tr>
<td>MES13</td>
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<td>-</td>
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</table>
Table 5 result revealed there is a strong internal consistency, Item discriminative power & validity for each items. P value is less than .05. Here correlation is Significant at .001 level.

**DISCUSSION**

The objective of this study is to design and construct a new measure MESPA to evaluate like Mental health, Emotional intelligence, Self esteem, Personality and Achievement motivation. Review of literature point out the use of the 5 personality dimensions instead of 5 personal dimensions. Adolescents at a particular age group of 2, 15, 18 is consider for the study. The 5 sub scales of the MESPA show high reliability and validity. The usual limitation of this study was small sample of 64 makes this a pilot study. Some other problem were difference in geographical areas like urban and rural. Another limitation was the Gender difference of the population.

**CONCLUSION**

The purpose of this study was to provide a five dimensional personal self rating scale to identify their Mental health, Emotional intelligence, Self esteem, Personality and Achievement motivation. This rating scale is also important in clinical and research settings with children suffering from poor self esteem, mental health disorders sand personality problems. This study has great important in academic field as well as job selection field to find out students with high achievement motivation, emotional intelligence and good personality. This research examine how these multi personal dimensions relate to adolescents of different age group 12, 15 and 18. MESPA RATING SCALE shows very high reliability and validity. Item analysis shows significant correlation with NEOFFI. So we can accept MESPA as a standard tool. MESPA is a valuable gift for teachers, parents, researchers, psychologists, counsellors and psychiatrist to study their students, children, clients and patients.

**REFERENCES**


MESPA – SELF RATING SCALE
(Mental health, Emotional intelligence, Self esteem, Personality and Achievement motivation Self Rating Scale)

By
SHYNY, T. Y & Dr. A Velayudhan
Research Scholar in Psychology
Bharathiar University, Coimbatore, India

Instructions: Read each statement carefully and indicate your single response by putting a “tick” mark against it in an appropriate box.

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<th>Statements</th>
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<th>Just a little true</th>
<th>Often true</th>
<th>Very much true</th>
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<td>3</td>
<td>Trying new and foreign food</td>
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<td>7</td>
<td>Feeling of confidence with many good qualities</td>
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<tr>
<td>8</td>
<td>Knowing others from their non verbal messages like voice tone, facial expression etc.</td>
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<td>Disturbed sleep</td>
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<td>11</td>
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<td>13</td>
<td>Co-operative</td>
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<tr>
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<td>Feeling of helplessness and need for others help</td>
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<td>15</td>
<td>Perform assigned task on time</td>
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<tr>
<td>16</td>
<td>Ability to do things as others</td>
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<tr>
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<td>Experiencing others emotions just by looking their face.</td>
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<tr>
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<td>Starting new work just after finishing the present one.</td>
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<td>Active and cheerful</td>
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<td>Feeling of self respect and proud</td>
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<tr>
<td>27</td>
<td>Doing things indifferent from others by using unique skills</td>
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<td>Digestive problem and acidity.</td>
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<td>Light hearted</td>
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<td>Harmonious with family members and co-workers</td>
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<td>Asthma or other allergy problems.</td>
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<td>Striving for excellence of a work.</td>
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<td>34</td>
<td>Feeling of worthiness and optimism</td>
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<td>Facing all life obstacles easily from previous experiences.</td>
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<td>Concentrating on own task by avoiding criticism.</td>
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<td>Easily frustrated</td>
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<td>Interesting to know human nature and conditions.</td>
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<td>Being helpful to others.</td>
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<td>Hiding from unfavourable conditions</td>
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<td>Trying to fulfil a commitment</td>
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<td>Dealings with problems well</td>
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<td>Aware of own emotions as it experience.</td>
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<td>44</td>
<td>Feeling of proud after finishing a new job.</td>
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MESP-SELF RATING SCALE
(Mental health, Emotional intelligence, Self esteem, Personality and achievement motivation Self Rating Scale)

Answer Sheet

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Extroversion:__________

Openness:__________

Agreeableness:__________

Conscientiousness:__________

(M=Mental health, E=Emotional intelligence, S=Self esteem, P=Personality, A=Achievement motivation)

Have you responded to all of the statements
Have you entered your responses in the correct boxes
Have you responded accurately and honestly

Yes/No
Yes/No
Yes/No

Name:__________________________ Age:__________ Sex: M/F:__________
Symbolic meanings in the architecture of Keraton Yogyakarta: a transformation study

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** Architecture Department, Diponegoro University, Semarang, Indonesia

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http://dx.doi.org/10.29322/IJSRP.8.5.2018.p7758

Abstract- Yogyakarta is one of provinces in Indonesia with special district status. The city planning use concept catur gatra tunggal (four element in unity) that covers palace, square, mosque, and market. As one of the top artifacts of Javanese culture, Keraton Yogyakarta which was established by Prince Mangkubumi in 1756 has experienced a transformation of function and appearance. To comprehend the embodied messages, it is substantial to interpret the meaning of the symbols existing in Keraton Yogyakarta. This study reviews the transformation of meaning taking place at Keraton Yogyakarta. This study applies the method of observation, examination, assessment to the object of study, interview with informants, and study of Javanese manuscripts: Serat Salokapatra. The result of this study indicates that there are some significant transformations of meaning in the architecture of Keraton Yogyakarta between the reign of HB I-HB VIII (1755-1939) and the reign of HB IX - HB X (1940 - 2018).

Index Terms- symbolic meaning, transformation study, Keraton Yogyakarta

I. INTRODUCTION

The history of the establishment of Keraton Yogyakarta was initiated with the signing of Giyanti Treaty or Palihan Nagari (the history of state division) held on Thursday Klivon, 29 Rabiuul Akhir 1680 of Javanese Calendar or 13 February 1755 AD in the village of Giyanti. It was stated in Giyanti Treaty that the Kingdom of Mataram would be divided into two regions, Kabanaran Sultanate with Surakarta Sultanate with Surakarta as the capital and Kabanaran Sultanate with Surakarta Sultanate with Surakarta as the capital (Sabdacaraka,2008).  

Kabanaran Sultanate was ruled by Prince Mangkubumi who was appointed by his proponents to be the Sultan of Yogyakarta with the title Sri Sultan Hamengku Buwono I, Senopati ing alaga, Abdurrrahman Sajidin Panata Gama Kalifatullah. The meaning of the title is that the Sultan domiciled as the supreme war commander whose duty was to spread Islamic teachings in his kingdom. In addition to that, the Sultan also served as a representative of God on earth carrying out the main mission of memayu hayuning bawana (prospering world life) (Haryanto 2013, Hendro 2001, Sabdacaraka,2008).  

Keraton Yogyakarta founded by Sri Sultan Hamengkubuwono I in 1756 owns a traditional Javanese architectural style. It can be clearly observed from the application of roof shapes (limasan, tajug, and joglo) on the buildings in the palace complex. However, during the reign of Sri Sultan Hamengku Buwono VIII (1921-1939), a significant renovation toward the architectural formation of Keraton Yogyakarta was carried out (Prijotomo, 2004). Some of the renovated buildings include Tratag Pagelaran, Tratag Sitiinggil, and Regol Danapratapa (Bangunjiwa,2015).

Along with the Dutch colonization in Indonesia came the influence of Dutch colonial architectural style called Indische Empire Style (Hadinoto, 1996). The Empire style is a style of neoclassical architecture that struck Europe at that time. In relation to the acculturation of Javanese traditional architecture, it is commonly referred to as the European style, yet it is more to the European Neoclassical style (Prijotomo, 2004). The characteristics of this style are: it is symmetrical, it owns thick walls, its ceilings are high, and it applies Greek columns (Doric, Ionic, Corinthian) (Hadinoto,1996). The European Neoclassical style is also applied to Keraton Yogyakarta’s renovation by HB VIII.

Transformations of Keraton Yogyakarta also occurred in the post-independence period of Republic of Indonesia (during the reign of HB IX) in 1956 by building Sasono Hinggil Dwi Abad to replace the South Bangsal Sitiinggil. In addition to that, during the reign of HB X in 1992, a new building was erected in Kedhaton courtyard. This new building is HB IX Museum, which was built to commemorate HB IX himself who was appointed as a national hero.

These transformations brought about the changes in symbolic meaning of Keraton Yogyakarta. In connection with the meaning of symbols, the transformations can basically be classified into two, namely: the reign of HB I-HB VIII (1755 - 1939) and the reign of HB IX-HB X (1940-2018).

II. METHOD OF STUDY

This study focuses on the reading of symbolic meanings in the architecture of Keraton Yogyakarta which is an artifact of Javanese culture. Culture itself according to Geertz is a system of meaning and symbol of the actualization and expression in a
particular community. Symbols can be objects, events, speeches, or written forms that are given meaning by humans (Geertz, 1992). The readings of meanings on Keraton Yogyakarta is executed by directly observing the building, interviewing informants who understand the history of the palace, and reviewing historical manuscripts, among others, Serat Salokapatra. Serat Salokapatra contains the myths of plants and buildings inside the palace complex of Keraton Yogyakarta implemented in the form of tembang macapat (Sunjata, 1995).

To obtain validity of data in this study, the researcher applies triangulation method. Validity test through triangulation is executed because testing the validity of information in qualitative research can not be performed with statistical test tools (Moleong, 2015). The validity of data is guaranteed by comparing data obtained from a particular source or method with data obtained from other sources or methods. In this study, the validity of data is obtained by comparing visual observation result of Keraton Yogyakarta with information from interview results as well as related history documents.

III. PERIODIZATION OF KERATON YOGYAKARTA’S ARCHITECTURAL TRANSFORMATION

The reading of symbolic meanings on Keraton Yogyakarta is exercised by periodizing based on certain time periods. This periodization is executed because of the symbolic meaning characters that will shift along with the shift of time. Hence, contextualization is required in reading the symbolic meanings.

From the review of architectural transformations occurred in Keraton Yogyakarta, the time periods can be sorted into two.

A. Based on expression:
   a. The period of 1756-1934, it started from the establishment of the palace to right before the renovation. The dominant appearance or expression of this period was a Javanese architectural building with the roof shape of Limasan and Joglo.
   b. The period of 1935-2018, it started from the period after the massive renovation undertaken by HB VIII to the present (2018). In this time period, the dominant appearance or expression has been the emergence of a mixture between Dutch colonial architectural style and Javanese traditional architecture.

B. Based on function:
   a. The period of 1756-1968, started from the establishment of the palace which was utilized as the king's palace and central government. During this period, the palace was very private and protective.
   b. The period of 1969-2018, since the Palace was opened to the public as a tourism object of Javanese culture. Some buildings are utilized for art performances, Javanese culture and Javanese history’s museum.

Periodization based on appearance and function occurs due to internal and external factors. The main internal factor is the concept of Keraton’s architectural philosophy by HB I; manunggaling kawulo lan gusti and sangkan paraning dumadi. Architecturally, during the reign of HB I-HB VII, Keraton Yogyakarta did not undergo many changes. Major transformations in the appearance took place when HB VIII renovated (1921-1934) some of the main buildings of the palace by incorporating European Neoclassical elements, while significant function transformations occurred after Keraton Yogyakarta joined the Unitary State of Republic of Indonesia (NKRI) and the palace is opened to the public. Thus, the following discussions would be divided into 2 studies; the reign of HB I-HB VIII (1755-1939) and the reign of HB IX-HB X (1940-2018). Various political, art, cultural and architectural policies adopted by the Sultan also influence the transformations of the palace’s architecture. These policies are as follows: (table 1)

<table>
<thead>
<tr>
<th>Reign</th>
<th>Political Policies</th>
<th>Architectural Policies</th>
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</thead>
<tbody>
<tr>
<td>HB I</td>
<td>(1755-1792)</td>
<td>- Principle of sabda pendita ratu tan kena wola-wala, faithful to the promise.</td>
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<td>- Succeeded in merging the interests of the palace and the interests of Dutch colonial</td>
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<td>- “The palace is devoted to its people”</td>
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<td>- Designing and building Keraton Yogyakarta. On 7 October 1756, it began to be resided.</td>
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<td>(dwı naga rasa tunggal/1682 Jawa)</td>
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<td>- The building of Tugu Golong Gilig, in 1759.</td>
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<tr>
<td>HB II</td>
<td>(1792-1812)</td>
<td>- Opposing Daendels &amp; Raffles.</td>
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<td>- The palace was divided into 2: Kasultanan Yogyakarta and Kadipaten Pakualam</td>
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<td>- The building of Gedhong (Gedhong Kuning) as the residence of King until HB IX.</td>
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<tr>
<td>HB III</td>
<td>(1812-1814)</td>
<td>- Dutch government prohibited the Palace to interact with other kingdoms</td>
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<tr>
<td>HB IV</td>
<td>(1814-1823, reigned at the age of 10)</td>
<td>- The relationship between HB IV and Dutch government was good, yet the relationship between HB IV and the people was vice versa</td>
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<td>- A revolt from the people occurred.</td>
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<td>- HB IV was known as figurehead of Dutch colonial/government.</td>
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<td>HB V</td>
<td>(1823-1855, reigned at the age of 3)</td>
<td>- Accompanied by Trusteeship Council.</td>
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<td>- Diponegoro War occurred in 1825-1830, Prince Diponegoro was assisted by Kiat Mojo and Sentot Prawirodirjo to fight Dutch colonial.</td>
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<td>- HB V had a good relationship with the Dutch government, with passive war politics.</td>
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<td>- The building of Gedhong Purworetna, utilized as private office of HB IX.</td>
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</tbody>
</table>
HB VI (1855-1877)  
- Reigned in an unstable political condition  
- The policy was passive war politics  
- Good relationship with other Kingdoms, including Brunei Kingdom  
- VOC limited social and political activities, yet grant freedom for art and cultural activities.  
- in 1867, there was an earthquake which demolished Tamansari, Tugu Golong Gilig, Masjid Gedhe, and Loji Kecil (Gedung Agung)  

HB VII (1877-1920)  
- The King complied to the rules made by Dutch Government.  
- The Sultan earned income from outside Yogyakarta.  
- the Sultan still spoke up for the people  
- promoting economic welfare  
- Peaceful succession, Lengser Keprabon, the King passed on the throne to his son.  
- The building of Tugu Pal Patih, in 1889 by Dutch government.  

HB VIII (1921-1939)  
- The changes of regulation in the palace must be with the approval from Dutch government  
- Confronting Dutch government with sistematic and modern strategies.  
- Sending his sons to continue their study abroad.  
- passing down the angering negari; the teachings of asta brata  
- Renovating Tratag Rambat (Pagelaran), Tratag Sitiininggil, Regol Danapratapa, Gedhong Jene, by inserting European classical style (a mixture of Javanese architecture and Europe/Indiche Empire Style)  

HB IX (1940-1988)  
- known as a democratic nobleman, confronting the colonial with sistematic and modern strategies.  
- simplifying Keraton ceremony, civil service post was opened to the public.  
- HB IX and Paku Alam VIII joined NKRI, with Yogyakarta Decree, 5 September 1945.  
- becoming the second Vice President of Republic of Indonesia (1973-1978)  
- becoming the first Governor of Special Region of Yogyakarta (1945-1988).  
- The throne is for the people.  
- the building of Sasono Hingga Dwi Abad meeting hall in 1955 to commemorate 200 years of Keraton Yogyakarta and to replace Bangsal Siti Hingga.  

HB X (1989-2018)  
- during Pisowanan Agung at the north square, HB X and Paku Alam  
- the building of HB IX Museum in Kedaton Courtyard  

VIII invite all people to support Reformation Movement on 20 May 1998  
- at the moment, his toughest duty is to keep the palace’s tradition inand to preserve the image that Keraton is owned by the people.  

From table 1, it can be reviewed that there are some transformations in the function of Keraton Yogyakarta. In the reign of HB I–HB VIII, the Palace was more functioning as a royal institution while in the reign of HB IX–HB X, once opened to the public, the palace serves as a cultural institution.

IV. THE REIGN OF HB I–HB VIII (1755–1939)

The colonial atmosphere that accompanied the construction of Keraton Yogyakarta and the HB I background of a military strategist, made it possible for the design of the palace to function not only as a center of government but also as a center of defense. This can be identified from the construction of the fort with a height of 3.5 M and a thickness of 5 M, surrounding the palace with 5 gates whose upper part is curved, commonly known as Pelengkung. These 5 Pelengkung can be found in: the south, called Pelengkung Nirbaya (Gading), the west, called Pelengkung Jagabaya (Tamansari), the north (there are 2), called Pelengkung Jagasoera (Ngasem) and PelengkungTanurasura (Wijilan), and the east, called Pelengkung Madyasura (figure 1).

Legenda:  
1.Bangsal Proboekso, tratag dan Bangsal Kencang  
2.Alun-alun Lor (utara)  
3.Alun-alun Kidul (selatan)  
4.Taman Sari  
5.Permukiman Prajurit  
a.Pemandangan  
b.Bangsal pengapit dan Pagelaran
During the reign of HB II, Pelengkung Madaysia (Pelengkung is kind of region gate) was destroyed by British troops and the gate then being closed until the present. Defense elements can also be observed from the thickness of the fortress that can be utilized for riding patrols and train. Each Regol (Regol is kind of gate) was equipped with bastion, which functioned as a cannon as well as a guard post (Sumalyo, 2011).

In addition to defense considerations, the palace is also designed as a medium to talk about the nature of human life’s journey. It is represented in the layouts of buildings on the north-south axis. The layouts are as follows (being described in sequence from south to north): in the most southern part is South Sea, Panggung Krapyak, South Square, Keraton Complex, North Square, Golong Gilig Monument, and Mount Merapi. Mount Merapi is symbolized as lingga and the southern sea as yoni, the fusion between lingga and yoni embodies fertility symbol.

As a whole, the palace complex, in the form of buildings and trees, holds symbolic meanings as follows: (Haryanto, 2013)

- A pair of banyan trees called "Wok". "Wok" derives from the word "brewok" or beard that symbolizes a child who gets older and becomes a teenager.
- Trees of Pakel and Kweni, symbols of teenagers who have reached their maturity and are brave (wani) to express their feelings to the opposite sex.
- Gayam tree, a symbol of peacefulness and tranquility (ayem) to describe a pair of young adults who are in love.
- South Bangsal Sitiiminggil, where the seeds of a male and a female meet. It is represented by the encounter of Palen Cempora flowers (white, male) with red Soka flowers (female).
- Pamengkang Road, a symbol of the path for the birth of a baby.
- Kemandungan, a symbol of a baby in the womb that is about to be born.
- Kemagangan, a symbol of a child who is ready to be mature.
- Bangsal Kencana, represents the light of nobleness and livelihood, like the sun that shines on the earth.
- Bangsal Srimanganti, represents a place for guests to await the arrival of the king (where the Sultan welcomes important guests).

- Panggung Keraton, as a symbol of holy spirit’s place of origin, sangkan paraning, a prospective baby. From the view of cosmology, psychology, philosophy, and symbolism of Javanese culture, Krapyak is a picture of the place where a person was born.
- Alun-alun Selatan (South Square), containing sand owning fragmentary nature, a symbol of a child who still put his own interests above the interests of others.
- A pair of banyan trees called "Wok". "Wok" derives from the word "brewok" or beard that symbolizes a child who gets older and becomes a teenager.
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- Bangsal Srimanganti, represents a place for guests to await the arrival of the king (where the Sultan welcomes important guests).

Figure 1. Complex of Keraton Yogyakarta inside of the fort at 1800 (source: Sumalyo, 2011)

The North of Alun-alun

The North of Alun-alun

Keraton Kilen

Kasatriyan

The South of Alun-alun

Figure 2. Philosophic axis ‘Sangkan Paraning Paraning ‘Dumadi’ at Keraton Yogyakarta (source: google earth processed by author, 2017)
V. THE REIGN OF HB IX–HB X (1940–2018)

The biggest transformation during the reign of HB IX took place when Indonesia became an independent republic and Yogyakarta Sultanate joined the NKRI. During this period, the palace gradually opened itself to the public. From time to time, there has been more and more visitors visited the palace. In its development, tourist access to the palace is divided into two, each with a different entrance ticket. This is in line with the consideration of the vastness of Keraton Yogyakarta complex. The first zone is the northernmost of Keraton complex, Pagelaran complex and North Sitihinggil complex. The second zone is from North Kemandungan complex or Keben courtyard to Kedhaton complex. In the southern part of Kedhaton, there are still courtyards of Kemagangan, Kemanggungan, and South Sitihinggil which are opened to the public without tickets.

*Tratag Pagelaran* was named *Tratag Rambat* at the time of HB I-HB VII. Besides Pagelaran complex, Sitihinggil Complex is also included in the first zone. The buildings within this complex are Bangsal Manguntur Tangkil located “inside” *Tratag Sitihinggil* and Bangsal Witono located in the south of Bangsal Manguntur Tangkil.

During the reign of HB I-HB VIII, the buildings within the palace complex were utilized for the purpose of government activities (figure 3, 4, 5), for Sultan’s coronation ceremony and for Sultan’s meditation (at Bangsal Manguntur Tangkil, the atmosphere is very sacred). Because they embraced activities that were transcendental, the spaces in the palace carried a sacred meaning. Hierarchically, the spaces are: Bangsal Proboyekso, Bangsal Kencono, Bangsal Manguntur Tangkil, Bangsal Witono, Bangsal Ponconiti, Bangsal Pangravit, Bangsal Sri Manganti and Bangsal Trajumas.
b) The architecture of the palace, from modesty symbol to grandeur symbol.

e) Golog Gilig Monument, from the philosophical symbol of \textit{Manunggaling Kawulo lan Gustu}, transforms into \textit{Pal Putih} Monument, the symbol of tourist existence (via selfie and wefie).

d) The fortress, from protective and defensive symbols, transforms into a boundary symbol of Keraton’s tourist zone.

e) \textit{Regol}, from a symbol of human life’s journey, transforms into a transition symbol of Keraton’s gallery zone.

f) Typical ornaments in palace buildings with flora-fauna patterns, calligraphy and sengkalan, as symbols of king's existence, transforms into visual aesthetic symbols.

g) Plants in the palace complex, as a symbol of a series of moral messages, transforms into complementary shade of the building.

VI. CONCLUSIONS

From the result of field observation, it can be concluded that the renovation exercised by HB VIII did not change the architecture of Bangsal Manguntur Tangkil and Bangsal Witono, as well as Bangsal Pengravin which is “inside" Tratag Pagelaran. This is because of the traces of spiritual activity that the Sultan performed in those Bangsal (wards).

The sacredness of north \textit{Sitihinggil} is illustrated in the fragment of \textit{serat salokapatra}: “sitihinggil is a place where the king resides, consequently, not everyone can enter the place. If people wish to come to sitihinggil, they must own the same character as the character meaning of \textit{Gayam} tree, which is the character of religious leader”(Sunjata, 1995). It implies that to enter sitihinggil, there are some terms and conditions to be applied.

Since it is opened to the tourists, Pagelaran complex and \textit{Sitihinggil} complex are functioned to display historical objects of the palace. Thus, the atmosphere is no longer sacred. Keraton now acts as an art gallery of Javanese culture (figure 6 and 7). The sacred atmosphere presents in \textit{Sitihinggil} and \textit{Pagelaran} complex when \textit{Garebeg} ceremony takes place (\textit{Maulud}, \textit{Syawal} and \textit{Besar}). These places are the main route of \textit{Gunungan Sekaten} from the Keraton to \textit{Gedhe Mosque}. The procession path of \textit{Gunungan Sekaten}, which is profane in daily basis, becomes sacred. The sacredness is temporary (figure 8).

REFERENCES

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Effect of molasses addition at different C:N ratios on growth and survival rate of spotted scat (Scatophagus argus) fingerling in biofloc system

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Abstract- Study was conducted to evaluate effect of C:N ratio on growth and survival rate of spotted scat fingerlings in biofloc system. Spotted scat with initial size of 0.149±0.03 g was reared in 100 L tank at salinity of 5 ppt. Experiment includes 4 treatments with C:N ratios: (i) no molasses addition (control), (ii) C:N=10, (iii) C:N=15, (iv) C:N=20. Each treatment was triplicated, and experiment lasted for 45 days. Spotted scat was reared at density of 500 ind/m³ and molasses was supplied every 3 days. Treatment with C:N=15 has the highest floc volume (7.33±2.08 ml/L) and total bacteria (650±122×10⁴ CFU/mL), the lowest Vibrio rate (0.21±0.07%). Fish reared at C:N=15 has highest average weight (0.97 g/ind), growth rate in weight (0.020 g/day, 4.07 %/day), survival rate (86.0±2.00%), biomass (416±35.5 g/m³), it was also the lowest FCR (1.39±0.15) and they all differed significantly with the other treatments (p<0.05).

Index Terms- Scatophagus argus, biofloc, spotted scat, molasses, C:N ratio, growth, survival rate

I. INTRODUCTION

Marine fish farming in Viet Nam has been developing in recent year. Popular species are being cultured including Serranidae, Lates calcarifer, Pseudopocryptes elongates, Rachycentron canadum, Scatophagus argus and Liza subviridis. Recently, Scatophagus argus becomes potential species for commercial aquaculture with high commercial value. Scatophagus argus is omnivorous and distributes naturally in coastal areas in a wide range of salinity. Beside monoculture, spotted scat can be reared in cage culture, integrated or polyculture with other species e.g. black tiger shrimp (Penaeus monodon) in mangrove shrimp culture and extensive culture. This contributes to diversification of farming species and model, creates job and income for farmer and contribute to the sustainability of aquaculture development. Researches on spotted scat are mainly focused on classification, biological and reproductive aspects. Issues in spotted scat rearing currently are identified as small fingerling size, slow growth and survival rate which interfere grow-out culture of this species, especially in cage and polyculture models. Previous studies indicated that main reasons reducing survival rate and growth were due to rearing technique and water quality, therefore development of new culture system which has high biosecurity and friendly to environment become essential. Biofloc technology is applied popularly in marine aquaculture, where C:N ratio in environment is adjusted accordantly to rearing species through addition of carbon source. In this kind of technique, toxic inorganic nitrogen could be converted to biomass of benefit heterotrophic bacteria, simultaneously floc particle could be good feed for fish (Avnimelech, 1999). In addition, floc particle with appropriate size contains essential nutrition which is suitable to omnivorous characteristic of spotted scat. Recent researches illustrate that molasses is effective carbon source for floc formation, due to short chain glucose which is easy to dissolve and be quickly hydrolyzed by heterotrophic bacteria. Currently, there is no information about using molasses with effective C:N ratio for spotted scat fingerling rearing in biofloc system. The application of biofloc in rearing spotted scat fingerling could create natural food with suitable size for fingerlings in the present models. Thus, the study entitled “Effect of molasses addition at different C:N ratio on growth and survival rate of Spotted scat (Scatophagus argus) fingerling” was carried out to determine the optimal C:N ratio for best growth and survival rate.

II. METHODS

2.1 Experiment design

Experiment was conducted in 120 L tanks contained 100 L of brackish water 5%. The experiment was randomly designed and included four treatments i.e. control treatment (no molasses
addition), C:N=10, C:N=15 and C:N=20. Each treatment was triplicated. Molasses was supplied for every 3 days. Spotted scat was bought from Ca Mau province where fish was collected from nature by farmer and then transported to experimental hatchery at The College of Aquaculture and Fisheries, Can Tho University. The stocking density was 500 individuals/m$^3$. The initial fish size was 15.1±1.39 mm in length and 0.149±0.03 g in weight. The experiment lasted for 45 days.

2.2 Experiment management

Spotted scat fingerlings were fed by commercial feed containing 56% crude protein, 8% crude lipid, 1.4% fiber, 13% total ash, 8% moisture, and 300 µm in particle size. The feeding frequency was four times per day (6 am, 10 am, 2 pm and 6 pm), the feeding rate is about 15% fish weight in all treatments. During rearing, tanks were aerated continuously to ensure enough oxygen and suspension of floc. Sodium bicarbonate was supplied whenever total alkalinity decreased during experiment to ensure the level around 150 ppm. Salinity of rearing tanks was maintained at 5 ppt.

Molasses with carbon content of 35.48%, carbohydrate content of 52%, moisture of 26.52% was incubated 24 hours by warm water at 40ºC before supplying into rearing tanks with volume ratio of 1 molasses and 3 water. Before stocking into rearing tanks, floc was created from each treatment. The ratio between molasses and feed to reach required C:N ratio was calculated based on assuming 50% nitrogen from feed eaten by fish excreting into water environment (Avnimelech, 1999). From this basis, the formula of the ratio in weight between carbon source and feed can be given as follow:

\[
\frac{\Delta CH}{\Delta F} = \left[\frac{CN \times \%P(F) \times \%N(P)}{\%C_{CH}}\right] - \%CF
\]

Where:

- $\Delta CH$: weight of carbon source
- $\Delta F$: weight of feed
- CN: C:N ratio need to be required
- $\%P(F)$: protein content in feed
- $\%N(P)$: nitrogen content in protein (15.5%)
- $\%CF$: carbon content in feed (50%)
- $\%C_{CH}$: carbon content in carbon source

During rearing time, there was no water exchange, floc volume from each treatment was maintained at level of < 15 mL/L (Avnimelech, 2015).

2.3 Measurement and calculation parameters

Temperature and pH were measured every 3 days (7h and 14h) by thermometer and pH meter (HANA, USA). TAN and NO$_2^-$ were measured every 5 days and alkalinity was measured every 10 days by test-kit sera.

Floc volume (FVI) was collected every 7 days by measuring 1 L water sample into “Imhoff cone” and settling in 30 minutes, sediment was recorded in volume by mL/L unit.

Floc particle size was collected every 7 days by measuring randomly length and width of 10 floc particles per tank through microscope at 40 times magnitude.

Water sample was collected to analyze total heterotrophic bacteria at 15$^{th}$, 30$^{th}$, 45$^{th}$ and total Vibrio bacteria at 30$^{th}$, 45$^{th}$.

Initial fish sample was weighed and measured length randomly 30 individuals for all treatments. At the end of experiment, all fish were weighed and measured length individually then the total number of fish was counted in every tank to determine growth and survival rate.

Growth rate, survival rate, coefficient of variation and floc volume were determined basing on the following formulas:

- Daily weight gain: $DWG (g/day) = \frac{W_t - W_0}{t}$
- Specific growth rate of weight: $SGR (%/day) = 100 \times \frac{\ln W_t - \ln W_0}{t}$
- Daily length gain: $DLG (mm/ngày) = \frac{L_t - L_0}{t}$
- Specific growth rate of length: $SGR (%/day) = 100 \times \frac{\ln L_t - \ln L_0}{t}$

(Where $W_0$ is initial weight, $W_t$ is final weight, $L_0$ is initial length, $L_t$ is final length, $t$ is culture period (day).

- Survival rate (%) = (number of harvest fish / number of stocking) * 100

- Coefficient of variation (CV) = \frac{S}{X} * 100

(Where $S$ is standard deviation, $X$ is average weight of fish).

- *Vibrio* bacteria rate (%):= \frac{V}{H} * 100

(Where $V$ is average density of *Vibrio* bacteria and $H$ is average density of total bacteria in each tank from periods of sample collection).

- Biofloc volume (FVI): = \frac{V_{floc}}{V_{collection}}

(Where $V_{floc}$ is biofloc volume (ml) and $V_{collection}$ is collected sample volume (L)).
Floc particle size (mm): \( L = \frac{1}{10} \times \frac{A}{\omega} \)

Where: \( A \) is the number of lines measured on the ruler of the glass, \( \omega \) is magnification degree.

2.4 Data analysis

Mean and standard deviation of collected data were calculated in Microsoft Excel 2010. The difference in variants between treatments was determined according to one-way ANOVA and following by DUNCAN test using SPSS 16.0, significant difference was set at 95%.

III. RESULTS AND DISCUSSION

3.1 Water quality parameters

3.1.1 Temperature and pH

Temperature in morning and afternoon between treatments ranged from 26.4-27.0 ºC (Table 1).

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Temperature (ºC) AM</th>
<th>Temperature (ºC) PM</th>
<th>pH AM</th>
<th>pH PM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>26.4±0.04</td>
<td>26.9±0.05</td>
<td>8.28±0.01</td>
<td>8.29±0.02</td>
</tr>
<tr>
<td>C:N=10:1</td>
<td>26.5±0.14</td>
<td>27.0±0.24</td>
<td>8.26±0.02</td>
<td>8.27±0.03</td>
</tr>
<tr>
<td>C:N=15:1</td>
<td>26.5±0.06</td>
<td>26.9±0.07</td>
<td>8.20±0.07</td>
<td>8.20±0.05</td>
</tr>
<tr>
<td>C:N=20:1</td>
<td>26.6±0.12</td>
<td>27.0±0.23</td>
<td>8.23±0.03</td>
<td>8.25±0.06</td>
</tr>
</tbody>
</table>

Spotted scat fingerlings were reared in experimental hatchery with cover at rainy season and cold weather, so temperature is relatively low and stable. Boyd (1998) revealed that optimal temperature for growth of tropical aquatic species ranged 25-32 ºC, Krishna and Van Loosdrecht (1999) stated that floc could be well aggregated at temperature up to 30-35ºC, according to Diep (2012) the temperature could be 24-26ºC.

pH varied from 8.20-8.29 in morning and afternoon, since fish was reared in cover condition leading to limitation from the effect of raining and light, which directly and indirectly cause fluctuation in pH due to the development of algae. Boyd (1998) stated that suitable pH range for best growth of fish and crustacean was 6-9, according to Diep (2012) floc is well formed at pH range of 7.2-8.2. Temperature and pH in this experiment are in suitable range for fish growth and floc formation.

3.1.2 TAN, \( \text{NO}_2^- \) and alkalinity

Table 2 shows that TAN content in treatments fluctuated in the range of 0.19-1.02 mg/L. The highest TAN was found in control treatment (1.02±0.06 mg/L), TAN content in treatments with molasses addition were lower than 0.21 mg/L.

Table 2. Concentration of TAN, \( \text{NO}_2^- \) and alkalinity between treatments

<table>
<thead>
<tr>
<th>Treatments</th>
<th>TAN (mg/L)</th>
<th>( \text{NO}_2^- ) (mg/L)</th>
<th>Alkalinity (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>1.02±0.06</td>
<td>4.79±0.14</td>
<td>154±0.00</td>
</tr>
<tr>
<td>C:N=10:1</td>
<td>0.19±0.11</td>
<td>4.19±0.05</td>
<td>151±3.43</td>
</tr>
<tr>
<td>C:N=15:1</td>
<td>0.21±0.15</td>
<td>3.69±0.17</td>
<td>153±2.07</td>
</tr>
<tr>
<td>C:N=20:1</td>
<td>0.19±0.15</td>
<td>4.38±0.22</td>
<td>158±4.13</td>
</tr>
</tbody>
</table>

\( \text{NO}_2^- \) content fluctuated in the range of 3.69-4.79 mg/L, the highest \( \text{NO}_2^- \) content was found in control treatment (4.79±0.14 mg/L) and the lowest was found in treatment of C:N=15 (3.69±0.17 mg/L). \( \text{NO}_2^- \) content at first reached 5 mg/L after that decreased clearly from the day 25th, the highest decrease of \( \text{NO}_2^- \) content was in treatment C:N=15 (Figure 1). In treatments with molasses supplied, the lower TAN and \( \text{NO}_2^- \) content indicate that beside TAN absorption of heterotrophic bacteria, there was nitrification process taken place. When forming and suspending, floc will become substrate for nitrifying bacteria to grow and convert nitrogen to other forms. Boyd (1998) stated that suitable TAN content for aquaculture ranged from 0.2-2 mg/L, \( \text{NO}_2^- \) content should not exceed 10 mg/L, TAN and \( \text{NO}_2^- \) content in this experiment was in suitable range for normal growth of spotted scat.

Fluctuation in \( \text{NO}_2^- \) concentration

![Fluctuation in NO2- concentration](http://dx.doi.org/10.29322/IJSRP.8.5.2018.p7759)
3.2 Biofloc size and volume

Results about floc size in treatments with different C:N ratio are presented in Table 3.

Table 3. Floc size in treatments with different C:N ratio

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Floc size (mm)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Length</td>
<td>Width</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>0.44±0.02 ab</td>
<td>0.30±0.02 a</td>
<td></td>
</tr>
<tr>
<td>C:N=10:1</td>
<td>0.44±0.02 ab</td>
<td>0.31±0.01 a</td>
<td></td>
</tr>
<tr>
<td>C:N=15:1</td>
<td>0.42±0.01 a</td>
<td>0.30±0.00 a</td>
<td></td>
</tr>
<tr>
<td>C:N=20:1</td>
<td>0.46±0.01 b</td>
<td>0.32±0.02 a</td>
<td></td>
</tr>
</tbody>
</table>

Floc length between treatments fluctuated in the range of 0.42-0.46 mm, the highest value was found in treatment C:N=20 (0.46 mm) and it differed significantly (p<0.05) with treatment C:N=15 (0.42 mm). Floc length (0.44 mm) in control treatment and C:N=10 treatment did not differ significantly (p>0.05) with C:N=15 and C:N=20 treatments. Width of floc was in the range of 0.30-0.32 mm and there was no significant difference (p>0.05) between treatments. In general, width and length of floc in treatments increased gradually by the time. In treatment C:N=15 floc length is closed to floc width. Du (2016) stated that spotted scat with the size of 3.59 g/ind was reared at different C:N ratios by molasses, floc length (0.33-0.44 mm) and floc width (0.23-0.31 mm) were relatively lower than result of this research.

Avnimelech (2015) revealed that one of factors affecting floc size is mixing intensity of water, the suitable energy for aggregation of bacteria in floc was about 0.1-10 W.m$^{-3}$, if the energy is higher than 100 W.m$^{-3}$ bacteria could be in dispersed form and difficult to aggregate in floc. Wilen and Balmer (1999) cited by Avnimelech (2015) reported that at higher oxygen concentration, floc has more big size and stable structure. The increase in number, composition of zooplankton and phytoplankton by the time also contributes to change in microbial composition and increase in floc size. Biological polymers as poly-B-hydroxybutyrate (PHB) also contribute to increase in floc size, at the final of rearing, accumulation a lot of PHB was due to development of heterotrophic bacteria, caused by adhesion of feed, feces, zooplankton and phytoplankton, indirectly leading to increase in floc size.

Fluctuation in floc volume between treatments with different C:N ratios is indicated in Figure 2. In the first three weeks, there was no significant difference (p>0.05) in floc volume between treatments, ranged 0.15-0.68 mL/L. In the 4th week, floc volume in treatments of C:N=10, C:N=15, C:N=20 was not significantly different (p>0.05), and fluctuated between 1.63-2.30 mL/L but it was significantly higher than control treatment (0.17±0.06 mL/L) (p<0.05). In the 5th week, floc volume in C:N=15 and C:N=20 treatments was not significant different (p>0.05), fluctuated between 3.53-3.87 mL/L and it was significantly higher (p<0.05) than that of C:N=10 (1.75±0.25 mL/L) and control treatments (0.43±0.12 mL/L).

After 6 weeks of rearing, floc volume reached the highest at C:N=15 treatment (7.33±2.08 mL/L) and it differed significantly with the other treatments (p<0.05). Floc volume in treatments of C:N=10 and C:N=20 were not significantly different (p>0.05) ranged 3.50-4.63 mL/L. The control treatment has the lowest floc volume (0.53 mL/L). Avnimelech (2015) reported that floc volume increased dramatically after 30 days and fluctuate between 2-10 mL/L, high floc volume can cause congestion of fish gill and should be maintained < 25 mL/L. Du (2016) stated spotted scat fingerling with initial size of 3.59 g after 4 months of rearing at different C:N ratios, floc volume can reach between 5-31 mL/L. Lower floc volume in this experiment can be explained as young stage of fingerling, amount of supplied feed and low molasses supplied. Increase in floc volume in combination with increase in total bacteria decreased concentration of TAN and NO$_2^-$. In general, floc volume in treatments was in suitable range for fingerling growth.

Figure 2. Fluctuation in floc volume between treatments

3.3 Fluctuation of microbial density

Total bacteria, total *Vibrio* bacteria and *Vibrio* rate of all treatments are indicated in Table 4, Table 5 and Figure 3.
Total bacteria in all treatments after 15 days of rearing was relatively low and fluctuated between \(0.06-2.55\times10^4\) CFU/mL. After 30 days of rearing, total bacteria in treatments of C:N=10, C:N=15, and C:N=20 were not significantly different \((p>0.05)\) ranging between \(39.0-48.7\times10^4\) CFU/mL and it was significantly higher \((p<0.05)\) than control treatment \((1.35\pm0.54\times10^4\) CFU/mL). After 45 days of rearing, total bacteria was the highest in treatment C:N=15 \((650\pm122\times10^4\) CFU/mL), following by C:N=20 \((445\pm87.0\times10^4\) CFU/mL), C:N=10 treatment \((165\pm26.9\times10^4\) CFU/mL) and control treatment \((15.0\pm2.40\times10^4\) CFU/mL), and there were significant differences between treatments \((p<0.05)\).

When C:N ratio increased to 15, floc volume reached highest value and \(\text{NO}_2^–\) content reduced to lowest value at the end of rearing. Heterotrophic bacteria absorbed toxic substances as \(\text{NH}_4^+\) and \(\text{NO}_2^–\) and converted into biomass leading to increase in bacteria density and floc volume. Avnimelech (2015) stated that total bacteria in biofloc system fluctuated between \(100\times10^4\) and \(1000\times10^4\) CFU/mL, Anderson (1993) cited by Ngan and Hiep (2010) reported that in clear water, total bacteria was lower than \(10^3\) CFU/mL. If total bacteria exceed \(10^7\) CFU/mL, it will be harmful to cultured shrimp, fish. Total bacteria in this experiment was in suitable range for growth of spotted scat.

After 30 days of rearing, total \(\text{Vibrio}\) bacteria was lowest in treatment C:N=15 \((6.43\pm1.63\times10^3\) CFU/mL), it did not differ significantly with treatment C:N=10 \((8.47\pm1.33\times10^3\) CFU/mL) \((p>0.05)\) but it was significantly lower than treatment C:N=20 \((11.7\pm2.61\times10^3\) CFU/mL) and control treatment \((12.8\pm1.51\times10^4\) CFU/mL) \((p<0.05)\). After 45 days of rearing, total \(\text{Vibrio}\) bacteria in treatments of C:N=10, C:N=15, and C:N=20 did not differed significantly \((p<0.05)\), in range of \(1.37\) to \(5.07\times10^3\) CFU/mL, but total \(\text{Vibrio}\) bacteria in these treatments were significantly lower than control treatment \((11.4\pm2.44\times10^3\) CFU/mL) \((p<0.05)\).

In general, when C:N ratio increased, total \(\text{Vibrio}\) bacteria decreased. Tao et al. (2017) reported that \(\text{Penaeus monodon}\) reared up to the stage PL-15, the highest total \(\text{Vibrio}\) bacteria was found in control treatment \((72\pm0.4\times10^3\) CFU/mL), and decreased dramatically to \(5\pm0.2\times10^3\) CFU/mL in treatment C:N=30. Souza et al. (2014) reported \(\text{Farfantepenaeus brasiliensis}\) can reach high survival rate of \(80-88%\) when total \(\text{Vibrio}\) bacteria of \(2\times10^3\) CFU/mL in treatment supplied with molasses. Ngan et al. (2008) reported that total \(\text{Vibrio}\) bacteria which is lower than \(6.5\times10^3\) CFU/mL did not cause effect to cultured shrimp. The result indicates that total \(\text{Vibrio}\) bacteria in this experiment does not cause effect to growth of spotted scat.

### Table 5. Fluctuation in total \(\text{Vibrio}\) bacteria \((\times10^3\) CFU/mL) between treatments by the time

<table>
<thead>
<tr>
<th>Treatment</th>
<th>30 days</th>
<th>45 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>12.8\pm1.51 a</td>
<td>11.4\pm2.44 a</td>
</tr>
<tr>
<td>C:N = 10</td>
<td>8.47\pm1.33 bc</td>
<td>5.07\pm2.23 b</td>
</tr>
<tr>
<td>C:N = 15</td>
<td>6.43\pm1.63 c</td>
<td>2.87\pm1.86 b</td>
</tr>
<tr>
<td>C:N = 20</td>
<td>11.7\pm2.61 ab</td>
<td>1.37\pm0.45 b</td>
</tr>
</tbody>
</table>

The highest \(\text{Vibrio}\) rate was found in control treatment \((22.5\pm5.18\%)\) and it was significantly higher than that of C:N=10, C:N=15, C:N=20 treatments. White leg shrimp \((0.37\ g/\text{ind})\) reared in biofloc system at C:N=15, after 45 days of rearing, \(\text{Vibrio}\) rate ranged \(0.04-1.88\%\) (Viet et al., 2017). \(\text{Bacillus}\) bacteria can produce anti-microbial substances which is able to kill \(\text{Vibrio harveyi}\) (Hasting and Nealson, 1981 cited in Ngan and Hiep, 2010). Result shows that suitable C:N ratio can facilitate development of benefit bacteria and inhibit the development of \(\text{Vibrio}\) bacteria.

![Vibrio rate](http://dx.doi.org/10.29322/IJSRP.8.5.2018.p7759)
3.4 Growth performance of spotted scat between treatments

Growth in weight and length of spotted scat fingerling after 45 days of rearing in all treatments are presented in Table 6 and Table 7. The highest final weight, daily weight gain, specific growth rate in weight was found in treatment C:N=15 (0.97 g/ind, 0.020 g/day, 4.07 %/day), following by treatment of C:N=20 (0.92 g/ind, 0.018 g/day, 3.95 %/day), and treatment of C:N=10 (0.76 g/ind, 0.013 g/day, 3.53 %/day) and control treatment (0.69 g/ind, 0.010 g/day, 3.31 %/day). In general, growth of weight between two treatments C:N=15 and C:N=20 did not differ significantly (p >0.05) but they were significantly higher than two treatments C:N=10 and control (p<0.05). Khanh (2012) reported that spotted scat with initial size of 0.14 g/ind reared for 30 days at density of 500 ind/m³ and salinity of 5‰, average weight, DWG and SGR in weight reached 0.91 g/ind, 0.026 g/day, 6.22 %/day, respectively. DWG and SGR in weight found in this experiment were lower than previous research because the rearing time was longer (up to 45 days), high mixing intensity in biofloc system, affected swimming and catching ability of spotted scat. In general, result of this research shows that spotted scat in treatment C:N=15 has best growth in weight.

Table 6. Growth in weight of spotted scat between treatments

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Final weight (g/ind)</th>
<th>Daily weight gain (g/day)</th>
<th>Specific growth rate (%/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>0.69±0.02 a</td>
<td>0.010±0.000 a</td>
<td>3.31±0.07 a</td>
</tr>
<tr>
<td>C:N=10:1</td>
<td>0.76±0.08 a</td>
<td>0.013±0.005 ab</td>
<td>3.53±0.22 a</td>
</tr>
<tr>
<td>C:N=15:1</td>
<td>0.97±0.09 b</td>
<td>0.020±0.000 c</td>
<td>4.07±0.21 b</td>
</tr>
<tr>
<td>C:N=20:1</td>
<td>0.92±0.08 b</td>
<td>0.018±0.005 bc</td>
<td>3.95±0.19 b</td>
</tr>
</tbody>
</table>

The highest final length, daily length gain and specific growth rate in length were found in treatment C:N=15 (30.7 mm/ind, 0.33 mm/day, 1.50 %/day) and the lowest ones was found in control treatment (27.0 mm/ind, 0.25 mm/day, 1.21 %/day). Growth in length between treatments C:N=15 and C:N=20 did not differ significantly (p>0.05) and they were significantly higher (p<0.05) than two treatments of C:N=10 and control.

In treatment C:N=15, total bacteria and floc volume were the highest, Vibrio rate and toxic substances as NH₄⁺, NO₂⁻ reached the lowest value. Beside commercial feed, floc is also secondary feed which has high nutritional value for fish, benefit bacteria both supports in good digestion and promote immunity, the above characteristics show that in treatment C:N=15 fish absorbs feed well and reaches highest growth.

Table 7. Growth in length of spotted scat between treatments

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Final length (mm/ind)</th>
<th>Daily length gain (mm/day)</th>
<th>Specific growth rate (%/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>27.0±0.59 a</td>
<td>0.25±0.01 a</td>
<td>1.21±0.05 a</td>
</tr>
<tr>
<td>C:N=10:1</td>
<td>27.7±0.95 a</td>
<td>0.27±0.02 a</td>
<td>1.26±0.07 a</td>
</tr>
<tr>
<td>C:N=15:1</td>
<td>30.7±0.70 b</td>
<td>0.33±0.02 b</td>
<td>1.50±0.05 b</td>
</tr>
<tr>
<td>C:N=20:1</td>
<td>29.5±1.09 b</td>
<td>0.31±0.03 b</td>
<td>1.39±0.08 b</td>
</tr>
</tbody>
</table>

3.5 Survival rate, FCR and biomass of spotted scat between treatments

Table 8 shows that FCR fluctuated in the range of 1.39-2.92 between treatments, the lowest FCR was found in treatment C:N=15 (1.39±0.15) and the highest one was found in control treatment (2.92±0.18). FCR in treatments C:N=10 (2.06±0.30) and C:N=20 (1.89±0.24) did not differ significantly (p>0.05) but they were significantly higher to treatment C:N=15 (p<0.05) and significantly lower to control treatment (p<0.05).

Biomass ranged between 233-416 g/m³ and similar trend was found as FCR. The highest biomass was found in treatment C:N=15 (416±35.5 g/m³) and the lowest one was found in control treatment (233±9.80 g/m³). Du (2016) reported that FCR was between 1.64-3.46 in grow-out culture of spotted scat in different C:N ratios. Ni et al. (2013) reported spotted scat with initial size of 0.49 g/ind after 2 months of rearing, FCR ranged between 2.6-2.83.

Table 8. FCR and biomass of spotted scat between treatments

<table>
<thead>
<tr>
<th>Treatment</th>
<th>FCR</th>
<th>Biomass (g/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>2.92±0.18 a</td>
<td>233±9.80 a</td>
</tr>
<tr>
<td>C:N=10:1</td>
<td>2.06±0.30 b</td>
<td>307±37.7 b</td>
</tr>
<tr>
<td>C:N=15:1</td>
<td>1.39±0.15 c</td>
<td>416±35.5 c</td>
</tr>
<tr>
<td>C:N=20:1</td>
<td>1.89±0.24 b</td>
<td>321±23.6 b</td>
</tr>
</tbody>
</table>

Figure 4 shows that after 30 days of culture, there was no significant difference in survival rate between treatments (p>0.05), ranged 88.7-95.3%. After 45 days of culture, survival rate in treatments C:N=10 (80.8±3.77%) and C:N=15 (86.0±2.00%) was not significantly different (p>0.05) and it was significantly higher than control treatment (68.0±2.00%) and C:N=20 (70.4±5.76%) (p<0.05). Khanh (2012) reported that spotted scat reared after 30 days reached survival rate between 55.1-92.8% at salinity between 0-30‰.

In general, total bacteria and floc volume were higher in treatments which molasses supplied, total Vibrio bacteria and...
toxic substances were very low, fish absorbs feed and grows well leading to high survival rate, increased biomass and lower FCR in comparison with control treatment. In treatment C:N=20 molasses is supplied with higher amount so it can directly affect to fish’s health, leading to lower survival rate compared to treatments C:N=10 and C:N=15. C:N=15 treatment has highest survival rate and biomass, lowest FCR.

**Figure 4: Survival rate of spotted scat between treatments by the time**

3.6 Coefficient of variation of spotted scat

Coefficient of variation (CV) reflects degree of variation of individual weight to average value, the higher the CV the higher the variation in fish’s weight. Table 9 indicates that after 45 days of rearing the CV from all treatments ranged 0.36-0.44, the highest CV was found in control treatment (0.44) and the lowest CV was found in treatment C:N=15 (0.36). There was no significant difference between treatments (p>0.05). Khanh (2012) reported spotted scat reared after 30 days reached the CV between 0.38-0.49.

Figure 5 indicates frequency of size groups of fish in treatments supplied with different C:N ratios, size of fish in all treatments was in normal distribution. Fish’s size in control treatment ranged between 0.11-1.31 g/ind, the most abundant size was 0.6-0.7 g/ind, the following group was in 0.4-0.5 g/ind.

**Table 9. Coefficient of variation of spotted scat between treatments**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Coefficient of variation (CV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>0.44±0.04 a</td>
</tr>
<tr>
<td>C:N=10:1</td>
<td>0.40±0.08 a</td>
</tr>
<tr>
<td>C:N=15:1</td>
<td>0.36±0.02 a</td>
</tr>
<tr>
<td>C:N=20:1</td>
<td>0.42±0.04 a</td>
</tr>
</tbody>
</table>

In treatment C:N=10, fish’s size was in the range of 0.17-1.34 g/ind, the most abundant size was 0.7-0.8 g/ind, and size group of 1.1-1.3 g/ind in this treatment was higher than control treatment. In treatment C:N=15, the lowest size of fish was 0.3 g/ind, fish group with size between 0.8-0.9 g/ind was the most abundant size. Moreover, there were also fish size up to 1.7-2 g/ind and fish’s size of 1.3-1.6 g/ind also occupy the highest quantity. In treatment C:N=20 the lowest size of fish was 0.2 g/ind, the biggest size of fish of 2 g/ind was low quantity, fish group which has the most quantity was in size of 0.8-0.9 g/ind. Generally, in treatment C:N=15, big size group accounted for large quantity, fish size fluctuated narrowly so CV was lower than the other treatments.
Figure 5. Frequency of different size groups of spotted scat between treatments after 45 days of rearing

IV. CONCLUSION

Supplementation molasses at C:N=15 into biofloc system for rearing of spotted scat proved the best condition for fingerling development. In rearing this condition, spotted scat has the highest growth rate, biomass and survival rate. Thus, application in on-farm condition should be done to promote this technique in rearing of spotted scat fingerlings.

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AUTHORS

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An Investigation on the Distribution of Mosquito Species in Guyuk L.G.A of Adamawa State, Nigeria

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Abstract: Mosquitoes are vectors of parasites causing diseases and are distributed in various ecological niches. This research work was set to determine the distribution and relative abundance of mosquito larvae in Guyuk Local Government Area of Adamawa State within the months of August 2014 and January 2015. Banjiram, Guyuk, Bobini and Chikila districts were surveyed using standard entomological procedures. Dipping Method was used in collecting larval samples from the field and reared to adult in insectaria. Results revealed two hundred and one (201) potential mosquito breeding sites, which were grouped with respective densities: cans/containers/tyres (16.75); ditches/pools/swamps (10.44); domestic runoffs/gutters (14.04); tree holes/leaf axils (5.16); and vehicle tyre tracks/human and animal foot prints (1.62). A total of two thousand, six hundred and eighty nine (2689) mosquito larvae were collected and subsequently reared to adults. The types of breeding sites, species of mosquito, as well as their seasonal distribution varied when analyzed.

Key words: Breeding, Larvae, Mosquito, Species

I. Introduction

Mosquito have successfully adapted to climates from the arctic to the equator, and everywhere they have solved fundamental survival problems. They must locate carbohydrate to fuel their flight muscles, blood to supply protein to the egg clutch, and suitable habitats in which to lay their eggs. They breed in natural or man-made, temporary, semi-permanent as well as permanent water bodies [6].

More than five hundred thousand people worldwide die from mosquito-borne diseases every year [13]. Not only can mosquitoes carry diseases that afflict humans, they also transmit several diseases and parasites that dogs and horses are very susceptible [12]. These include dog heartworm, West Nile Virus and Eastern Equine Encephalitis. In addition, mosquito bites can cause severe skin irritation through an allergic reaction to the mosquito’s saliva – this is what causes the red bump and ditching. Mosquito vectored diseases include protozoan diseases i.e. malaria, filarial diseases such as dog heartworm, and viruses such as dengue, encephalitis and yellow fever. CDC Travelers’ Health provides information on travel to destinations where human-borne diseases might be
a problem (American Mosquito Control Association).

Interest in environmental management of mosquito larval habitats has been rekindled due to the debilitating effects of malaria in tropical Africa. Appropriate management of larval habitats in Sub-Saharan countries, particularly during the dry season may help suppress vector densities and mosquito-borne diseases transmission. Permanent breeding sites during the dry season may serve to seed the additional habitats formed during the rainy season [7]. The indications for larval control are limited to densely populated areas with relatively few breeding places, such as urban or irrigated arid areas [1].

II. Materials and Method

Mosquito larvae, particularly the common Culex, Aedes and Anopheles, are usually found at the water’s surface and frequently next to vegetation or surface debris. In larger pools and ponds, they are usually near the margins, not in open, deep water. Dipping was concentrated around floating debris and aquatic and emergent vegetation. If there is a strong wind, dipping was done on the windward side of the habitat where larvae and pupae were most heavily concentrated [8].

Each water body may contain a number of different microhabitats which could contain different mosquito species. Microhabitats are such places as under tree roots within clumps of emergent vegetation, under floating or overhanging vegetation and in open water. Different microhabitats within an area were identified and many are sampled in order to obtain an accurate picture of the areas’ species composition.

The larvae collection method was adopted from [9] which includes the following seven steps;

The shallow skim consists of submerging the leading edge of the dipper, tipped about 45°, about an inch below the surface of the water and quickly but gently, moving the dipper along a straight line in open water or in water with small floating debris. End the stroke just before the dipper was filled to prevent overflowing. The shallow skim is particularly effective for anopheles larvae that tend to remain at the surface longer than Aedes and culex. Anopheles is usually associated with floating vegetation and debris.

The second method in open water with or without floating objects is the complete submersion. Many mosquito larvae, particularly those of the genera Aedes and Psorophora, are very active and usually dive below the surface quickly if disturbed. In this case, a quick plunge of the dipper below the surface of the water is required, bringing the dipper back up through the diving larvae. The dipper carefully brought up to avoid losing the larvae in the overflow current.

Partial submersion technique was employed when sampling at the edges of emergent vegetation. Here the dipper is tilted at about 45°, straight down adjacent to the vegetation. This causes the water around the vegetation to flow into the dipper, carrying the larvae with the flow. There is no need to move the dipper horizontally, and the dipper is pulled up before it is full.

In very shallow water, the flow-in method is used. Larvae was collected by pushing the dipper into the substrate of the pool and letting the shallow surface water, debris and larvae flow into the dipper, the dipper is not moved horizontally.

Scraping technique was used to sample the larvae that may be under floating or emergent vegetation. This
method was used in habitats that contain clumps of vegetation such as tussocks of sedges, floating mats of cattails or water lettuce or other plants that were too large to get in the dipper, or clumps of submerged vegetation such as hydrilla or bladderwort. The water was dipped in towards the vegetation and ended by using the dipper to scrape up against the base or underside of the vegetation to dislodge larvae.

The simple scoop is the method used and consists of simply scooping a dipperful of water. It is often the method referred to in much of the literature as “the standard dipping procedures”, while it can be successfully used to collect culex larvae, it is still not the method of choice. This was especially useful in pools and the other shallow water or when larvae are disturbed and dive to the bottom. The dipper was submerged completely to the bottom litter and slowly moved around. The darker mosquito larvae and pupae stood out against the background of a white or aluminium dipper. Once larvae appeared in the dipper, it is lifted upward.

One or more of these methods was used to determine the mosquito species composition of most aquatic habitats, excluding those whose openings are smaller than dipper, such as tires, rock pools, tree-holes and tree root systems like those found in swamps. In those cases, a smaller container, such as vial, measuring spoon or tea strainer was used in the same seven ways as the dipper and the content transferred to smaller containers. Then there was the tubular dipper, the chef’s poultry baster, for those really hard to get to places like plant axils, tree-holes and tee root holes.

The contents of smaller containers of the same type/group in a compound or area were carefully pooled together into a white bowl. Natural tree hole collections was carried out by means of a bore glass pipette (0.5-1cm) attached to a squeeze bulb rubber. Samples collected were labelled according to the types of containers, the macro habitat and ecological foci. Larvae and a sample of water from each habitat was placed in plastic bags and transported to the laboratory for further examination.

Thereafter, the larvae were reared to adults in the laboratory in bowls containing a diet of baker’s yeast and mashed Yale cabin biscuit. Data characteristics of each aquatic habitat were recorded on a field sampling form using [3] method. These include; water quality, categorized into three types as clear, turbid and polluted. Clear water refers to water from opaqueness while turbid water was having sediments and suspended particles and polluted water as water containing high organic and oily matter.

The turbidity of the water was estimated by placing water samples in a glass test tube and holding against a white background and was classified into two levels ranging from clear or not clear. Canopy cover was by visual estimate of the area of habitat covered by shade as a percentage. Emergent plants included both aquatic and immersed terrestrial vegetation. This was measured as percentage of water surface covered by flora [3]

Other physical parameters noted included depth and the nature of breeding site either temporary or permanent.

### III. Result and Discussion

**Table 1: Mosquito Breeding and Abundance in Guyuk**

<table>
<thead>
<tr>
<th>Habitat type</th>
<th>District</th>
<th>Cans/</th>
<th>Ditches/</th>
<th>Gutters/</th>
<th>Tree</th>
<th>Prints</th>
<th>subtotal</th>
<th>total</th>
</tr>
</thead>
</table>

http://dx.doi.org/10.29322/IJSRP.8.5.2018.p7760  www.ijsrp.org
Table 2: Mean Larval Densities in Different Habitat Types in Guyuk

<table>
<thead>
<tr>
<th>Habitat type</th>
<th>Number of sites containing larvae</th>
<th>Number of larvae collected</th>
<th>Density (larvae/habitat)</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1 Cans/containers/tyres</td>
<td>107</td>
<td>1792</td>
<td>16.75</td>
</tr>
<tr>
<td>H2 Ditches/swamps</td>
<td>43</td>
<td>449</td>
<td>10.44</td>
</tr>
<tr>
<td>H3 Run off/gutters</td>
<td>24</td>
<td>337</td>
<td>14.04</td>
</tr>
<tr>
<td>H4 Tree holes/leaf axils</td>
<td>19</td>
<td>98</td>
<td>5.16</td>
</tr>
<tr>
<td>H5 Foot print/tyre tracks</td>
<td>8</td>
<td>13</td>
<td>1.62</td>
</tr>
</tbody>
</table>

Table 2 reveals the larval densities of mosquitoes, cans and containers (H1) had highest larval densities of 16.75 followed by domestic run-offs and gutters which had 14.04, tyre tracks had the least larval densities.

Table 3: Distribution of Mosquito in Different Habitat in Guyuk

<table>
<thead>
<tr>
<th>Location</th>
<th>Species</th>
<th>H1</th>
<th>H2</th>
<th>H3</th>
<th>H4</th>
<th>H5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bobini</td>
<td>Culex</td>
<td>133</td>
<td>27</td>
<td>18</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Anopheles</td>
<td>132</td>
<td>13</td>
<td>25</td>
<td>5</td>
<td>0</td>
</tr>
</tbody>
</table>

http://dx.doi.org/10.29322/IJSRP.8.5.2018.p7760 www.ijsrp.org
Table 3 reveals the distribution of mosquito larvae in the various habitats, in Banjiram, only anopheles species were found to be absent in habitats 2, 4 and 5 but Aedes and Culex species were found in all the habitats in Bobini districts.

Table 4: Distribution of Mosquito Larvae in Habitats of Different Qualities in Guyuk

<table>
<thead>
<tr>
<th>Habitat quality</th>
<th>Aedes</th>
<th>Anopheles</th>
<th>Culex</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Water quality</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clear</td>
<td>336</td>
<td>81</td>
<td>113</td>
<td>560</td>
</tr>
<tr>
<td>Turbid</td>
<td>1134</td>
<td>98</td>
<td>567</td>
<td>1799</td>
</tr>
<tr>
<td>Organic</td>
<td>36</td>
<td>218</td>
<td>76</td>
<td>330</td>
</tr>
<tr>
<td><strong>Depth</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shallow &lt;1m</td>
<td>1536</td>
<td>386</td>
<td>756</td>
<td>2678</td>
</tr>
<tr>
<td>Deep &gt;1m</td>
<td>0</td>
<td>11</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td><strong>Light</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sun lit</td>
<td>948</td>
<td>229</td>
<td>388</td>
<td>1565</td>
</tr>
<tr>
<td>Shaded</td>
<td>588</td>
<td>168</td>
<td>368</td>
<td>1124</td>
</tr>
</tbody>
</table>

Table 4 reveals larvae collected in different water qualities, mosquito larvae were predominantly found in turbid water totally to 1799 larvae, shallow water at depth below 1m, 2678 mosquito larvae were collected. Both shaded and lit water habitat had fairly equal distribution of mosquito larvae.
Mosquito species use different natural and artificial habitats as sources of water for oviposition and breeding. These breeding sites are numerous in Guyuk. This was due to varied human activities, poor economic conditions, poor sanitation level, digging of earth (mud) for building of mud houses, uncovered water storage containers and indiscriminate disposal of discarded household materials. The resultant effect is abundance of ponds, puddles, water collections in tins, bowls, drums and containers of varying sizes. This observation is in line with [5]. Guyuk L.G.A is bordered by kiri Dam to the East and River Gongola to the North which also serves as conducive breeding and survival sites for mosquitoes of different species [12].

Chikila and Guyuk villages have high number of breeding sites than Bobini and Banjiram districts. This is as a result of differences in the human activities, water storage and microhabitat conditions of these two paired districts. During the study, it was observed that Banjiram and Guyuk districts are low lying, prone to flood water and had swampy terrain in the rainy season. The districts also had a more rural setting with inhabitants more often, keeping water holding vessel around their homes. Also due to the swampy terrain of the districts especially in the rainy season, the grounds were able to retain water for a longer period of time thus serves as breeding sites for mosquitoes.

Result reveals that a total of 2689 larvae were sampled in the four selected districts of Guyuk L.G.A with Guyuk district having the highest number of mosquito larvae (714) examined in the five categories of breeding habitats. Bobini has the highest number of breeding sites being examined, 91 sites in total. Cans and containers as breeding habitat examined, out-number all other types of habitat.
IV. Summary and conclusion

Mosquitoes are not evenly distributed in the five habitats. The richest of the habits is habitat 3 (domestic run-offs/gutters). The presence of any of these mosquito species may be affected by some physical parameters like shade, sunlit, debris, turbidity of the water and depth.

Increased water storage, digging of earth for clay, indiscriminate disposal of tins and cans used for food and procuring cooking ingredients by inhabitants of the town, and a breakdown of public pipe for water supply are chiefly accountable for increase in the number of possible sites in the study area. A combination of factors; abundant rainfall, tropical temperatures and a high relative humidity accounts for mosquito breeding in wet periods in the study area. The abialability of Aedes, Culex and Anopheles, which are known vectors of urban yellow fever, lymphatic filariasis and malaria, suggests that the residents of Guyuk are at risk of mosquito-borne diseases.

It is therefore recommended that residents of the town are enlightened on the environmental factors that contribute to mosquito breeding and for the government to institute proper sanitation measures to reduce mosquito breeding sites.

REFERENCES


Analysis and Accuracy Level Comparison Between Capital Asset Pricing Model (CAPM) and Arbitrage Pricing Theory (APT) In Determining the Expected Return

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Abstract- The objectives of this study are to determine the eligible stocks to be selected based on the CAPM and APT methods, to determine the accuracy level of expected return of the stock using Mean Absolut Deviation (MAD), and to compare the accuracy level of CAPM and APT methods. Based on the CAPM method, there are 18 eligible stocks to choose: AKRA, ADRO, BPRT, CTRA, ICBP, INCO, KLBF, LPPF, LSIP, MYRX, PTBA, PTPP, PWON, TPIA, UNTR, UNVR, WSKT, TLKM. Based on APT method, there are 16 selected stocks: AKRA, ADRO, BPRT, CTRA, ICBP, INCO, LPPF, MYRX, PTBA, PTPP, PWON, TPIA, UNTR, UNVR, WSKT TLKM. MAD APT method is more accurate than MAD CAPM in determining the expected return. The comparative result shows that there is no significant difference between the accuracy of CAPM and APT methods in estimating the stock return of the company in Jakarta Islamic Index.

Index Terms- Capital Asset Pricing Model, Arbitrage Pricing Theory, Mean absolut Deviation, Jakarta Islamic Index

I. INTRODUCTION

Investments can be made both on real and financial assets. One of investment types in financial assets is investing in stocks. Stock is a form of the company ownership. Investment is related to the return and risk of an asset. The investor requires the capability to estimate the rate of return to assist in stock selection. In determining the expected rate of return, there are two estimation models that can be used: Capital Asset Pricing Model (CAPM) and Arbitrage Pricing Model (APT).

CAPM was firstly introduced by William Sharpe, John Litner and Jan Mossin in 1964 [1]. This method determines the expected rate of return based on the systematic risk of stocks i.e. beta stock. Meanwhile, APT was firstly introduced by Stephen A. Ross in 1976 [1]. This method determines the expected rate of return based on a lot of factors other than market.

In determining the accuracy level of stock return prediction using CAPM and APT, there are several measurements that can be used; one of them is Mean Absolut Deviation (MAD). MAD is a sum of prediction errors regardless of the algebraic marks divided by the number of observed data [2]. Some researches use MAD method in determining the accuracy of CAPM and APT in predicting stock returns. [3] show that there is a small difference between MAD CAPM and APT and the results show that there is no significant difference between estimation results using CAPM and APT methods. The results have also shown that MAD APT is smaller than MAD CAPM; in other words, it is more accurate in predicting stock returns. In the contrary, [4] shows that CAPM is the most accurate method in predicting stock returns because it has a smaller MAD value compared to MAD APT.

The differences found in the result of these studies became the basis of this research to test the accuracy of CAPM and APT models in predicting stock returns in the Jakarta Islamic Index (JII). The Jakarta Islamic Index is an index at the Indonesia Stock Exchange which consists of stocks that meet the sharia criteria. One of the criteria of Islamic stock is that the shares are issued by the companies whose business activities are engaged in halal fields [5].

II. LITERATURE REVIEW

2.1 Capital Asset Pricing Model (CAPM)

Capital Asset Pricing Model (CAPM) is a model of the relationship between the rate of return and risk of an asset based on the systematic risk i.e. beta that cannot be diversified. [6] states that investors will focus more on undiversifiable risk in an effort to

Where:
minimize the risk at a certain rate of return. For individual stocks, the model of the relationship between rate of return and risk is indicated by Securities Market Line (SML) [7]. SML shows the relationship between covariance and expected return [8]. The equation of CAPM model is shown in the following model [7]:

E(Ri) = R_f + β_i [(E (Rm) - R_f)]

Where:
E(Ri) = Expected Return Saham
R_f = Risk Free Return
E(Rm) = Market Expected Return
β_i = stock return’s sensitivity of stock–i to market return
2.2 Arbitrage Pricing Theory (APT)

Arbitrage Pricing Theory (APT) was introduced by Stephen A. Ross in 1976. The Arbitrage Approach states that the expected return of an asset is not determined by one single variable (market mean and variance) but it is determined by various macroeconomic factors and the change sensitivity of each factor [1]. [9] states that in Arbitrage Pricing Theory, the expected return of a securities is determined by multifactor/index from other sources of risk. APT model can provide a more accurate expected return value and will not lead to arbitrage [1]. Equation of APT model is indicated by linear function against the following factors [1]:

\[ R_i = R_f + \beta_1 (R_1 - R_f) + \beta_2 (R_2 - R_f) + \ldots + \beta_n (R_n - R_f) \]

\( R_i \) = Expected Return of Stock

\( R_f \) = Risk Free Return

\( R_{e-n} \) = Expected Return of factors that affecting stocks

\( \beta_{in} \) = Return sensitivity of stock I to stock n to the factors that influence it.

2.3 Mean Absolute Deviation (MAD)

Mean Absolute Deviation is a measure of overall forecasting errors for a model [10]. The MAD value is calculated by taking the sum of the absolute values of each forecasting error divided by the number of data periods (n) [10]:

\[ MAD = \frac{\sum|actual - prediction|}{n} \]

III. METHODOLOGY

The population of this research are all stocks listed in the Indonesia Stock Exchange. Meanwhile, the research samples are stocks registered in Jakarta Islamic Index year 2018 which have the completeness of the data in March 2014 to March 2018. This research is using secondary data that obtained through the website www.yahoofinance.com and www.bi.go.id. The data period used is monthly data for the last 4 years i.e. from March 2014 to March 2018: Adaro Energy Tbk (ADRO), AKR Corporindo Tbk (AKRA), Aneka Tambang (Persero) Tbk (ANTM), Astra International Tbk (ASII), Barito Pacific Tbk (BRTP), Bumi Serpong Damai Tbk (BSDE), Ciputra Development Tbk (CTRA), XL Axiata Tbk (EXCL), Indofood CBP Sukses Makmur Tbk (ICBP), Vale Indonesia Tbk (INCO), Indofood Sukses Makmur Tbk (INDF), Kalbe Farma Tbk (KLBF), Lippo Karawaci Tbk (LPKR), Matahari Department Store Tbk (LPFF), PP London Sumatra Indonesia Tbk (LSIP), Hanson International Tbk (MYRX), Perusahaan Gas Negara (Persero) Tbk (PGAS), Tambang Batubara Bukit Asam (Persero) Tbk (PTBA), PP (Persero) Tbk (PTPP), Pakuwon Jati Tbk (PWON), Surya Citra Media Tbk (SCMA), Semen Indonesia (Persero) Tbk (SMGR), Summarecon Agung Tbk (SMRA), Telekomunikasi Indonesia (Persero) Tbk (TLKM), Chandra Asri Petrochemical Tbk (TPIA), United Tractors Tbk (UNTR), Unilever Indonesia Tbk (UNVR), Wijaya Karya (Persero) Tbk (WKA) dan Waskita Karya (Persero) Tbk (WSKT). The factors that is used in APT Model is Inflation, Exchange Rate, Composite Stock Exchange Price Index and BI Rate.

3.1 Research Steps

A. Calculating Stock Expected Return by using CAPM model:

\[ E(R_i) = R_f + \beta_i [(E(R_m) - R_f)] \]

B. Calculating Stock Expected Return by using APT model:

\[ R_i = R_f + \beta_1 (R_1 - R_f) + \beta_2 (R_2 - R_f) + \ldots + \beta_n (R_n - R_f) \]

C. Calculating Mean Absolute Deviation (MAD) :

\[ MAD = \frac{\sum|actual - prediction|}{n} \]

D. Calculating the difference between CAPM and APT by using Independent Sample t-Test

The objective of this testing is to determine whether there are differences in average (mean) between two populations to see the average of two samples [11].

The hypotheses of this research are as follows [11]:

- \( H_0 = \) The average of expected return in CAPM and APT is the same.
- \( H_1 = \) The average of expected return in CAPM and APT is different.

The basis for decision making is as follows:
- If the probability is > 0.05, \( H_0 \) is accepted
- If the probability is < 0.05, \( H_0 \) is rejected

IV. RESULTS AND DISCUSSION

Table 4.1 Actual Return and Stock Beta

<table>
<thead>
<tr>
<th>Code</th>
<th>AKRA</th>
<th>ADRO</th>
<th>ASII</th>
<th>BPRT</th>
<th>BSDE</th>
<th>CTRA</th>
<th>EXCL</th>
<th>ICBP</th>
<th>INCO</th>
<th>INDF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual Return</td>
<td>0.0259</td>
<td>0.0253</td>
<td>-</td>
<td>0.0002</td>
<td>0.0501</td>
<td>-0.0022</td>
<td>0.0079</td>
<td>-0.0005</td>
<td>0.0108</td>
<td>0.0146</td>
</tr>
<tr>
<td>Beta Saham,βi</td>
<td>0.7478</td>
<td>0.9421</td>
<td>1.4131</td>
<td>1.8335</td>
<td>1.8602</td>
<td>2.3874</td>
<td>0.7148</td>
<td>0.6231</td>
<td>0.7554</td>
<td>0.8769</td>
</tr>
<tr>
<td>Code</td>
<td>KLB</td>
<td>LPKR</td>
<td>LPFF</td>
<td>LSIP</td>
<td>MYRX</td>
<td>PGAS</td>
<td>PTBA</td>
<td>PTPP</td>
<td>PWON</td>
<td>SMRA</td>
</tr>
<tr>
<td>Actual Return</td>
<td>0.0042</td>
<td>-0.0118</td>
<td>0.0086</td>
<td>0.0052</td>
<td>0.0084</td>
<td>-0.0064</td>
<td>0.0189</td>
<td>0.0126</td>
<td>0.0224</td>
<td>-0.0054</td>
</tr>
</tbody>
</table>
Table 4.1 shows the actual return value i.e. between -0.0118 up to 0.0501. The highest actual return value is BPRT stock while the lowest actual return is LPKR stock. The beta company stocks are between 0.0672 and 2.387. The greater the value of the beta stock, the more sensitive the stock is to market changes. The lowest beta value is LPKR stock while the highest beta value is CTRA stock.

<table>
<thead>
<tr>
<th>Code</th>
<th>SCMA</th>
<th>SMGR</th>
<th>TPIA</th>
<th>UNTR</th>
<th>UNVR</th>
<th>WIKA</th>
<th>WSKT</th>
<th>TLKM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beta Saham,βi</td>
<td>0.9696</td>
<td>0.0672</td>
<td>0.8752</td>
<td>0.3148</td>
<td>0.3982</td>
<td>1.4403</td>
<td>1.3017</td>
<td>1.6393</td>
</tr>
<tr>
<td>Actual Return</td>
<td>-0.0031</td>
<td>0.0032</td>
<td>0.0406</td>
<td>0.0114</td>
<td>0.0161</td>
<td>~</td>
<td>0.0047</td>
<td>0.0102</td>
</tr>
<tr>
<td>Beta Saham,βi</td>
<td>0.7874</td>
<td>1.3720</td>
<td>0.6337</td>
<td>0.7487</td>
<td>0.1037</td>
<td>1.6529</td>
<td>0.7739</td>
<td>0.7874</td>
</tr>
</tbody>
</table>

Source: Data Processed (2018)

Table 4.2 Expected Return Capital Asset Pricing Model (CAPM)

<table>
<thead>
<tr>
<th>No.</th>
<th>Code</th>
<th>Actual return</th>
<th>αi</th>
<th>βi</th>
<th>E(Rm)</th>
<th>Rf (RBI rate)</th>
<th>E(Ri) CAPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AKRA</td>
<td>0.0259</td>
<td>0.02</td>
<td>0.7478</td>
<td>0.0041</td>
<td>0.0065</td>
<td>0.0047</td>
</tr>
<tr>
<td>2</td>
<td>ADRO</td>
<td>0.0253</td>
<td>0.02</td>
<td>0.9421</td>
<td>0.0041</td>
<td>0.0065</td>
<td>0.0042</td>
</tr>
<tr>
<td>3</td>
<td>ASII</td>
<td>-0.0002</td>
<td>-0.01</td>
<td>1.4131</td>
<td>0.0041</td>
<td>0.0065</td>
<td>0.0031</td>
</tr>
<tr>
<td>4</td>
<td>BPRT</td>
<td>0.0501</td>
<td>0.04</td>
<td>1.8335</td>
<td>0.0041</td>
<td>0.0065</td>
<td>0.0020</td>
</tr>
<tr>
<td>5</td>
<td>BSDE</td>
<td>-0.0022</td>
<td>-0.01</td>
<td>1.8602</td>
<td>0.0041</td>
<td>0.0065</td>
<td>0.0020</td>
</tr>
<tr>
<td>6</td>
<td>CTRA</td>
<td>0.0079</td>
<td>0.00</td>
<td>2.3874</td>
<td>0.0041</td>
<td>0.0065</td>
<td>0.0007</td>
</tr>
<tr>
<td>7</td>
<td>EXCL</td>
<td>-0.0005</td>
<td>0.00</td>
<td>0.7148</td>
<td>0.0041</td>
<td>0.0065</td>
<td>0.0048</td>
</tr>
<tr>
<td>8</td>
<td>ICBP</td>
<td>0.0108</td>
<td>0.01</td>
<td>0.6231</td>
<td>0.0041</td>
<td>0.0065</td>
<td>0.0050</td>
</tr>
<tr>
<td>9</td>
<td>INCO</td>
<td>0.0146</td>
<td>0.01</td>
<td>0.7554</td>
<td>0.0041</td>
<td>0.0065</td>
<td>0.0047</td>
</tr>
<tr>
<td>10</td>
<td>INDF</td>
<td>-0.0002</td>
<td>0.00</td>
<td>0.8769</td>
<td>0.0041</td>
<td>0.0065</td>
<td>0.0044</td>
</tr>
<tr>
<td>11</td>
<td>KLB</td>
<td>0.0042</td>
<td>0.00</td>
<td>0.9696</td>
<td>0.0041</td>
<td>0.0065</td>
<td>0.0041</td>
</tr>
<tr>
<td>12</td>
<td>LPKR</td>
<td>-0.0118</td>
<td>-0.01</td>
<td>0.0672</td>
<td>0.0041</td>
<td>0.0065</td>
<td>0.0063</td>
</tr>
<tr>
<td>13</td>
<td>LPPF</td>
<td>0.0086</td>
<td>0.00</td>
<td>0.8752</td>
<td>0.0041</td>
<td>0.0065</td>
<td>0.0044</td>
</tr>
<tr>
<td>14</td>
<td>LSIP</td>
<td>0.0052</td>
<td>0.00</td>
<td>0.3148</td>
<td>0.0041</td>
<td>0.0065</td>
<td>0.0057</td>
</tr>
<tr>
<td>15</td>
<td>MYRX</td>
<td>0.0084</td>
<td>0.01</td>
<td>0.3982</td>
<td>0.0041</td>
<td>0.0065</td>
<td>0.0055</td>
</tr>
<tr>
<td>16</td>
<td>PGAS</td>
<td>-0.0064</td>
<td>-0.01</td>
<td>1.4403</td>
<td>0.0041</td>
<td>0.0065</td>
<td>0.0030</td>
</tr>
<tr>
<td>17</td>
<td>PTBA</td>
<td>0.0189</td>
<td>0.01</td>
<td>1.3017</td>
<td>0.0041</td>
<td>0.0065</td>
<td>0.0033</td>
</tr>
<tr>
<td>18</td>
<td>PTPP</td>
<td>0.0126</td>
<td>0.01</td>
<td>1.6393</td>
<td>0.0041</td>
<td>0.0065</td>
<td>0.0025</td>
</tr>
<tr>
<td>19</td>
<td>PWON</td>
<td>0.0224</td>
<td>0.02</td>
<td>0.0735</td>
<td>0.0041</td>
<td>0.0065</td>
<td>0.0063</td>
</tr>
<tr>
<td>20</td>
<td>SMRA</td>
<td>-0.0054</td>
<td>-0.02</td>
<td>2.3582</td>
<td>0.0041</td>
<td>0.0065</td>
<td>0.0008</td>
</tr>
<tr>
<td>21</td>
<td>SCMA</td>
<td>-0.0031</td>
<td>-0.01</td>
<td>0.7874</td>
<td>0.0041</td>
<td>0.0065</td>
<td>0.0046</td>
</tr>
<tr>
<td>22</td>
<td>SMGR</td>
<td>0.0032</td>
<td>0.00</td>
<td>1.3720</td>
<td>0.0041</td>
<td>0.0065</td>
<td>0.0032</td>
</tr>
<tr>
<td>23</td>
<td>TPIA</td>
<td>0.0406</td>
<td>0.04</td>
<td>0.6337</td>
<td>0.0041</td>
<td>0.0065</td>
<td>0.0050</td>
</tr>
<tr>
<td>24</td>
<td>UNTR</td>
<td>0.0114</td>
<td>0.01</td>
<td>0.7487</td>
<td>0.0041</td>
<td>0.0065</td>
<td>0.0047</td>
</tr>
<tr>
<td>25</td>
<td>UNVR</td>
<td>0.0161</td>
<td>0.02</td>
<td>0.1037</td>
<td>0.0041</td>
<td>0.0065</td>
<td>0.0062</td>
</tr>
<tr>
<td>26</td>
<td>WIKA</td>
<td>-0.0047</td>
<td>-0.01</td>
<td>1.6529</td>
<td>0.0041</td>
<td>0.0065</td>
<td>0.0025</td>
</tr>
<tr>
<td>27</td>
<td>WSKT</td>
<td>0.0208</td>
<td>0.01</td>
<td>2.0249</td>
<td>0.0041</td>
<td>0.0065</td>
<td>0.0016</td>
</tr>
<tr>
<td>28</td>
<td>TLKM</td>
<td>0.0102</td>
<td>0.01</td>
<td>0.7739</td>
<td>0.0041</td>
<td>0.0065</td>
<td>0.0046</td>
</tr>
</tbody>
</table>

Source: Data Processed (2018)
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ISSN 2250-3153

Table 4.2 shows that Rm and Rf values are derived from
the average return value of Composite Stock Exchange Price
Index and BI rate during the study period. The expected return
value based on CAPM calculation is between 0.0007 and 0.0063.
The highest expected return value of CAPM is PWON stock
while the lowest expected return value is CTRA stock. There are
18 stocks that have the actual return value > expected return

471

CAPM i.e. AKRA, ADRO, BPRT, CTRA, ICBP, INCO, KLBF,
LPPF, LSIP, MYRX, PTBA, PTPP, PWON, TPIA, UNTR,
UNVR, WSKT, TLKM. These stocks are eligible stocks to be
purchased under the CAPM method as the actual return value of
the stock is greater than the expected return value under the
CAPM.

Table 4.3 Expected Return Arbitrage Pricing Theory (APT)
α

βInflasi

βExRate

βIHSG

0.0041

Rf
(BIrate)
0.0065

0.0200

-0.1502

-0.8155

0.0062

0.0041

0.0065

-0.1287

0.0008

0.0062

0.0041

0.0065

BPRT

0.0008

0.0062

0.0041

0.0065

BSDE

0.0008

0.0062

0.0041

0.0065

CTRA

0.0008

0.0062

0.0041

0.0065

EXCL

0.0008

0.0062

0.0041

0.0065

0.0200
0.0030
0.0510
0.0050
0.0040
0.0060
0.0070

Code

Rinflasi

RExRate

RIHSG

AKRA

0.0008

0.0062

ADRO

0.0008

ASII

0.7478

(RInflasiRf)
-0.0057

(RExRateRf)
-0.0003

(RIHSGRf)
-0.0024

0.0058

-1.0280

0.9421

-0.0057

-0.0003

-0.0024

0.0053

-0.0553

-1.1833

1.4131

-0.0057

-0.0003

-0.0024

0.0038

0.2201

-1.4089

1.8335

-0.0057

-0.0003

-0.0024

0.0012

-0.1729

-1.7202

1.8602

-0.0057

-0.0003

-0.0024

0.0035

-0.3616

-2.7681

2.3874

-0.0057

-0.0003

-0.0024

0.0037

-0.0566

-0.9245

0.7148

-0.0057

-0.0003

-0.0024

0.0054

-0.0069

0.0048

0.6231

-0.0057

-0.0003

-0.0024

0.0050

-0.2013

-0.4566

0.7554

-0.0057

-0.0003

-0.0024

0.0060

-0.0173

-0.5623

0.8769

-0.0057

-0.0003

-0.0024

0.0046

-0.0072

-1.0701

0.9696

-0.0057

-0.0003

-0.0024

0.0045

-0.0339

0.1603

0.0672

-0.0057

-0.0003

-0.0024

0.0065

-0.0962

-1.1785

0.8752

-0.0057

-0.0003

-0.0024

0.0053

-0.1088

-0.1027

0.3148

-0.0057

-0.0003

-0.0024

0.0064

-0.0476

-0.1599

0.3982

-0.0057

-0.0003

-0.0024

0.0059

-0.0853

-1.5382

1.4403

-0.0057

-0.0003

-0.0024

0.0040

-0.1497

-1.6329

1.3017

-0.0057

-0.0003

-0.0024

0.0047

E(Ri)

ICBP

0.0008

0.0062

0.0041

0.0065

INCO

0.0008

0.0062

0.0041

0.0065

INDF

0.0008

0.0062

0.0041

0.0065

KLBF

0.0008

0.0062

0.0041

0.0065

LPKR

0.0008

0.0062

0.0041

0.0065

LPPF

0.0008

0.0062

0.0041

0.0065

LSIP

0.0008

0.0062

0.0041

0.0065

MYRX

0.0008

0.0062

0.0041

0.0065

PGAS

0.0008

0.0062

0.0041

0.0065

PTBA

0.0008

0.0062

0.0041

0.0065

0.0090
0.0040
0.0000
0.0180
0.0030
0.0010
0.0030
0.0100
0.0140

PTPP

0.0008

0.0062

0.0041

0.0065

0.0100

-0.0719

-1.5532

1.6393

-0.0057

-0.0003

-0.0024

0.0034

PWON

0.0008

0.0062

0.0041

0.0065

-0.1415

-0.0070

0.0735

-0.0057

-0.0003

-0.0024

0.0071

SMRA

0.0008

0.0062

0.0041

0.0065

-0.1954

-2.1622

2.3582

-0.0057

-0.0003

-0.0024

0.0026

SCMA

0.0008

0.0062

0.0041

0.0065

-0.0859

-0.1005

0.7874

-0.0057

-0.0003

-0.0024

0.0051

SMGR

0.0008

0.0062

0.0041

0.0065

-0.1400

-1.3907

1.3720

-0.0057

-0.0003

-0.0024

0.0044

TPIA

0.0008

0.0062

0.0041

0.0065

0.0150
0.0070
0.0070
0.0009
0.0370

-0.1602

0.7864

0.6337

-0.0057

-0.0003

-0.0024

0.0056

UNTR

0.0008

0.0062

0.0041

0.0065

0.0070

-0.0738

-0.3456

0.7487

-0.0057

-0.0003

-0.0024

0.0052

UNVR

0.0008

0.0062

0.0041

0.0065

0.0336

-0.2068

0.1037

-0.0057

-0.0003

-0.0024

0.0061

WIKA

0.0008

0.0062

0.0041

0.0065

-0.0486

-1.4940

1.6529

-0.0057

-0.0003

-0.0024

0.0032

WSKT

0.0008

0.0062

0.0041

0.0065

0.0100
0.0070
0.0190

-0.0783

-2.0038

2.0249

-0.0057

-0.0003

-0.0024

0.0027

TLKM 0.0008 0.0062
0.0041
Source : Data Processed (2018)

0.0065

0.0060

-0.0181

-0.5592

0.7739

-0.0057

-0.0003

-0.0024

0.0049

http://dx.doi.org/10.29322/IJSRP.8.5.2018.p7761

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From Table 4.3, Ri (Inflation, exchange rate, Composite Stock Exchange Price Index and BI Rate) values were obtained from the average returns of each factor during the study period. The expected return value based on APT calculation is between 0.001245 and 0.007131. The highest expected return value in APT is PWON while the lowest expected return value in APT is BPRT. There are 16 stocks that have actual return value > expected return in APT: AKRA, ADRO, BPRT, CTRA, ICBP, INCO, LPPF, MYRX, PTBA, PTPP, PWON, TPIA, UNTR, UNVR, WSKT and TLKM. These stocks are eligible stocks to be purchased in APT method because the actual return value of the stocks is greater than the expected value in APT.

From the calculation of expected return in CAPM and APT, there are 16 eligible stocks to be selected either based on CAPM and APT methods such as: AKRA, ADRO, BPRT, CTRA, ICBP, INCO, LPPF, MYRX, PTBA, PTPP, PWON, TPIA, UNTR, UNVR, WSKT TLKM. While KLBF and LSIP are chosen only based on APT method.

Table 4.4 Mean Absolute Deviation (MAD) CAPM and APT

<table>
<thead>
<tr>
<th>No.</th>
<th>Code</th>
<th>Actual Return</th>
<th>E(Ri) CAPM</th>
<th>E(Ri) APT</th>
<th>MAD CAPM</th>
<th>MAD APT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AKRA</td>
<td>0.0259</td>
<td>0.0047</td>
<td>0.0058</td>
<td>0.02123</td>
<td>0.02011</td>
</tr>
<tr>
<td>2</td>
<td>ADRO</td>
<td>0.0253</td>
<td>0.0042</td>
<td>0.0053</td>
<td>0.02104</td>
<td>0.01998</td>
</tr>
<tr>
<td>3</td>
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</table>

Average 0.01124 0.01081

Sumber: Data Processed (2018)

From Table 4.4, MAD value based on the CAPM calculation is between 0.00003 and 0.04804. The highest MAD value in CAPM is BPRT stock while the lowest MAD value in CAPM is SMGR stock. MAD value based on APT calculation is between 0.00033 and 0.04884. The highest MAD value in APT is INDF stock while the lowest MAD value in APT is KLBF stock. The average of the smallest MAD value is APT; therefore, APT accuracy level is higher than CAPM because APT has the smallest MAD value.
Table 4.5 Independen t-test result of MAD CAPM and MAD APT

<table>
<thead>
<tr>
<th></th>
<th>Levene's Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
<th>Mean Difference</th>
<th>Std. Error Difference</th>
<th>95% Confidence Interval of the Difference</th>
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<td>Sig.</td>
<td>t</td>
<td>df</td>
<td>Sig. (2-tailed)</td>
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<tr>
<td>MA D</td>
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<td>.908</td>
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<td></td>
<td>Equal variance not assumed</td>
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<td>.901</td>
<td>.00036</td>
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</table>

Source: Data Processed (2018)

From Table 4.5, it can be seen that the significance value (Sig. 2 tailed) is 0.901. This value is greater than P-Value (5%). Therefore, Ho is accepted and it can be concluded that there is no significant difference between the CAPM and APT models in estimating the expected return of stocks listed in the Jakarta Islamic Index.

V. CONCLUSION AND RECOMMATION

Based on the expected return value using CAPM method, there are 18 eligible stocks to be included in the investment portfolio: AKRA, ADRO, BPRT, CTRA, ICBP, INCO, KLBF, LPPF, LSIP, MYRX, PTBA, PTTP, PWON, TPIA, UNTR, UNVR, WSKT, TLKM. Based on APT Methode, there are 16 stocks to be included in the investment portfolio: AKRA, ADRO, BPRT, CTRA, ICBP, INCO, LPPF, MYRX, PTBA, PTTP, PWON, TPIA, UNTR, UNVR, WSKT, TLKM. The research result on the comparative test shows that there is no significant difference between the accuracy of CAPM and APT methods in estimating the stock return of the company in Jakarta Islamic Index for the March 2014-March 2018 period.

Investors can estimate stock return using both CAPM and APT methods. However, the more accurate method referring to this research is APT method because it has higher accuracy rate than CAPM.

REFERENCES


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Nepotism and Job Performance in the Private and Public Organizations in Kenya

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Abstract- Performance in any business enterprise is the major concern of every entrepreneur whose objective is to make profits and grow. The differentiating factor is the type and nature of recruitment practices that is strategically put in place to create job fit for effective productivity and performance. Many studies have been conducted to explore the impact of recruitment and performance. However we find no known study conducted to identify Nepotism and how it impacts on performance of both public and private institutions. The purpose of this study was therefore to examine how nepotism impacts on individual job performance in both public and private organizations in Kenya. Data was collected through a sample of 357 respondents from various public and private institutions. A deductive approach was employed to construct the conceptual framework and accordingly a hypothesis was formed, and data analyzed using SPSS. The hypothesis was tested using Correlations and Regression analysis. Findings revealed that nepotism significantly affects negatively job performance of employees in Kenya. In addition a new concept thus, the tribal labour theory (TLT) was discovered by this study. Discussions, managerial implications and the research propositions were suggested for future studies and conclusion made.

Index Terms- Nepotism, Job performance, Organizations in Kenya.

I. INTRODUCTION

T1.1 Historical Background of the Study

he world wide economic downturn is increasingly shrinking job opportunities to the ever growing millions of qualified candidates in the labour market. Organizational competition pressures and corporate governance issues push off underperforming organizations to extinction thereby leaving few enterprises in entrepreneurial grid to experience the scramble for fewer job opportunities hence the breeding ground for nepotism. Most studies have shown that nepotism lead to decreased employee satisfaction and commitment (Bellow, 2003). On the other hand, human resource management is crucial to organizations to create competitive advantage but only when there is a highly competent workforce to utilize (Boxall, 1998). This is supported by the resourced based view school of thought that argues that a firm can only create a sustainable competitive advantage through its human capital pool. Both Bellow (2003) and Boxall (1998) point out that organization’s behaviour manifested in nepotism may influence individual employees’ behaviour and performance.

Nepotism is widespread and worldwide phenomena today and because of its very nature, it is difficult to document. A growing number of reports find that parents tend to facilitate the hiring of their children and other relatives in the firms in which they work, even when family members exhibit lower observable qualities and capabilities. Other evidence shows that, in many contexts, managers and those responsible for recruitment decisions hire people with whom they are socially connected regardless of their ability or qualifications (Alesina, 2007). Such practice disadvantages qualified candidates who as a result miss out on job and growth opportunities.

According to one known theory on cronyism by Rushton (1984), genetically similarity (GST) proposed genetic similarity detection as a mechanism by which organisms are attracted and repelled by each other. Rushton hypothesized that genetically similar people have a tendency to seek each other out and provide mutually supportive environments; while genetically dissimilar people have a tendency to form natural antipathies and provide mutually hostile environments (Rushton, Russell, & Wells, 1984). That is the way nepotism works by attracting cronies and repelling strangers in that sense.

Wong & Klemer (1994) defined nepotism as the hiring and advancement of unqualified or under qualified relatives simply by virtue of their relationship with an employee, officer, or shareholder in the firm. Kenya has not been left behind in serious cases and reports about nepotism. A report on independent commissions showed most state organizations don’t comply with the National Cohesion and Integration (NCI) Act, (2008) that treats nepotism as ethnic or racial contempt. Reports show nepotism in Kenya as a big orchestrated syndrome. In some counties, politicians from big clans’ plot among themselves on whom among chief officers they want impeached on frivolous grounds due to the devolved tyranny of numbers in political hierarchy. They must approve any appointment and sanction all projects to be undertaken in a county and this includes falsification of academic certificates to recruit the intended person. This has made working for state organizations at an executive level more risky. The report urged the National Cohesion and Integration Commission (NCIC) to now re-focus its energy from tribalism to clannism, nepotism and individual behaviour to help Kenyan leaders know how to employ labour fairly (Office of Ombudsman, 2014).

1.1 Nepotism
According to Boadi (2000) history shows the term nepotism as ancient and originated with the assignment of nephews to important positions by Catholic popes and bishops. Today trading political employment for favours is a modern day example of nepotism. Empirical studies explain the term nepotism came from Italian word nepotismo, which is based on Latin root nepos meaning nephew. Since the Middle Ages and until the late 17th century, some Catholic popes and bishops, who had taken vows of chastity, and therefore usually had no legitimate offspring of their own, gave their nephews such positions of preference as were often accorded by fathers to son (Gianvittorio et al., 2002). Several popes elevated continuing a papal dynasty. For instance, Pope Callixtus III, head of the Borgia family, made two of his nephew’s nephews and other relatives to the cardinalate. Often, such appointments were a means of cardinals; one of them, Rodrigo who later used his position as a cardinal to step into the papacy, becoming Pope Alexander VI. Alexander then elevated Alessandro Farnese, his mistress's brother, to cardinal; Farnese would later become Pope Paul III. Paul III also engaged in nepotism, appointing two of his nephews, aged 14 and 16, as cardinals (New Catholic encyclopedia, 2007). The practice was finally stopped when Pope Innocent XII issued the Papal bull Romanum decrep Cardinalem, in 1692. The papal bull prohibited popes in all times from bestowing estates, offices, or revenues on any relative, with the exception that one qualified relative (at most) could be made a cardinal. That decree to large extent criminalized nepotism and agreeing with the ancient Indian philosopher, Valluvar that nepotism is both evil and unwise (Anura Guruge, 2010).

While recruitment is the process of identifying and attracting potential candidates from within and outside an organization and to evaluate them for employment, selection begins with choosing the right calibre of candidates (Bloom, 2007). However, most recruitment and selection processes have elements of subjective judgment inherent in them. Treating job applicants in a professional and positive manner is more likely to leave them, whether they are successful or not, with a positive view of the organization.

Studies confirm that the success of the organization is directly linked to the performance of those who work for it, and under-achievement can be a result of workplace failures through hiring the wrong people or failing to anticipate fluctuations in hiring needs (Djabatey, 2012). It has also been argued that in order for the enterprise to build and sustain the competitive advantage, proper staffing is critical. Thus, recruitment and selection have become imperative in organizations because individuals need to be attracted on a timely basis, in sufficient numbers and with appropriate qualifications. According to the Resource- Based View, organizations should constantly evaluate their employees to ensure that they have the right people with the right skills in the right places to ensure sustained competitive advantage (Bloom, 2007) and that firms should constantly employ appropriate recruitment and selection criteria. The theory confirms that the major part of any firm’s strength or weakness stem from the caliber of the people employed and the quality of their working relationships and such negates nepotism.

Performance is the effective effort made by an employee to achieve a planned goal successfully by conducting and concluding a task effectively. Performance is evaluated by quantitative and qualitative scores of a individual employee, teams or the organization based on pre-determined targets for a certain period (Baş and Artar 1990). Performance is determined an employees knowledge, skills, ability and capabilities in order to reach his targets or expectations through an evaluation process. The reason for performance evaluation is to make decisions on an employee about salary increment, promotion or discipline in line with the performance evaluation results.

Borman and Motowidlo (1997) divided performance into a dual concept of task performance and contextual performance. Task performance is defined as the effectiveness with which job incumbents perform activities that contribute to the organization’s success. Contextual performance is defined as performance that is not formally required as part of the job but that helps shape the social and psychological context of the organization and further confirms that such can only be achieved through fairness in recruitment. Objective recruitment brings job fit and justice to all employees in the organization.

To achieve this it calls for organizational justice. Organizational justice refers to perceptions of fairness within an organizational setting (Greenberg, 1990). It has become an area of focus by researchers and is widely accepted that organizational justice contributes to employee performance. Adams’ equity theory indicates that an individual can alter his quality and quantity of work to restore justice when he perceives the outcome/input ratio to be unjust (Adams, 1965). Interestingly, some empirical studies have found that individuals decrease their performance to reduce input when they are overpaid, and increase their performance to produce more input when they are underpaid (Greenberg, 1990). Some studies have also shown that underpayment or overpayment is a result of nepotism to greater extent. The equity theory has provided a theoretical explanation to the distributive justice’s effects on performance.

1.1.3 Public Sector in Kenya

Public sector in Kenya is those institutions owned by the government whose employees are paid with tax payer money. In Kenya the public sector covers the education sector, the judiciary, public administration, devolved county’s, the health sector among others. Recruitment in the public sector was centrally being done by the public service commission until devolution allowed county governments to be recruiting some county staff. The Public Service Commission was established under Section 106 of the Constitution of Kenya which provides for a Chairman, Deputy Chairman and 15 Commissioners. The role of the Commission is therefore to ensure that the Civil Service is manned by qualified personnel for efficient and effective delivery of quality services to the public through placement, promoting and retention of the right personnel and the promotion of impartiality, equity, justice and objectivity in the recruitment process, advancement and discipline in the public service. (Source: The Republic of Kenya - The Public Service Commission).

1.1.4 Private Sector in Kenya
The private sector is the part of the economy, sometimes referred to as the citizen sector, which is run by private individuals or groups, usually as a means of enterprise for profit, and is not controlled by the State. It encompasses all for-profit businesses and owned, controlled and managed by private individuals or enterprises. The private sector employs workers through individual business owners and is responsible for allocating most of the resources within an economy (Heinrich, 2013).

1.2 Statement of the Problem

Unemployment level among qualified people in Kenya has really increased today more than ever despite the fact that organizations require qualified and skilled manpower for good performance. In the same wavelength many organizations in Kenya whether public or private are facing business hardships that are related to governance and performance regardless of the fact that there are more qualified personnel in the job market. This is the situation Kenya is faced with today, where businesses are failing due to corporate governance issues and more to it is the trend in the recruitment process that is perceived to be biased and attributed to nepotism (IEA Kenya, 2003). The resource-based view infers that employees are engaged on criteria that their skills and qualifications are valuable, rare, inimitable, and non-substitutable (Barney, 1991). For organizations to succeed in better recruitment and job performance there is need to address the recruitment process of this valuable asset, hence the need to address aspects such as nepotism which have an impact on employees' performance.

Empirical studies by Allesina (2011) show that intense preferential treatment, kinship, friendship or other forms of relationship replace the principles of merit, such as knowledge, skills, ability, competence, experience or level of education, in the recruitment and promotion of employees (Keles, 2011). The lack of confidence that creeps in such circumstances negatively affects job satisfaction, organizational commitment and individual performance (Büte, 2009). In heavily nepotism-oriented organizations, the human resource management practices cannot work independently. Thus, under such conditions, appointments based on competence and knowledge accumulation seem impossible. It is very difficult to promote employees, if they compete with the one who has a family member, relative or friends at the higher-level position in the organization (Abdala, Maghrabi - Al- Dabbagh, 1994) thereby killing the hopes of many qualified job seekers. Earlier studies have shown that the climate of unfair competition arising from nepotism and favoritism adversely affects job satisfaction of employees leading to weakening in organizational commitment hence performance. This study therefore intends to answer the question: Does nepotism affect job performance in the public and private organizations in Kenya?

1.3 Research Objective

The objective of this study is to investigate the effects of nepotism on job performance in the private and public sectors in Kenya.

1.4 Value of the Study

It is expected that the findings of this study will contribute to the existing body of knowledge by providing a better understanding of the effects of nepotism on job performance in the public and private organizations in Kenya. Given that there is a dearth of studies in this area, this study will provide a general insight about nepotism and job performance in the Kenyan context. The study will also be a rich field for further academic research. Researchers and Scholars in social studies will find this valuable for review and analyze the gaps that may not have been captured in this study. It is also anticipated that the results of the study will help managers of private organizations and public institutions understand the effects of nepotism on job performance. Policy makers such as Human Resource Managers will use the results of this study to address specific challenges in the areas of nepotism in recruitment and job performance.

II. LITERATURE REVIEW

2.1 Introduction

This chapter discusses literature on the theoretical grounding of the study, the first part focusing on perceptual behaviors at recruitment, promotions, rewards, training and development and job performance of employees in both public and private organizations in Kenya. The second part will discuss literature showing relationships between nepotism and job performance and the third and last part discussing the conceptual framework and the hypothesis to be tested.

2.2 Theoretical Grounding.

This study is guided by the Genetic Similarity Theory (GST) Hamilton (1964) and Equity Theory (Adams, J. S. 1963).

2.2.1 Genetic Similarity Theory

Hamilton (1964) says genetic similarity theory (GST) seeks to explain a number of pro-social behaviors including ethnic affiliation by generalizing the theory such that genetic similarity alone elicits affiliative behavior without knowledge of genealogical kinship. Studies on sensitivity of ethnic nepotism to culture (Kurzban, Tooby, and Cosmides, 2001), found that participants in an experiment were prone to categorize others by race/tribe when the others’ race/tribe did not correlate with coalition membership. The same was true of categorization by sex, which remained robust even when coalitions contained men and women. It then concluded that race is a proxy for coalition, a formulation compatible with ethnic categorization being automatic and invariably strong. The theory similarly showed nepotism relationships between beggars and race /tribe linkages thus, ethnic similarity was seen to affect charitable donations to strangers in need. Field studies of street beggars in Eastern Europe found that passersby gave more generously to beggars of the same ethnicity than the opposite (Butovskaya, Salter, Diakonov, & Smirnov, 2000).

Rushton (1989) speculated about how similarity could give rise to ethnocentric ideology. He reviewed the literature on extended phenotypic effects of genes, focusing on the idea that epigenetic development can incline people towards constructing and learning ideologies that increase their ethnic likeness. The theory suggests that group selection in humans has been led by cultural/ethnic strategies for success. Socialization pressure
could have included mutual moralistic aggression that helped shape an optimum degree of ethnocentric ideology that replicated group genes most successfully. Thus, it concluded under such conditions, appointments based on competence and knowledge accumulation seem impossible. It is very difficult to promote employees, if they compete with the one who has a family member, relative or friends in the higher-level position in the organization (Abdala, Maghrabi, 1994).

2.2.2 Equity Theory
Equity theory is built-on the belief that employees become de-motivated, both in relation to their job and their employer if they feel as though there is unfairness in the employment practices. Employees can be expected to respond to this in different ways, including de-motivation, reduced effort, becoming disgruntled, or in more extreme cases being disruptive. Much like the five levels of needs determined by Maslow and the two factors of motivation as classified by Herzberg (intrinsic and extrinsic), the Adams’ Equity Theory (1965) of motivation states that positive outcomes and high levels of motivation can be expected only when employees perceive their treatment to be fair.

Equity theory has been widely applied in business settings by industrial psychologists to describe the relationship between an employee's motivation and his or her perception of equitable or inequitable treatment. According to Adams (1965), Equity theory introduces the concept of social comparisons, whereby employees evaluate their own input/output ratios based on their comparison with the input/output ratios of other employees (Carrell and Dittrich, 1978). Inputs in this context include the employee’s time, expertise, qualifications, experience, intangible personal qualities such as drive and ambition, and interpersonal skills. Outcomes include monetary compensation, perquisites, benefits, and flexible work arrangements. Employees who perceive inequity will seek to reduce it, either by distorting inputs and/or outcomes in their own minds called cognitive distortion, directly altering inputs and/or outcomes, or leaving the organization (Carrell and Dittrich, 1978). These perceptions of inequity are perceptions of organizational justice, or more specifically, injustice. Subsequently, the theory has wide-reaching implications on nepotism and employees’ efficiency and performance.

2.2.3 Perceptual Behaviours of Nepotism in the Recruitment Process
Meritocratic recruitment is usually seen to be objective and achieved through the use of educational requirements for employment, combined with competitive formal job interviews. Managers in some cases find it possible to circumvent these requirements, for instance by making special appointments to suit their interests (Cheng, Haggard & Kang 1998). However, such behaviours lower discretion in hiring, thereby making patronage and nepotism easier to accomplish. The strength of nepotism in recruitment is however also its weakness. Proponents of Management science have criticized the rigidity and inflexibility in hiring, arguing that it only serves to make recruitment of the most suitable people harder hence managers choose to hand-place their cronies as opposed to subjecting them to rigorous interviews where they may not get a chance following meritocracy (Lewis 2008). There is thus a tradeoff between flexibility, risk for patronage and nepotism (Schick 1998). Laker and Williams (2003) talked about four different models of nepotism at recruitment stage.

2.2.3.1 The first model is hiring of a relative of the owner of the business.
According to Laker and Williams (2003) nepotism at work can mean increased opportunity at a job, attaining the job or being paid more than other similarly situated people. Arguments are made both for and against employment granted due to a family connection, which is most common in small, family run businesses. On one hand, nepotism can provide stability and continuity. Critics cite studies that demonstrate decreased morale and commitment from non-related employees, and a generally negative attitude towards superior positions filled through nepotism. An article from Forbes magazine stated that there is no ladder to climb when the top step is reserved for people with a certain name. Some businesses forbid nepotism as an ethical matter, considering it too troublesome and disruptive (Arash et al 2008).

Studies by Ozler et al (2007) show that in China, for the past 3,000 years, nepotism was common in clan and extended family based culture. Confucius wrote about the importance of balancing filial piety with merit. The clan-based feudal system collapsed during Confucius’ lifetime, yet nepotism have continued through the modern age. For instance, Zhang Hui, was believed to have his career expedited through the intervention of his uncle, Li Jianguo, Vice Chairman and Secretary General of the National Peoples Congress. Hui was made the youngest member and secretary of Jining’s Municipal Standing Committee at the age of 32 years.

2.2.3.2 The second model is the hiring of a spouse of an existing employee (paired employees)
In Australia, Anna Bligh, who won the 2009 Queensland State election, was accused of nepotism by giving her husband Greg Withers a position as the Office of Climate Change head. Shortly after his appointment as the Anglican Archbishop of Sydney in 2001, Peter Jensen was accused, in an Australian Broadcasting Corporation interview, of nepotism after nominating his brother Phillip Jensen as Dean of Sydney and appointing his wife Christine Jensen to an official position in the Sydney diocese (Edward Behr 1991).

2.2.3.3 The third model is political nature of nepotism, whose results usually furthers corruption.
Bandiera et al (2009) confirmed that nepotism is a common accusation in politics when the relative of a powerful figure ascends to similar power seemingly without appropriate qualifications. The British expression, Bob’s your uncle is thought to have originated when Robert Arthur Talbot Gascoyne-Cecil 3rd Marquess of Salisbury, promoted his nephew, Arthur Balfour, to the esteemed post of chief secretary of Ireland, which was widely seen as an act of nepotism. Brenden Gallagher (2017) in the history of nepotism at white house reiterated similarly that, in 1979, Bill Clinton, within weeks of being newly elected as Governor of Arkansas, appointed his wife Hillary to chair the Rural Health Advisory Committee. In 1993, newly elected as

http://dx.doi.org/10.29322/IJSRP.8.5.2018.p7762 www.ijsrp.org
President of the United States, he again appointed his wife to chair a Task Force on National Health Care Reform. In 2017, the president-elect Donald Trump appointed his son-in-law Jared Kushner as a senior adviser to the president. He then announced on 29 March 2017 that his eldest daughter, Ivanka, would also become an official White House employee. Both the Clinton and Trump presidential appointments raised ethical and legal questions about whether they conflict with a 1967 federal anti-nepotism law.

According to Egweni (2012) in Africa, the Liberian Central Bank, in a controversial decision appointed Charles Sirleaf as its interim governor. Charles, son of the country’s president, Ellen Johnson Sirleaf, was formerly the deputy governor of the apex bank and he replaced John Mills Jones who stepped down as governor earlier. However, this latest appointment seems to support the idea harboured by some Liberians, that Ellen Johnson only appoints her family members to key posts in order to consolidate her presidency. In 2012, rivals in her ruling party accused her of nepotism. She allegedly had 17 of her family members working in the country’s government. Another son of hers was the head of Liberia’s National Security Agency, while another was Chairman of the National Oil Company of Liberia. In Angola, Jose Eduardo Santos has been accused of hiring his daughter Isabel to head the government-owned mining company and an international diamond company. Her half brother, Jose Filomeno dos Santos is the chairman of Angola’s Sovereign Trust Fund Company, Fundo Soberano de Angola.

2.2.4 Nepotism and Staff Promotions

Studies by Longenecker et al. (1987) and Bjerke et al. (1987), examined determinants of promotion evaluations in a US company and the US Navy respectively. Both studies claim that company political considerations rather than true performance were the basis of promotion evaluation. Nepotism is more often the cause of conflict in case of promotion of an incompetent family member/tribesman (Abdalla et al., 1998) and further suggests that this type of conflict can be reduced by applying formal anti-nepotistic practices.

Studies show that nepotism has implications not only for management development, promotion, and control, organizational image and public relations of business, but also for executives who have or would like to have relatives in management positions. The family or kinship influence in the organization leads to the promotion of relatives or tribesmen, not based on competence but nepotism. It was concluded specifically, that nepotism negatively influences the performance of organizations, when family members without high competency, are promoted to senior positions in the company due to their relatedness and not on merit or training and experience (Perez-Gonzalez, 2006).

2.2.5 Nepotism and Staff Rewards

Empirical studies reveal that traditionally, job specifications, levels of compensation in the job market and the need to maintain equity among employees were used to determine workers pay. Then later on the level of reward was determined by individual performance using bonus systems and individually bargaining power based on past experiences and on individual skills and qualifications. This may not be true today where an individual’s pay is augmented by nepotism based on the employee’s relationship with the superiors within or outside the organization (Goldenberg, 1982).

Studies show that nepotism in staff reward as a kind of conflict of interest. It means providing unearned income in an unethical way to a relative or somebody from family connection (Boadi, 2000). This happens when an employee is rewarded just because of his family connections, ignoring his characteristics and without considering some factors such as education level, capabilities, abilities and accomplishments or performance.
2.2.6 Nepotism and Staff Training and Development

Training and development of employees is always meant to close the gap between current performances and expected future behaviour after a successful performance appraisal (Weil & Woodall 2005). They noted that training and development activities are focused to either improve performance on the present job of the incumbent, train new skills for better performance or for succession planning and future growth of both individuals and organization so as to be able to meet organization’s strategic objectives.

Studies by Weil and Woodall (2005) found the focus of training on cronies to have different objective. Cronyism is a preferential treatment to long-standing friends regardless of their skills, competence, performance or level of education, especially due to sharing the same tribal or political preference. The ill-functioning nature of superiors in organizations coupled with persistent corruption exacerbates the circumvention of the noble intentions for training. In many organizations managers will engage in bribery or some other sort of corruption-related activities in order to pass or register some favourites for training. Mauro (2004) further confirmed that corruption in many cases tends to grease the wheels and expedite the process of recruitment for training. Therefore training and development in nepotism perspective is seen as a conduit for tour, earn per diems or falsify receipts for financial gains.

2.3 Impact of Nepotism in Organizations

Studies by Breuer (2010) showed that the workplace has evolved over the years to reflect the diversity of the people from different backgrounds and viewpoints. However, the sad reality is that office nepotism is still present and it dictates different company processes like recruitment, promotions, salary increase, among others. It is a potent threat to a company’s growth, as well as individual career progress. In situations where jobs are hard to find, nepotism can be quite demoralizing to notice that someone else is getting a job you deserve or the promotion you have been eyeing, all because they knew someone in the management. This practice is rampant in almost all organizations private and public in Kenya. The biggest downside of office nepotism is that most often than not, it locks out qualified people who would have greatly impacted on performance, and gives the undeserving few an edge. It should be noted that workplace nepotism mostly enhances the hiring of people with fewer skills, qualifications, and experience into positions based on their relationship with the hiring manager, other managers or the overall boss (Allen and Meyer, 1990).

2.3.1 Micro Effects of Nepotism in Organizations

Brown (2003) in his work on organizational commitment identified four key negative effects of nepotism in organization thus, i) Low staff morale: Members of staff may feel less motivated to give their best performance as they feel like the favored member of staff gets all the credit. Internal sabotage: Other members of staff may intentionally try to undermine the favored member as they constantly question his qualifications and motives. ii) High staff turnover: Members of staff may be locked out of promotions and pay increments in favor of the boss’s favorite and this demotivates them. In some cases, it can lead to a high turnover. Locking out potential employees, Favoritism may also result in low productivity, as the boss overlooks a qualified person and thus fails to harness his/her skills for the job and the company’s growth. iii) Mistrust in the team: Favoritism may result in the staff member’s segregation and forming the us and them’ mentality. This erodes trust and harmony in the organization and breeds hostility. iv) Employee conflicts: Favoritism erodes the confidence of a team on management since they view all other decisions made by management as biased. Workers question the employer’s judgment and decisions in relation to promotions, punishments, and fairness in the event of a conflict. It also becomes a source of conflict in the organization among employees.

There is no doubt that nepotism have a negative effect on the morale of employees who are obliged to transact business and work with the relatives of high level executives or feel that a family member of the bosses is being promoted and awarded higher perks without merit (Asunakutlu and Avei, 2010). Nepotism harm employee relations by weakening the bonds between employees to an extent of causing a general inefficacy in the work environment leading to a negative impact on the satisfaction level of employees (Arash et al., 2006). Studies by Barney (1998) show that the negative effects of employee favoritism and nepotism are many and potentially include a combination of the following: Low Personal Accountability, Low Employee Accountability, Low Productivity, Poor Employee Morale, Low Trust Relationships, Diminished Customer Experiences and High Performer Turnover.

2.4 Dealing with Nepotism in the Organization

Under Chapter Six article 73 of the constitution of Kenya (2010), it is illegal to hire people based on one’s relationship with them. Nevertheless nepotism has become hard to notice as many organizations try to keep a national outlook with severe reservations even though there are some pointers to nepotism such as a person of little qualification is hired to fill a particular position. An individual who is not hard working and has no qualification is promoted while the person with a higher qualification or superior skill is overlooked. The boss constantly gives an unqualified employee the best or most visible tasks so as to make him or her to get accolades for the job even if he does not perform well. Unmerited praise for a job done even if the outcome is low or the person being praised did not necessarily have a large impact on the outcome. When a job advertisement is being placed you may notice that the qualifications listed tend to bend towards people of a certain group and this fosters nepotism from the recruitment stage (Carless, 2004).

2.5 Dimensions of Nepotism in Organizations.

Nepotism occurs when relations are more significant than the qualification or competency, skills, and experience and it affect the performance of employees as well as performance of the organization. It involves in hiring and firing of employees just to give priorities to their favorite ones. Nepotism is common in developing and developed country as well (Arash & Tumer, 2008). Nepotism is manifested in various dimensions that includes;

i) Relative Nepotism - This one is obvious. Relative nepotism is one of the most insidious forms.
ii) Friend Nepotism - This one is relatively obvious. The boss is good friends with some employees and not-so-good friends with others. This type of nepotism is a real morale killer because it is so blatantly unfair to the not-so-good friends of the boss.

iii) Connection Nepotism - By virtue of a shared experience such as attending the same high school (not necessarily at the same time), the connection nepotism turns a blind eye to poor Job Fit and Low Employee Performance. The connection may be by virtue of being from the same community, attended the same high school, members of the same fraternity/sorority, interest in the same sports team, and/or served in the same branch of the armed forces to comrades who drink in the same club.

iv) Contribution Nepotism - A good example is a sales person who three years ago, landed a big account that made the organization much more successful as well as a big commission for the sales person. Three things happen. One - The sales person lives off of the big commission for life. Two - Management feels a sense of gratitude and obligation to the sales person and therefore does not punish current or future poor performance because of past contributions. Three - Management promotes the sales person to a higher position as a reward creating the Peter Principle.

v) Referral Nepotism – this involves HR managers asking their trusted high performers if they know someone looking for a job. This is a natural employee hiring strategy. After all birds-of-a-feather-flock-together. The problem is that what makes your high performer a high performer may be the exact missing "ingredient" that their best friend needs most. Hire the low performer who is attached to a high performer through friendship. Then try to terminate the low performer friend at the peril of upsetting your high performer (Arasli & Tumer, 2008).

2.6 Relationship between Nepotism and Job Performance

The relationship between nepotism and job performance has not been extensively shown and is not clear from the various studies done and we cannot therefore assume that nepotism leads to high performance or that high performers are necessarily relatives or friends of the senior staff. Studies done by Baodi (2000) found there is but negative directional relation between nepotism and employee commitment. It is thought that in case there is a more strong relation between nepotism applications and employee performance, this relation will be negative directional, in other words relative or acquaintance partiality will have negative influence on the employee performance. The more nepotism exists, the more the employee commitment will decrease.

Studies by Ozler (2007) found that the thought that nepotism would have a positive effect on the employees recruited through this method was not been supported. Getting a job as a relative or acquaintance of a manager, or being known in any way did not have an impact at raising the employee performance.

In another related study by Arasli and Tumer (2008) carried to find out the relationship between nepotism and job satisfaction the findings showed negative relationship between favoritism and job satisfaction.

2.7 Conceptual Framework on Nepotism and Job Performance

From the empirical literature, Studies show that there is a relationship between nepotism and job performance. A question arises as to whether the relationship is positive or negative. The conceptual model in Figure 2.1 below depicts this relationship and seeks to show whether it is positive or negative. H1 shows that there is significant direct relationship between nepotism and job performance.
Fig 2.1 Conceptual Framework

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Dependent Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nepotism</td>
<td>Job Performance</td>
</tr>
<tr>
<td>• Relative</td>
<td>• Task performance</td>
</tr>
<tr>
<td>• Friendship</td>
<td>• Team work</td>
</tr>
<tr>
<td>• Favorite</td>
<td>• Skills fit</td>
</tr>
<tr>
<td>• Spouse</td>
<td>• Creativity</td>
</tr>
<tr>
<td>• Tribe/race</td>
<td>• Dexterity</td>
</tr>
<tr>
<td>• Kinship</td>
<td>• Ability</td>
</tr>
<tr>
<td>• Political</td>
<td>• Capacity</td>
</tr>
<tr>
<td>• Connections</td>
<td></td>
</tr>
</tbody>
</table>

H1

(Source author)

2.8 Hypothesis 1:
Nepotism has no significant effect on job performance in the private and public organizations in Kenya.

III. RESEARCH METHODOLOGY

3.1 Introduction
This chapter explains the methods and approaches that were adopted in conducting this study. The methodology includes the philosophical foundation, research design, study population and sampling approaches. The type and sources of data are explained, as well as the methods of data collection and how reliability and validity was ensured. The chapter also provides an explanation of how study variables were measured. Data was analyzed using SPSS and presented in tables and graphs.

3.2 Philosophical Orientation
This study adopted the positivist approach given the approach is methodologically quantitative and value free (Easterby-Smith et al 2002). The approach works well with observable social reality and that the end product of such research can be generalized into law (Remenyi, et al, 1998). The emphasis was on quantifiable observations that lend themselves to statistical analysis. It is also works well with hypothesis testing and use of Questionnaires for data collection and analysis.

3.3 Research Design
The objective of this study is to give an accurate profile of the effects of nepotism on job performance. To achieve this, the use of a descriptive research design was used for the survey. This is because nepotism and job performance can be measured as they naturally occur. According to Robinson (1994) descriptive approach is a means to an end but not an end in itself, and if the research was concerned with finding out the strength of the relationship between nepotism and job performance, then descriptive research design was found to be the most appropriate.

3.4 Target Population
Records from the registrar of companies show that there were 310,000 registered private companies in Kenya by December 2015 though only 65 companies had been listed by then. From the Kenya gazette issue of 28 April 2015, Kenya had 147 state corporations/ Parastatals. Therefore the target population is all staff working in the formal 65 private organizations and 147 public organizations. According to the wage bill economic survey of 2013 Kenya a civil service population of 655300 employees. Reports by economic policies and employment programmes in Kenya showed the formal private sector had 12.1million employees. Factor analysis as a statistical tool used to describe variability among observed, correlated variables in terms of a potentially lower number of unobserved variables called factors was used to obtain lower subsets that created a total target population of 5000 employees form both private and public sectors to work with.

3.5 Sample Design
Due to costs and time involved it may not be practical to interview all the 5000 targeted employees in both sectors but a sample was chosen at random from different organizations in both sectors. A ratio of 1:3 public to private organization representation was calculated for the survey giving a total target population of 5000 employees for both sectors. According to the table for determining sample size of research activities by Krejcie and Morgan (1970) recommended a sample of 357 for a population of 5000 employees (Appendix 2). A sample of 357 will therefore be chosen for this study and picked randomly from 40 organizations as shown in the table below.
Table 3.1: Sampling size

<table>
<thead>
<tr>
<th>Sector</th>
<th>Number of Organizations</th>
<th>Population</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private</td>
<td>30</td>
<td>3750</td>
<td>268</td>
</tr>
<tr>
<td>Public</td>
<td>10</td>
<td>1250</td>
<td>89</td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
<td>5000</td>
<td>357</td>
</tr>
</tbody>
</table>

3.6 Data Collection
The study relied on primary data collected using questionnaires. The questionnaires sought views on various types of nepotism and job performance from staff in organizations. The questionnaires were structured to capture nominal scale and five point likert scale data and was developed and classified into three sections capturing demographic profile, Nepotism and job performance profiles.

3.7 Reliability Tests
The reliability of the study was ensured by the use of similar questionnaire instruments that have been used before for a similar study and also by use of the Cronbach’s Alpha coefficient (α) to measure internal consistency and stability of scales used in the study. Nunnally (1978) suggested that as a rule of the thumb, a reliability coefficient value of above 0.7 is statistically acceptable for a study. This study adopted the rule of the thumb to the extent the factors measured individual latency of the variables under study.

3.8 Validity Test
This study was tested for validity by both face and construct validity tests. To ensure face validity the draft questionnaires was given to a few selected persons knowledgeable in research to ascertain its suitability in obtaining information in accordance to the study’s objective. Content validity was ensured by pre-testing the questionnaires on a section of the study sample and appropriate modifications made to ensure clarity, comprehensiveness, relevance, meaning and requisite depth (DeGroot, 1970). This was to ensure that the study instruments measured what they were purported to measure and therefore reduced systematic and non-random errors.

3.10 Data Analysis
Descriptive analysis was done by use of SPSS. Factor analysis was done for the purpose of sample reduction before testing the analytical model. The purpose of Factor analysis was to reduce large data and to identify a small number of factors that would explain most of the variance observed in a much larger number of manifest variables. Regression analysis was conducted to determine the relationships between Nepotism and job performance.

IV. DATA ANALYSIS, INTERPRETATION AND DISCUSSIONS

4.1 Introduction
The objective of this study was to investigate the relationship of nepotism and job performance in the private and public sectors in Kenya. This chapter provides data analysis, findings and discussions of the results based on the objectives of the study. Primary data was used for this research and was collected from both categories of employee in either public or private organizations by use questionnaires.

4.2 Response Rate
A total of 357 questionnaires were distributed to both public and private sectors at random in the ratio specified so as to achieve uniformity and 304 questionnaires were collected back. The return rate was 85 percent and that gave a clear confidence as the rule of the thumb is that a higher response of over 70 percent is highly representative and strongly significant. Compared to other studies we reviewed, the response rate was higher than the studies conducted by Munjuri (2013) at 61 percent, Muindi (2014) at 72 percent, and Wakaisuka (2016) at 69 percent. Table 4.1 below shows the response distribution by sector.

Table 4.1: Response distribution by nature of the institution

<table>
<thead>
<tr>
<th>Nature of the institution</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private sector</td>
<td>114</td>
<td>32</td>
</tr>
<tr>
<td>Public sector</td>
<td>190</td>
<td>53</td>
</tr>
<tr>
<td>Total</td>
<td>304</td>
<td>85</td>
</tr>
</tbody>
</table>

4.3 Reliability Test Results
Reliability tests on instruments by Cronbach’s alpha gave overall results as summarized in table 4.2 below and showed Nepotism practices had 24 items with a reliability coefficient of 89.7 percent and performance practices had 9 items at 90 percent coefficient. The reliability coefficients for all the study variables were above 70 percent, which is high and acceptable as confirmed by George and Mallery’s criteria (2003). The range of the coefficients was between strongly true and strongly false which signifies a high level of internal consistency of the data collection instrument.

Table 4.2: Overall Cronbach's Alpha

| Cronbach's Alpha               | .897 |
| Cronbach's Alpha Based on Standardized Items | .902 |
| N of Items                     | 33   |

4.4 Frequency Statistics
The respondents were asked to state their levels of employment. The objective was to find out at what level is nepotism prevalent. Over half 54.6 percent of the respondents were in middle management, 43.4 percent in junior levels while 6 percent senior managers.

Table 4.3: Distribution by level of employment

<table>
<thead>
<tr>
<th>Level of employment</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Junior</td>
<td>132</td>
<td>43.4</td>
</tr>
<tr>
<td>Middle</td>
<td>166</td>
<td>54.6</td>
</tr>
<tr>
<td>Top</td>
<td>6</td>
<td>2.0</td>
</tr>
<tr>
<td>Total</td>
<td>304</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 4.4: Distribution by nature of employment

<table>
<thead>
<tr>
<th>Nature of employment</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full-time</td>
<td>278</td>
<td>91.4</td>
</tr>
<tr>
<td>Contract</td>
<td>26</td>
<td>8.6</td>
</tr>
<tr>
<td>Total</td>
<td>304</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Of the respondents 91.4 percent were permanent employees and 8.6 percent were on contract employment.

Table 4.5: Distribution by work experience

<table>
<thead>
<tr>
<th>Work experience</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4 years</td>
<td>137</td>
<td>45.1</td>
</tr>
<tr>
<td>5-9 years</td>
<td>93</td>
<td>30.6</td>
</tr>
<tr>
<td>10-14 years</td>
<td>37</td>
<td>12.2</td>
</tr>
<tr>
<td>20-24 years</td>
<td>34</td>
<td>11.2</td>
</tr>
<tr>
<td>Not indicated</td>
<td>3</td>
<td>1.0</td>
</tr>
<tr>
<td>Total</td>
<td>304</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Respondents were asked about their length of service in their various organizations in order to establish performance based on longevity. As shown in Table 4.5, majority of the respondents (45.1 percent) had worked for 4 years, 30 percent for 9 years, 12 percent 14years and 11 percent 24 years. This could be sign of early leaving due to poor performance or shaky patronage.

Table 4.6: Distribution by current position

<table>
<thead>
<tr>
<th>Current position</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analyst Policy and Planning</td>
<td>12</td>
<td>3.9</td>
</tr>
<tr>
<td>Planning Officer</td>
<td>12</td>
<td>3.9</td>
</tr>
<tr>
<td>Technician</td>
<td>24</td>
<td>7.9</td>
</tr>
<tr>
<td>Supervisor</td>
<td>12</td>
<td>3.9</td>
</tr>
<tr>
<td>Driver</td>
<td>18</td>
<td>5.9</td>
</tr>
<tr>
<td>Administrator</td>
<td>23</td>
<td>7.6</td>
</tr>
<tr>
<td>Manager</td>
<td>10</td>
<td>3.3</td>
</tr>
<tr>
<td>Advocate</td>
<td>13</td>
<td>4.3</td>
</tr>
<tr>
<td>Principal Prosecution Counsel</td>
<td>5</td>
<td>1.6</td>
</tr>
<tr>
<td>Clerical Officer</td>
<td>20</td>
<td>6.6</td>
</tr>
<tr>
<td>Cleaner</td>
<td>10</td>
<td>3.3</td>
</tr>
<tr>
<td>Police Officer</td>
<td>20</td>
<td>6.6</td>
</tr>
<tr>
<td>Not Indicated</td>
<td>32</td>
<td>10.5</td>
</tr>
<tr>
<td>Total</td>
<td>304</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 4.7: Distribution by highest level of education

<table>
<thead>
<tr>
<th>Highest level of education</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certificate</td>
<td>41</td>
<td>13.5</td>
</tr>
<tr>
<td>Diploma</td>
<td>62</td>
<td>20.4</td>
</tr>
<tr>
<td>1st degree</td>
<td>116</td>
<td>38.2</td>
</tr>
<tr>
<td>Masters degree</td>
<td>85</td>
<td>28.0</td>
</tr>
<tr>
<td>Total</td>
<td>304</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Fig. 4.7 above showed that 20.4 percent of the respondents had attained Diploma level of education while 13.5 percent were Certificate holders. 38.2 percent were holders of First Degrees and 28 percent had Masters Degrees.

Table 4.8: Distribution by gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>156</td>
<td>51.3</td>
</tr>
<tr>
<td>Female</td>
<td>110</td>
<td>36.2</td>
</tr>
<tr>
<td>Not indicated</td>
<td>38</td>
<td>12.5</td>
</tr>
<tr>
<td>Total</td>
<td>304</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 4.6 shows distribution of current position of respondents across the country in both private and public sectors.

The study sought to identify the gender composition of the respondents for the reason to find out which gender engaged in nepotism practice than the other. Though not focusing on gender equity, the frequency reflected that the sample was biased towards male. As shown in Figure 4.8, majority of the respondents (51.3 percent) were male and 36.2 percent were female though 12.5 percent didn’t indicate their gender.
As shown in Table 4.9, majority of the respondents 44.7 percent were between the age of 26 and 33 years old. 34.5 percent were in the age bracket of 34 to 41 years while 14.5 percent were between 42 to 49 years of age. A few 6.3 percent were between 18 to 25 years old.

### Table 4.9: Distribution by age

<table>
<thead>
<tr>
<th>Age</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-25 years</td>
<td>19</td>
<td>6.3</td>
</tr>
<tr>
<td>26-33 years</td>
<td>136</td>
<td>44.7</td>
</tr>
<tr>
<td>34-41 years</td>
<td>105</td>
<td>34.5</td>
</tr>
<tr>
<td>42-49 years</td>
<td>44</td>
<td>14.5</td>
</tr>
<tr>
<td>Total</td>
<td>304</td>
<td>100.0</td>
</tr>
</tbody>
</table>

### 4.5: DESCRIPTIVES STATISTICS

This section reported the analysis of nepotism factors in public and private organizations in Kenya. The factors were rated as strongly false, 1 false, 2 neutral, 3 true 4 and strongly true 5. A score of ≤1.5 was interpreted to mean strongly false, while a score 1.5 to ≤2.5 implied that is false and 2.5 to ≤3.5 was interpreted to mean neutral opinion. A mean score of 3.5 ≤ 4.5 was interpreted to mean that is true opinion while a score of ≥ 4.5 was interpreted to mean strongly true. A standard deviation of ≤1 was interpreted to mean that respondents had a consensus in the rating of the statement while a standard deviation greater than 1 was interpreted to mean that the respondents differed in their perception about the statement.

#### 4.5.1 NEPOTISM PRACTICES

### Table 4.10: Nepotism Practices Analysis

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Min.</th>
<th>Max.</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Skewness Statistic</th>
<th>Std. Error</th>
<th>Kurtosis Statistic</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you have a friend/Relative who works in this organization?</td>
<td>304</td>
<td>1</td>
<td>5</td>
<td>2.52</td>
<td>1.671</td>
<td>.476</td>
<td>.140</td>
<td>-1.509</td>
<td>.279</td>
</tr>
<tr>
<td>Were you recruited through public job advertisement in the press?</td>
<td>297</td>
<td>1</td>
<td>5</td>
<td>3.82</td>
<td>1.467</td>
<td>-.858</td>
<td>.141</td>
<td>-.764</td>
<td>.282</td>
</tr>
<tr>
<td>Did any of your friends or relatives introduce you to the job in this institution?</td>
<td>304</td>
<td>1</td>
<td>5</td>
<td>2.17</td>
<td>1.416</td>
<td>.909</td>
<td>.140</td>
<td>-.631</td>
<td>.279</td>
</tr>
<tr>
<td>Have you ever been promoted in the last three years?</td>
<td>304</td>
<td>1</td>
<td>5</td>
<td>1.98</td>
<td>1.240</td>
<td>1.010</td>
<td>.140</td>
<td>-.372</td>
<td>.279</td>
</tr>
<tr>
<td>Was the promotion influenced by any one close to you in the organization?</td>
<td>266</td>
<td>1</td>
<td>3</td>
<td>1.21</td>
<td>.527</td>
<td>2.518</td>
<td>.149</td>
<td>5.237</td>
<td>.298</td>
</tr>
<tr>
<td>Do you feel liked that you are able to move up the ladder very fast in a short period of time?</td>
<td>304</td>
<td>1</td>
<td>5</td>
<td>2.68</td>
<td>1.471</td>
<td>.395</td>
<td>.140</td>
<td>-1.213</td>
<td>.279</td>
</tr>
<tr>
<td>Was/is any of your parents worked/working in the institution?</td>
<td>292</td>
<td>1</td>
<td>5</td>
<td>1.84</td>
<td>1.333</td>
<td>1.576</td>
<td>.143</td>
<td>1.083</td>
<td>.284</td>
</tr>
<tr>
<td>Was/is any of your friends worked/working in this institution?</td>
<td>292</td>
<td>1</td>
<td>5</td>
<td>2.04</td>
<td>1.321</td>
<td>1.051</td>
<td>.143</td>
<td>-.245</td>
<td>.284</td>
</tr>
<tr>
<td>Question</td>
<td>N</td>
<td>Min.</td>
<td>Max.</td>
<td>Mean</td>
<td>Std. Deviation</td>
<td>Skewness Statistic</td>
<td>Std. Error</td>
<td>Kurtosis Statistic</td>
<td>Std. Error</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>----</td>
<td>------</td>
<td>------</td>
<td>-------</td>
<td>----------------</td>
<td>---------------------</td>
<td>------------</td>
<td>-------------------</td>
<td>------------</td>
</tr>
<tr>
<td>Was/is any of your friends/relatives known to any employee worked/working in this institution?</td>
<td>292</td>
<td>1</td>
<td>5</td>
<td>1.95</td>
<td>1.232</td>
<td>1.237</td>
<td>.143</td>
<td>.519</td>
<td>.284</td>
</tr>
<tr>
<td>Do you believe majority of employees here come from one region/tribe/race?</td>
<td>304</td>
<td>1</td>
<td>5</td>
<td>2.40</td>
<td>1.003</td>
<td>.717</td>
<td>.140</td>
<td>.152</td>
<td>.279</td>
</tr>
<tr>
<td>Do you agree employees who get promotion come from the majority tribe/race/region?</td>
<td>304</td>
<td>1</td>
<td>5</td>
<td>2.46</td>
<td>1.011</td>
<td>.514</td>
<td>.140</td>
<td>-.319</td>
<td>.279</td>
</tr>
<tr>
<td>Is it true mother tongue from majority tribe/race/region forms third language of communication in this institution?</td>
<td>304</td>
<td>1</td>
<td>5</td>
<td>2.55</td>
<td>1.223</td>
<td>.410</td>
<td>.140</td>
<td>-.858</td>
<td>.279</td>
</tr>
<tr>
<td>Is it true majority of leaders here come from same tribe/race/region?</td>
<td>304</td>
<td>1</td>
<td>5</td>
<td>2.49</td>
<td>1.034</td>
<td>.378</td>
<td>.140</td>
<td>-.432</td>
<td>.279</td>
</tr>
<tr>
<td>Do the majority of supervisors also come from same tribe/race/region of the managers?</td>
<td>304</td>
<td>1</td>
<td>5</td>
<td>2.44</td>
<td>1.010</td>
<td>.686</td>
<td>.140</td>
<td>-.164</td>
<td>.279</td>
</tr>
<tr>
<td>Do the majority of shop floor leaders also come from same tribe/race/region as supervisors/managers?</td>
<td>304</td>
<td>1</td>
<td>5</td>
<td>2.47</td>
<td>1.037</td>
<td>.491</td>
<td>.140</td>
<td>-.409</td>
<td>.279</td>
</tr>
<tr>
<td>Is it true you can tell that one tribe/race/region is dominating the employee population?</td>
<td>304</td>
<td>1</td>
<td>5</td>
<td>3.00</td>
<td>.993</td>
<td>.339</td>
<td>.140</td>
<td>-.466</td>
<td>.279</td>
</tr>
<tr>
<td>Is it true you can claim that there is a minority tribe/race/region employee?</td>
<td>304</td>
<td>1</td>
<td>5</td>
<td>3.60</td>
<td>1.176</td>
<td>-.535</td>
<td>.140</td>
<td>-.654</td>
<td>.279</td>
</tr>
<tr>
<td>Is it true that the institution does not have employees from other major regions/race/tribe in Kenya?</td>
<td>292</td>
<td>1</td>
<td>5</td>
<td>2.68</td>
<td>1.114</td>
<td>.301</td>
<td>.143</td>
<td>-.351</td>
<td>.284</td>
</tr>
<tr>
<td>Is it true some of your peers earn far more than yourself due to patronage?</td>
<td>296</td>
<td>1</td>
<td>5</td>
<td>2.88</td>
<td>1.280</td>
<td>.171</td>
<td>.142</td>
<td>-1.187</td>
<td>.282</td>
</tr>
<tr>
<td>N</td>
<td>Min.</td>
<td>Max.</td>
<td>Mean</td>
<td>Std. Deviation</td>
<td>Skewness Statistic</td>
<td>Std. Error</td>
<td>Kurtosis Statistic</td>
<td>Std. Error</td>
<td></td>
</tr>
<tr>
<td>-----</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>---------------</td>
<td>---------------------</td>
<td>------------</td>
<td>-------------------</td>
<td>------------</td>
<td></td>
</tr>
<tr>
<td>Is it true that some employees pay were fixed from above?</td>
<td>304</td>
<td>1</td>
<td>5</td>
<td>2.72</td>
<td>1.234</td>
<td>.277</td>
<td>.140</td>
<td>-1.000</td>
<td>.279</td>
</tr>
<tr>
<td>Is it true that there is generally disquiet that some preferred staff earn more than other staff?</td>
<td>296</td>
<td>1</td>
<td>5</td>
<td>3.02</td>
<td>1.325</td>
<td>-.055</td>
<td>.142</td>
<td>-1.181</td>
<td>.282</td>
</tr>
<tr>
<td>Is it true that all managers/supervisors/junior leaders have superior qualifications better than all other employees?</td>
<td>304</td>
<td>1</td>
<td>4</td>
<td>2.13</td>
<td>1.053</td>
<td>.526</td>
<td>.140</td>
<td>-.936</td>
<td>.279</td>
</tr>
<tr>
<td>Is it true that all employees are recruited based on certain set high academic criteria?</td>
<td>304</td>
<td>1</td>
<td>5</td>
<td>2.97</td>
<td>1.214</td>
<td>-.166</td>
<td>.140</td>
<td>-1.094</td>
<td>.279</td>
</tr>
<tr>
<td>Is it true that most preferred employees may have no high or reasonable academic background?</td>
<td>304</td>
<td>1</td>
<td>5</td>
<td>2.47</td>
<td>1.134</td>
<td>.458</td>
<td>.140</td>
<td>-.759</td>
<td>.279</td>
</tr>
<tr>
<td>Cronbach's Alpha</td>
<td>.774</td>
<td>Cronbach's Alpha Based on Standardized Items</td>
<td>.788</td>
<td>N of Items</td>
<td>24</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The results in Table 4.10 reveal that Cronbach’s alpha was 0.774 based on the 24 items of nepotism practices. That showed the study had high internal consistency and variable correlation significance. Cronchch’s Alpha based on standardized items had a significance value score of 0.79 qualifying the variables for analysis. The individual item statistical analysis on having a relative who works in the same organization was Mean 2.52, SD 1.67. This implied that the respondents were neutral about nepotism practices in their organizations but had mixed perceptions. This result could have been caused by fear of reprisal as evidence can be revealed by SD <1 which means respondents had different perceptions on the items of analysis. Response on whether one was recruited through public job advertisement in the press had a Mean of 3.82 and SD 1.46 showing great significance. Response on whether there is general disquiet that some preferred staff earn more than other staff, had Mean 3.02 SD 1.32, meaning it was confirmation of the nepotism statement. Response on whether one could claim that there is a minority tribe/race employees in the organization, had Mean 3.6 SD 1.7, meaning this nepotism statement was confirmed.

Response on whether one tribe/race/ dominates the employee population, had Mean 3.0 SD 0.99 meaning there was high consensus respondents perceive one tribe/race is dominant at their work places. The analysis of the nepotism factors revealed that both private and public organizations have high nepotism challenges.

4.5.2: Performance Practices

This section reports the analysis of performance factors in public and private organizations in Kenya. The factors were rated as Strongly False, 1 False, 2 Neutral, 3 True 4 and Strongly True 5. A score of ≤1.5 was interpreted to mean strongly false, while a score 1.5 to ≤2.5 implied that is false and 2.5 to ≤3.5 was interpreted to mean neutral opinion. A mean score of 3.5 ≤ 4.5 was interpreted to mean that is true opinion while a score of ≥ 4.5 was interpreted to mean strongly true. A standard deviation of ≤1 was interpreted to mean that respondents had a consensus in the rating of the statement while a standard deviation greater than 1 was interpreted to mean that the respondents differed in their perception about the statement.
Table 4.11 Performance factors

<table>
<thead>
<tr>
<th>N</th>
<th>Min.</th>
<th>Max.</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Skewness Statistic</th>
<th>Std. Error</th>
<th>Kurtosis Statistic</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is it true some staffs in your organization are pampered when it is clear they don’t perform well while others are being punished for poor performance?</td>
<td>304</td>
<td>1</td>
<td>5</td>
<td>2.34</td>
<td>1.132</td>
<td>.515</td>
<td>.140</td>
<td>-.438</td>
</tr>
<tr>
<td>Is it true some staffs that perform dismally are promoted while handworkers are ignored or dismissed?</td>
<td>304</td>
<td>1</td>
<td>5</td>
<td>2.41</td>
<td>1.134</td>
<td>.673</td>
<td>.140</td>
<td>.015</td>
</tr>
<tr>
<td>Is it true that some staff enjoy protection from elsewhere and others are easily touchable?</td>
<td>296</td>
<td>1</td>
<td>5</td>
<td>2.84</td>
<td>1.264</td>
<td>.180</td>
<td>.142</td>
<td>-.925</td>
</tr>
<tr>
<td>Is it true that some staff can be absent without permission for days and resume work normally later while others may be punished for absence?</td>
<td>304</td>
<td>1</td>
<td>5</td>
<td>2.26</td>
<td>1.153</td>
<td>.668</td>
<td>.140</td>
<td>-.375</td>
</tr>
<tr>
<td>Is it true that some staffs can report to work very late and one asks while other will be questioned?</td>
<td>304</td>
<td>1</td>
<td>5</td>
<td>2.42</td>
<td>1.166</td>
<td>.521</td>
<td>.140</td>
<td>-.726</td>
</tr>
<tr>
<td>Is it true that some staffs are perceived to be earning for free and no one bothers while others do a lot of work under threats?</td>
<td>304</td>
<td>1</td>
<td>5</td>
<td>2.73</td>
<td>1.188</td>
<td>.226</td>
<td>.140</td>
<td>-.841</td>
</tr>
<tr>
<td>Is it true that you have trained a newly recruited boss who is far less qualified than yourself?</td>
<td>304</td>
<td>1</td>
<td>5</td>
<td>2.32</td>
<td>1.249</td>
<td>.691</td>
<td>.140</td>
<td>-.593</td>
</tr>
<tr>
<td>Is it true that you work with some staffs whose skills are very questionable but you can’t dare question?</td>
<td>304</td>
<td>1</td>
<td>5</td>
<td>2.27</td>
<td>1.050</td>
<td>.700</td>
<td>.140</td>
<td>-.087</td>
</tr>
<tr>
<td>Is it true that you work with some staff who were “just brought in” nobody knows when or how they were recruited?</td>
<td>304</td>
<td>1</td>
<td>5</td>
<td>2.66</td>
<td>1.333</td>
<td>.512</td>
<td>.140</td>
<td>-1.040</td>
</tr>
</tbody>
</table>
The results in Table 4.11 showed a Cronbach’s Alpha score of 0.91 and Cronbach’s Alpha based on standardized items, a score of 0.913 meaning internal consistency items measurement indicate performance have significance correlation effects to nepotism. The statistics showed that the respondent were generally neutral on the performance factors asked. This can as well be attributed to the fear of reprisal as it can be clearly seen that all the SD were <1.0 meaning the respondents had different perceptions about performance statements. The analysis of the performance factors revealed that both private and public organizations have problems with performance related to nepotism.

Table 4.12: Overall Descriptives

<table>
<thead>
<tr>
<th>Nepotism Practices and Performance Practices</th>
<th>N</th>
<th>Min.</th>
<th>Max.</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>304</td>
<td>1.23</td>
<td>4.13</td>
<td>2.50</td>
<td>0.63</td>
<td>.756</td>
<td>.140</td>
</tr>
</tbody>
</table>

The results in Table 4.12 showed an overall relationship between nepotism and performance. The overall mean score was 2.5. This means that the respondent were neutral on the indicator statements asked. The SD 0.63 showed the respondents had a strong consensus that nepotism does affect performance as the standard deviation is >1. The overall analysis of nepotism and performance factors revealed that both private and public organizations have problems with nepotism and performance that employees fear talking about.

Table 4.13: Correlation of Indicators

<table>
<thead>
<tr>
<th>Recruitment and Selection</th>
<th>Promotion and Growth</th>
<th>Kinship / Friendship</th>
<th>Organizational Culture</th>
<th>Leadership Positions</th>
<th>Employee Formation</th>
<th>Reward and Recognition</th>
<th>Training and Development</th>
<th>Discipline and Performance</th>
<th>Time Management</th>
<th>Competency Levels</th>
<th>Nepotism Practices</th>
<th>Performance Practices</th>
</tr>
</thead>
<tbody>
<tr>
<td>r N</td>
<td>1</td>
<td>1.00</td>
<td>.217** .237**</td>
<td>.113* .292</td>
<td>.000 .292</td>
<td>.049 .000</td>
<td>.091** .000</td>
<td>.000 1</td>
<td>.000 .292</td>
<td>.000 .292</td>
<td>.000 .292</td>
<td></td>
</tr>
<tr>
<td>p N</td>
<td>.049 .304</td>
<td>.000 .292</td>
<td>.217** .237**</td>
<td>.113* .292</td>
<td>.000 .292</td>
<td>.049 .000</td>
<td>.091** .000</td>
<td>.000 1</td>
<td>.000 .292</td>
<td>.000 .292</td>
<td>.000 .292</td>
<td></td>
</tr>
</tbody>
</table>
The analysis on Table 4.03 above showed the relationship between Nepotism and Performance factors. The statistics showed that there was a significant positive relationship between kinship and promotion indicators (r = .579, p< .01). Leadership position and kinship had significant positive relationships (r = .521, p < 0.01), discipline and reward (r = .560, p < 0.01), time management and discipline had a significant of (r = .821, p <0.01). Also, competency was significantly and positively associated with kinship (r = .549, p< 0.01), competency with leadership position (r = .614, p< 0.01), competency with discipline (r = .633, p<0.01) and competency with time management (r = 0.703, p< 0.01). There was a significant positive relationship between kinship and recruitment indicators (r = .217, p<.01). Employee formation and recruitment (r = .250, p< 0.01), Competency Levels with recruitment (r = .375, p< 0.01).

The analysis also revealed that nepotism significantly influence performance (p-value 0.01) in all indicators. Reward and recognition (p-value 0.01) and training and development (p-value 0.01). This therefore is to say that there is high nepotism in both public and private organizations and such affects performance. The low p-values (0.01) in Table 4.13 indicates that we reject the null hypothesis (Ho) that is nepotism has no significant effect on job performance in the private and public organizations in Kenya and move to confirm that the alternative is true, nepotism actually has significant effect on job performance of staffs in both public and private sectors.
Table 4.14: Relationship between nepotism practices and performance practices

<table>
<thead>
<tr>
<th>Variables</th>
<th>β</th>
<th>SE</th>
<th>Std. β</th>
<th>t</th>
<th>p</th>
<th>R</th>
<th>R²</th>
<th>∆R²</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>1.709</td>
<td>.060</td>
<td>28.579</td>
<td>.000</td>
<td>.644</td>
<td>.415</td>
<td>.413</td>
<td>214.131</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Performance practices</td>
<td>.332</td>
<td>.023</td>
<td>.644</td>
<td>14.633</td>
<td>.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Dependent Variable: Nepotism Practices

Predictors: (Constant), Performance Practices

The regression line statistics on table 4.14 showed about 42 percent of the dependent variable can be explained by the independent variable. Looking at the ANOVA statistics, the F statistics is high 214.131 and significance p-value < 0.01. This means that the relationship between the variables is strong and both variables increase proportionally. The results presented in table 4.14 show that the influence of nepotism on performance was significant (F = 214.131, p < 0.05). Meaning about 42 percent of the variation in performance was explained by variations in nepotism practices (R square = 0.415, p < 0.05). In addition the coefficient was also statistically significant (β = 0.644, t = 14.63, p < 0.05). The overall conclusion is that based on the regression results in table 4.14 nepotism practices have positive effect job performance.

The hypothesis in this study sought to establish whether nepotism does not affect job performance in the private and public organizations in Kenya. The Baron and Kenny (1986) approach in testing for mediation was adopted for the purposes of this study and guided by the equation: Regress the dependent variable on the independent variable to confirm that the independent variable is a significant predictor of the dependent variable.

4.6 Discussions of the Study Findings

This section discusses the results in line with the objectives and the hypotheses of the study. A conceptual framework was derived from the existing literature on the variables in the study including empirical literature on relationship between the variables. The conceptual model outlined the relationship between nepotism practices and job performance. Overall results of this study indicate that nepotism practices explained R-squared 0.456, P < 0.05, that is 46 percent of the variance in job performance as shown in Table 4.15 below meaning as nepotism increases performance decreases.

Table 4.15: Relationship between overall Nepotism Practices and Performance Practices

<table>
<thead>
<tr>
<th>Variables</th>
<th>β</th>
<th>SE</th>
<th>Std. β</th>
<th>t</th>
<th>p</th>
<th>R</th>
<th>R²</th>
<th>∆R²</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>1.649</td>
<td>.059</td>
<td>27.805</td>
<td>.000</td>
<td>.675</td>
<td>.456</td>
<td>.45</td>
<td>83.698</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Discipline and Performance</td>
<td>.133</td>
<td>.034</td>
<td>.293</td>
<td>3.893</td>
<td>.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time Management</td>
<td>-0.016</td>
<td>.036</td>
<td>-0.373</td>
<td>-0.451</td>
<td>.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Competency Levels</td>
<td>-.242</td>
<td>.03</td>
<td>-.482</td>
<td>7.971</td>
<td>.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Dependent Variable: Nepotism Practices

Predictors: (Constant), Competency Levels, Discipline and Performance, Time Management

The objective of this study was to investigate the effects of nepotism practices on job performance in the private and public sectors in Kenya. The study hypothesized that nepotism has no effect on job performance of staff in both public and private organizations in Kenya. The study disapproved this and confirmed the alternative that actually there is a significant relationship between nepotism and job performance in both institutions in Kenya. This means that indeed nepotism contributes to poor job performance. Specifically the study revealed that of the total working population in both sectors 46 percent (almost half) are employed out of relatedness and contribute to 46 percent of poor performance in both sectors because they are inversely related. This supports the study by Ercenap, (2006), who revealed that organizations with intense preferential treatment, kinship, fellow tribesmanship or friendship or other forms of relationship replace the principles of merit, such as knowledge, skills, ability, competence, success or level of education, in the recruitment or promotion of employees hence performance becomes sluggish.

On the assessment of the nature of tribalism in organizations, the respondents were of the opinion that there is high tribalism in both private and public institutions in Kenya. The respondents significantly agreed that certain tribes dominate work places than the rest, Mean of 3.60 and the indication was that employees in these organizations were employed based on nepotism. These results are in line with existing literature done by O’Brien (1993) which conducted by the society for Human Resource Management and found that 88 percent of the 432 responding companies employ workers that were related in some way. They also found that 83 percent of employees are married bringing a whole tribe into an organization. The results also showed that there is a statistically significant relationship between nepotism and job performance. This confirms Bennedsen et al, (2007) study that found that nepotism is inversely related to...
performance and that nepotism is a non-strategic decision that affects performance for all organizations.

In conclusion, based on the results of the analysis of this survey, we can confidently confirm that the relationship between nepotism practices and job performance is significant. All the parameters in the analysis measuring nepotism practices indicated a strong relationship with job performance (P < 0.05). Meaning, when employee nepotism is present job performance is low. The results of this research have been proven by Ozler and Buyukarslan (2011) who found that Nepotism and Cronyism are practiced from the upper management of the organizations and that nepotism does not only affects the performance of the employees but also it affects the performance of the organizations as a whole because employees are the most important source of performance for the organizations to generate profits. The relationship between nepotism and its effects in Human Resource practices has been demonstrated by many other studies. Fershtman et al (2005) studied nepotism and job discrimination and found that nepotism led to job dissatisfaction and related conflicts. Ercenap (2006) studied Favoritism, nepotism and cronyism as predictors of job satisfaction and found that favoritism, nepotism and cronyism are negatively connected with job satisfaction in cyprus. Büte (2009) on his study on the effects of nepotism and favoritism on employee behaviors and human resources practices: a research on Turkish public banks found that nepotism had significant negative effects on the intention to quit, job satisfaction, organizational commitment and weaker human resource management practices.

V. SUMMARY, CONCLUSION, RECOMMENDATIONS AND IMPLICATIONS

5.1 Introduction
The objective of this study was to investigate the effects of nepotism and job performance in the private and public sectors in Kenya. This chapter therefore provides a summary of the major findings of the study, discussion on theory and practice, implications, recommendations, conclusions and the limitations of the study and outlines proposed areas of future research.

5.2 Summary of Findings
The hypothesis that nepotism has no significant effect on job performance in the private and public organizations in Kenya, explored the relationship between nepotism and job performance in Kenya. Results of multiple linear regression showed that there was a high significant relationship (F= 83.6, p<0.05) between nepotism and job performance in both public and private sectors. It can then be concluded that the null hypothesis was rejected but we failed to reject the alternative hypothesis that nepotism has significant relationship with individual employee job performance.

Correlation statistical analysis of the variables showed a very strong relationship between nepotism and employee job performance (r = .644, p <0.05). In addition, the study revealed that nepotism is rampant in both public and private institutions (r = .771, p<0.05) that is recruitment is largely based on kinship/friendship. The study found that 77 percent of the staff currently on employment are as a result of relatedness to senior leaders or managers (r=.763, P< 0.5) within or outside the institutions or have kinship or friendship networks across organizations. The study further revealed that competence is not a key consideration in nepotism. Meaning in Kenya recruiters tend ignore competence, read as qualifications when employing relatives or friends (r = .642, P<0.05). This then may largely be the reason and evidence for poor job performance. This study also revealed that most organizations whether public or private have a whole cultural inclination of tribe either by show of mother tongue or regional inclination (r = .605, p < 0.05). This confirms our new found concept that labour in Kenya tribal based (Tribal Labour Theory, TLT) composed of couples, kinships and friends confirming Levine et al (2007) study on the brother in law effect in organizations.

Table 5.1: Summary of Research Objectives, Hypotheses and Test Results

<table>
<thead>
<tr>
<th>Research Objectives</th>
<th>Hypothesis</th>
<th>Hypothesis test results</th>
</tr>
</thead>
<tbody>
<tr>
<td>To investigate the effects of nepotism on job performance in the private and public sectors in Kenya.</td>
<td>Nepotism has no significant effect on job performance in the private and public organizations in Kenya</td>
<td>Ho REJECTED</td>
</tr>
</tbody>
</table>

5.3 Conclusions
Cronbach’s alpha reliability test was used to measure reliability of instruments used in this study. The results had a high reliability on nepotism practices 24 items with a reliability coefficient of 89.7 percent and performance practices 9 items with 90 percent reliability coefficient. The study covered almost every area of employment in both public and private sectors ranging from drivers to top managers across all professions in Kenya, meaning the study was well represented and in the ratio of gender 1:1. Majority of the respondents were permanent staff 90 percent. The findings revealed significant inverse relationship between nepotism and job performance. The influence of kinship/friendship or tribal culture was found to be statistically significant in making decision to recruit an employee and that was found to reduce employee performance. The findings also revealed that employee’s competence or qualification did not matter when nepotism is practiced and that poor performance is not punished where nepotism was applied. In addition this study found that four dimensions of nepotism exist in Kenyan organizations, thus Tribal nepotism (nepotism based on ones tribe), Kinship nepotism (nepotism based on ones relationship), Bribery nepotism (nepotism based on payback ability) and Political nepotism (nepotism based on one’s political affiliation). The study further concluded that labour in Kenya is significantly based on tribal nepotism linkage.

5.4 Implications of the Research Findings
The results of this study added to existing knowledge in the area of Ethical Human Resource practices in both public and private organizations in Kenya. The major contribution is the perspective of the negative effects of nepotism in institutions in

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Kenya. It revealed that nepotism affects employee job performance negatively. Therefore, leaders of institutions should set strategies or structures that are objective in manner of recruitment to avoid nepotism that affects performance at all costs. It further revealed that labour in Kenya is tribal based kind of nepotism, implying that stringent measures should be put in place to deal with nepotism in organizations. In addition the management should consider developing policies and guidelines against nepotism. The study results therefore present theoretical and policy implications in organizations in Kenya.

The labour ministry in Kenya is charged with the responsibility of overseeing fairness and equity in labour matters. It should be in the interest of the labour ministry to draft a law against nepotism and set penalties for leaders practicing nepotism in Kenya. The performance of employees in Kenya is important because this has a direct influence on the gross domestic product and economic growth in Kenya in terms of quality of products/services offered to the citizens and other stake holders. The Policy makers in the labour industry can then use the results of this study to address issues of nepotism in organizations in Kenya in order to improve on job performance, guide on recruitment of staff objectively based on qualifications and skills necessary for job performance. The policy on recruitment in public and private organizations should address the issue of tribe, kinship, friendship, favouritism and bribery as bases of nepotism. The findings of this study will help human resource managers of public and private organizations to understand the effects of nepotism on performance and create strategies to deal with nepotism in their organizations. It is clear that managers in organizations in Kenya need to focus on aspects of nepotism to create fairness and equal opportunity for employment for all qualified candidates when recruiting, rewarding and recognition, in promotion or training and punishment for poor job performance. Human Resource managers may also need to focus on recruitment techniques which may help them identify certain personality characteristics which have been linked to job satisfaction and performance.

5.5 Recommendations

The study recommends that to deal with nepotism a law should be enacted or added to the labour statutes that specify issues that qualify nepotism and thereto penalties for offenders besides just making nepotism a moral or ethical issue in Kenya. Organizations should carry out an independent audit of existing staff to deal with the intensity and depth of nepotism in individual institutions in Kenya and look into mitigation factors based on law and ethics. Change of attitude, stereotyping and leadership influence as exposed in the findings portrays organizations in Kenya as nepotistic, bringing entire tribe into one organization.

5.6 Limitations of the Study.

This study provided clear insight into the nature of nepotism and its effects on job performance but it has some limitations. Nepotism was only correlated to job performance without consideration to other intervening and moderating variables which could be related and relevant in this study. Again the study used respondents as subjects of measure in data collection by asking the incumbents to rate themselves on nepotism and job performance. The results presented therefore are in the view of the incumbency and may have been distorted as some of the respondents may be beneficiaries of nepotism.

The study did not attain 100 percent response rate because some of the respondents were unwilling to disclose information about their organization’s behaviour for fear of reprisal or considered the information as highly confidential. Such pushed more respondents to be neutral with their responses. As much as the study included both public and private organizations, the NGOs were left out. This means that the results may not be generalized for all organizations in Kenya given that the sample selection may have also limited the generalization of results to the overall population.

Lastly, the study was based on cross-sectional research design where the respondents were interviewed only once to get their perspectives of the variables in the study. Obviously cross-sectional data enable generalization of the findings while offering cost and control advantages, but it disallows close investigation of several aspects of the relationships in this study. Perhaps a time-series database and testing of the nepotism and employee job performance relationship in a longitudinal framework would have provided more insight into probable effects.

5.6 Suggestions for Further Research

The findings add to the body of existing empirical evidence that nepotism practices negatively impacts of employee job performance. Though this study was not measuring the extent of nepotism in Kenya parse, it came out that nepotism is rampant. The inclusion of the extent of nepotism, nepotism based recruitment and such like not covered in this study could bring more insights into the nature and extent nepotism. Future research could also consider a similar research in the NGOs or the armed forces in Kenya hence add to the knowledge of nepotism and job performance or nepotism and labour turn over in Kenya.

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Feature Analysis of Sketch Based Image Retrieval System
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Abstract- Although many researches are increased in Sketch Based Image Retrieval (SBIR) field, it is still difficult to bridge the gap between image and sketch matching problem. Feature extraction is the critical role for SBIR to get efficient matching. In this paper, the proposed feature descriptor called Edge Orientation Histogram (EOH) for sketch based image retrieval (SBIR) system is presented. The features of database images and query sketch are extracted by EOH descriptor. And then cosine similarity measure is applied for matching features. The retrieved images similar with query sketch are displayed by rank order. Mean Average Precision (MAP) is measured as evaluation criteria. The Flickr15K benchmark dataset is used to evaluate the performance of this system.

Index Terms- EOH, IR, MAP, SBIR

I. INTRODUCTION

Due to the progress in digital imaging technology, image retrieval has become a very active research area in computer science. Moreover, searching desired image by describing hand-drawn sketch is popular, because of the emerging of touch screen technology. An image retrieval system basically consists of three components: preprocessing, feature extraction, and similarity measurement. The results of the search are usually shown as a list which is sorted according to a score given by a selected similarity measure.[1]

• Preprocessing: This component uses image processing techniques in order to get simpler representation of the input image that could be analyzed in an easier way by the subsequent steps. Some techniques applied here are noise elimination, edge detection, image enhancement, thresholding and morphological operations among others.

• Feature Extraction: This component is very critical in order to select appropriate features for the image retrieval task. These features are typically low-level features related to color, texture and/or shape. The set of features must possess a good or an optimal discriminatory power in the particular application.

• Similarity Measurement: The similarity measure is used to compute a distance value between the user query and a candidate match from the database. A good similarity measure is characterized by showing a low distance value when the underlying compared images are very similar and vice-versa, it must show a high distance value when the underlying images are very different.

Feature extraction is the main part in SBIR system. It extracts the visual information from the image and save them as the feature vectors in database. The feature extraction finds the image description in the form of feature values called feature vector for each pixel. These feature vectors are used to compare the query with the other images and retrieval. Features extracted from the whole image are called global features. Local features are extracted from an object or a segment of an image. Global features cannot provide enough information to estimate the similarity between images. Therefore, local feature descriptor is proposed in this system.

II. RELATED WORKS

This section describes the related literature and the concept of an image retrieval system. An image retrieval system is a computer system for browsing, searching and retrieving images from large databases of digital images.

In 2014, Prajakta A. More et al., presented an efficient Content Based Image Retrieval (CBIR) system using Sobel's edge detection algorithm [7]. Content Based Image Retrieval (CBIR) is a process to retrieve a stored image from database by supplying an image as query instead of text. This can be done by proper feature extraction and querying process. A universal content based image retrieval system uses color, texture and shape based feature extraction techniques for better matched images from the database.

Gang. H et al [9], proposed a novel image feature descriptor, namely texture structure histogram (TSH) for content-based image retrieval. This method using the color and edge orientation information to describe the image texture structure information. Considering the HSV color space conforms to humans’ visual perception mechanism, the feature extraction is conducted in the HSV color space. The authors also proposed a novel non-equal interval quantization scheme that according to the different attribute and distribution of the H, S and V channels. Building texture structure map is also a key step, which provides a good feature representation for the texture information of image. TSH integrates the advantages of both color and texture features, and
shows a good retrieval performance. Their experimental results demonstrated that the proposed algorithm have a better performance for image retrieval.

Recently, content based image retrieval is becoming a way of fast retrieval. Users are not satisfied with the usual information retrieval techniques. Retrieving the relevant information from keywords is very major task and this technique has been focused by researchers in many ways. Sketch is more natural and informative, that breaking down the language barrier and one of the strong media for communication in old era as well as in current scenarios. Hence currently sketch based image retrieval (SBIR) is also in focus for research purposes [10].

In 2015, in order to increase the accuracy of image retrieval, an intent-based image retrieval system (IBIR) based on interactive genetic algorithm (IGA) is proposed [12] by Kumar K.R and Sindhu S.N. In the query stage of their work, the feature descriptors of a query image were extracted and then used to evaluate the similarity between the query image and those images in the database. In the evolution stage, the most relevant images were retrieved by using the IGA. IGA is employed to help the users identify the images that are most satisfied to the users’ need.

In 2017, Tolias, G. and Chum proposed a novel concept of asymmetric feature maps (AFM), which allows evaluating multiple kernels between a query and database entries without increasing the memory requirements [13]. They also derive a short vector image representation that supports efficient scale and translation invariant sketch based image retrieval system. The authors states that the performance is further boosted by image-based average query expansion combined with AFM for object outline localization.

Bozas, K. and Izquierdo proposed a large scale sketch based image retrieval using patch hashing [11]. Sketch recognition and designing of descriptor are included in their system. The system in this paper is closely related to that paper. The differences are feature descriptor and similarity measure. The result of our system is compared with theirs. In this work, the feature descriptor is proposed and cosine similarity measure is used for feature matching.

This is the extended work of our prior work in [15]. The performance of this work is outperforming the prior work and the experiments also emphasize on the feature analysis of our proposed descriptor.

III. PROPOSED SBIR SYSTEM

The aim of this paper is to develop a sketch based image retrieval system, which can retrieves images quickly, easily and efficiently. Therefore, the SBIR system is presented by proposing the feature descriptor.

The proposed feature descriptor called Edge Orientation Histogram (EOH) is a local approach that is based on computing a histogram of edge orientation in each block and matching them for the whole image. The features of database images and query sketch are extracted by EOH descriptor. And then cosine similarity method is applied for matching features. The system architecture of this approach is described in figure 1.

![System Architecture of EOH Approach](image)

In this work, sketches are simple curve drawings and define the boundaries of an object or a scene. There are 10 folders of 33 sketches in dataset. The sketches of 5 folders are trained and that of the other 5 folders are tested. Therefore, the features of 165 sketches are pre-extracted by the proposed descriptor and stored in the file. On the other hand, the all (14660) images in the dataset are labelled with categories and stored. Then, the features of all labelled images are also extracted by the proposed descriptor. When the query sketch is inputted, the features of the sketch are extracted by the proposed descriptor (EOH). The next step is matching the features of both. Cosine similarity is used for matching. Finally, the retrieving images are displayed by rank.

A. Preprocessing

The input sketch and all of database images are resized to 240x320 pixels. Then, the edges of resized images are detected by Canny. The edge images are divided into various blocks: 4x4, 6x6, 8x8, 9x9, 10x10, 12x12, 14x14, 16x16, 17x17, 20x20 and 21x21 respectively. Finally, the features are extracted by EOH descriptor for each block.

B. Proposed Edge Orientation Histogram (EOH) Descriptor

EOH descriptor considers the orientation only, magnitude of edge is neglected. It contains:
1. Masking
2. Edge detection by Canny
3. Cropping into 3*3 kernel

Five types of edge are defined for masking such as horizontal mask, vertical mask, 45° diagonal mask, 135° diagonal mask and non-directional mask respectively.

![Fig.2. 5 types of Edge](image)

The Canny edge detector uses a filter based on the first derivative of a Gaussian, because it is susceptible to noise present on raw unprocessed image. The raw image is convolved with a Gaussian filter [8]. The result is a slightly blurred version of the original which is not affected by a single noisy pixel to any significant degree.

Gaussian operator is:

$$g(x, y, \sigma) = e^{-\frac{(x^2+y^2)}{2\sigma^2}}$$

In this system, 5×5-size Gaussian mask with $\sigma = 1.4$ is used. Threshold value of Canny is $[0.25, 0.6]$ for weak and strong edge respectively.

The final stage of EOH descriptor is cropping the edge image into 3*3 kernel size and the features are extracted by mapping various bin histograms. The best result is got by 8 bin histogram. EOH descriptor is used in three phase: for training sketch and images, for feature extracting of query sketch and that of database images.

C. Similarity Measure

The extracted features are matched by measuring cosine similarity. The cosine similarity between two vectors is:

$$\cos \theta = \frac{\vec{a} \cdot \vec{b}}{\|\vec{a}\| \|\vec{b}\|}$$

In this system, 

$$\cosine = \frac{AdotB}{(A \ast B)}$$

where,

$$A = sqrt(sum(skfeature)^2)$$

$$B = sqrt(sum(imfeature)^2)$$

IV. EXPERIMENTAL EVALUATION

To evaluate the performance of the proposed SBIR System, the Mean Average Precision (MAP) rate is calculated. The Precision provides information related to effectiveness of the system. Consequently, the mean average precision (MAP) is the mean of the average precision scores over all queries:

$$MAP = \frac{1}{Q} \sum_{q \in Q}^{NG(q)} AP(q)$$

Where, $Q$ = no: of queries images displayed with similar shape accuracy of the system. To calculate the MAP, average precision is firstly calculated. Average Precision is averaging the precision values from the rank positions where a relevant image was retrieved. As a global estimate of performance using a single value, it is standard to use the average precision (AP). The average precision for a single query $q$ is the mean over the precision scores at each relevant item:

$$AP(q) = \frac{1}{NG(q)} \sum_{k=1}^{NG(q)} p_q(R_k)$$

where $R_k$ is the recall after the $k^{th}$ relevant image was retrieved. In this work, 5 categories of sketches are defined depend on their MAP value. Sketch number 1, 3, 12 and 20 are included in the category C5 and their MAP value is 1. The MAP value of category C1 is 0.8 and consists of sketch number 5, 6, 8, 14, 15, 16, 21 and 23. Sketch number 2, 4, and 24 are comprised in the category C3 and their MAP value is 0.6. The MAP value of C2 category is 0.4 and sketch number 10, 17, 18, 19, 27 and 29 are included. The category C4 sketches are 9, 11, 22, 25, 28, 31 and 33 and their MAP value is 0.2. The sketch categories and their related MAP values are illustrated in the figure3.

![Fig 3: MAP Score with related sketch categories](image)

A. Dataset

Flickr15k dataset is used to evaluate the performance of the proposed SBIR system. Flickr15k dataset consists of approximate 15k photographs and manually labeled into 33 categories based on shape, and 330 free-hand drawn sketch queries drawn by 10 non-expert sketchers. In this system, the half of sketch and database images are trained by EOH and tested by the other half.

B. MAP Comparison over various Block sizes

The experiments are analyzed over various block sizes and the comparison of MAP score on each block size to the PH-HOG descriptor is also illustrated in the figure 4 and table 1. The MAP value over all the sketch queries in the testing set is 0.485 and comparison with that of the state-of-the-art methods is described in table 2.
For each sketch, testing time is at least 5times in this work. Therefore, the MAP score is calculated over 165 sketches while the number of wrong sketches is counted over 33 sketches.

Table 2. SBIR Result Comparison (MAP)

<table>
<thead>
<tr>
<th>Methods</th>
<th>Vocabulary Size</th>
<th>MAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>EOH (Ours)</td>
<td></td>
<td>0.4848</td>
</tr>
<tr>
<td>PH-HOG</td>
<td></td>
<td>0.2000</td>
</tr>
<tr>
<td>Siamese CNN</td>
<td></td>
<td>0.1954</td>
</tr>
<tr>
<td>Perceptual Edge</td>
<td>Non-BoW</td>
<td>0.1513</td>
</tr>
<tr>
<td>GF-HOG</td>
<td>3500</td>
<td>0.1222</td>
</tr>
<tr>
<td>HOG</td>
<td>3000</td>
<td>0.1093</td>
</tr>
</tbody>
</table>

V. CONCLUSION

In this paper the sketch based image retrieval system is presented which is developed to retrieve desired image efficiently. The feature descriptor called Edge Orientation Histogram (EOH) is proposed for feature extraction. The feature analysis is tested over various block sizes and histogram bins. 8x8 block size with 8 bin histogram get the best MAP result. Cosine similarity measure is used for feature matching. The half of and sketches are trained by EOH and then tested on the other half of both. The result is depend on the quality of input sketch.

VI. FUTURE WORK

The success of the proposed EOH descriptor is dependent on the quality of input sketch and neglected the magnitude of edge feature. Since the both of input sketch and the database image are resized in the preprocessing stage, there is no scaling invariant. Future work should focus on the preprocessing steps of SBIR system. Before feature extraction, background and foreground of the image should be segmented. Moreover it should be extending EOH descriptor to be invariant to scaling.

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THE DEVELOPMENT OF RESEARCH-BASED LEARNING MODEL AND JOURNAL AS FOR GRADUATE STUDENTS’ SCIENTIFIC PUBLICATIONS OF M.Pd.E ON ECONOMIC

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Abstract- The ability of Students in the Master Economic Education - FE UNP in writing the qualified articles are still low. The thesis proposed still only based on previous research, not based on the data and relevant article. The research development aims to develop teaching materials and research-based learning model in the lecture of Economics and Macroeconomics Learning Strategy and as a comparison class were learning accounting. The aims of this research is improving students’ ability in conducting a research and writing scientific journals and. The method used was a research design, which consists of three stages, i.e. preliminary design, teaching experiment, and retrospective analysis to improve the students’ analytical capabilities. Research output is publications of national and international scientific journals.

Index Terms- Research-Based Learning, Intellectual Skills, scientific article, Problem based learning, Inquiry

I. INTRODUCTION

The educational strategy is an important indicator that is capable of changing the human thoughts from less understand to be more comprehend the matter occured as a whole. The improvement of comprehension capacity were in cognitive, affective, and psychomotor domain. Students is intellectuals positioned as 5% of nation’s population in Indonesia which obliged to improve self quality particularly in order to improve the quality of nation in general with the knowledge learned during the education on campus in accordance with certain scientific fields.

The science obtained through the educational process at college should be implemented in students’ life, one of those ways such as conducting scientific research. The research conducted by students can develop themselves, moreover it contributes many benefits for the progress of civilization and the interests of the nation in an effort to improve welfare. In addition to scientific and academic self-development, the student must constantly develop his or her own skills in softskill and self-maturity in solving all problems. Students must develop a critical mindset against all existing phenomena and study them scientifically.

The methods and development of science is a systematics and objective plan with the following stages : 1) observe and define problems and goals; 2) formulate hypotheses; 3) develop a research plan; 4) carry out the experiments based planned method; 5) conduct the observation and data collection; 6) analyze and interpret data; and 7) formulate conclusions or theories (Dalman, 2013: 9).

In an effort to improve academic skills, it is required a learning strategy which are able to explore the level of students’ rationality, that is research-based learning model. Students are supposed to have the capability to think rationally about an economic, social, and politics issues in their daily life, then the capability to analyze those matters happened and think about and alternative solutions to these problems. It is assumed to be capable of raising the level of intellectual skills of students.

Research-based learning is a multifaceted concept that describes the new face of a learning strategy that links between research and teaching. Practicing a good research-based learning should involve four aspects include: 1) The results of the study should have an impact on the curriculum, 2) methods of teaching and learning must be based on research, 3) learning should use research elements, 4) RBL should be able to develop a context of inclusive research (Blackmore & Fraser, 2007).
Lockwood (2001: 1) explains that the research-based learning is a learning system that uses authentic learning, problem-solving, direct inquiry and discovery approach, referring to the constructivist philosophy. The benefits of this model have been widely recognized for several decades, but research in the classroom has not been done by many experts as a learning method. Thus, RBL is a learning model that uses authentic learning, problem-solving, cooperative learning, contextual (hands-on and minds-on) and the inquiry discovery approach.

Basically, research-based learning aims to create a learning process that leads to activity analysis, synthesis, and evaluation, and improve the ability of students and professors in terms of assimilation and application of knowledge. The destination can be described as follows: 1) Increase the meaningfulness of the course to make it more contextual with describing the research results. 2) Strengthening the thinking ability of students as researchers. 3) Complete learning through the internalization of research, practice, and research ethics by involving research. 4) Improve the quality of research at the university and involve students in research activities. 5) Enhance student understanding of science through the development of an ongoing investigation. 6) Increase understanding of the role of research in innovation so as to encourage students to think creatively in the future. 7) Improve the quality of education in general (Widyawati, Diah Tri et al., 2010).

One of most important indicator should be concerned in the research-based learning is the involvement of research elements in the learning process. This is because research-based learning (RBL) is authentic with the perspective of the problem formulation, alternative solutions, and how the implementations of the research results can provide benefits in the form of ways and levels of student thinking.

Research-based learning can improve academic achievement, increase the target level of education up to the level of how to learn and build new knowledge that is beneficial to themselves and the environment (Blackmore & Fraser, 2007). These competencies are very important for education in the 21st century (Brew, 2010).

The phases of research based learning model by Arifin (2010) consisted of three steps. Firstly, Exposure Stage is carried out to determine the ability of early students. Secondly, Experience Stage is the step of administrating to conduct research experience. Thirdly, Capstone Stage is the final stage of research by presenting research results orally and in writing.

The excellence of RBL Model expressed by Toisuta (2012) that is a research-based learning model that featured not only develop the ability to discover and communicate knowledge but is also able to integrate ethical and moral decisions both individually and collectively useful for private and public. Research-based learning has a component of “social learning” to develop self-confidence and social solidarity in order to function effectively in a society that is constantly changing.

The RBL concept is a new learning method that enriches students with a variety of research experience. RBL is not only expected to improve students' academic ability, but also improve motivation, active learning, and development of capabilities, such as critical analysis, teamwork, time management and resources.

Benefits of RBL are concerned that RBL may develop inquiry critical attitude, a lot of ideas, and creative solutions. Other benefits revealed by Dafik (2015) as follows: (1) Encourage faculty to conduct research and always updating their knowledge; (2) To encourage the role of students in the learning process, and be research partners; (3) Students are accustomed to thinking process with a scientific approach; (4) Students have the independence, logical, critical, and creative; (5) Students are trained ethics, ethics, in particular, abstain from plagiarism behavior.

The development of science and technology grow rapidly in various part of the world, therefore the research based learning is an appropriate model used in the learning on higher education. As we know that RBL (Research Based Learning) have not only capability to improve the students knowledge, but also increase cognitive skills, thinking skills, and creative in thinking and learning. Students are guided to the active learning, and continuously searching for the latest research results, do analyzing then synthesizing and its implementation to discover the new science. Previous studies have proved that research-based learning is more effective than conventional learning methods (Johnston et al., 2009; Luangangoon; Choeisuwan 2015). However, the impact of socio-cultural factors on RBL is poorly comprehended in Asia (Johnston et al., 2009).

In line with that, based on the experience of researchers that many higher education institutions have implemented a variety of learning methods, but little is oriented on developing the ability to write a scientific paper on the student. In essence, a scientific paper presents the idea of a systematic problem solving is presented objectively and honestly use language that is supported by the facts, theory and empirical evidence.

Various new findings in science can be traced through papers. Scientific papers resulting from solving a problem-based inquiry, observation, a collection of data obtained from a research, both field studies, laboratory tests, or a literature review based on the ideas (methods) are logical and empirical science.
Those perception above strengthen this research, by conducting each structured steps in research based learning model, including 1) describes in detail the concept of the lectures so that students understand the main purpose of the content subjects are studied, 2) outlines the topics of lectures, in brief, provides guidance on finding journals that are relevant to the topic, 3) ask the students do a review of several international journals relevant obtained a student, then narrated the results of the analysis in the scientific literature brief, incorporating gap theory found in the journal, 4) lecturer assesses students' writing, 5) to follow up on the results of student writing assessment, by giving new assignment, ask students seeking more international journals relevant to the topic and narrated in a more scientific papers. The next steps 6) to evaluate the performance of the students, 7) spread out a questionnaire about students' perceptions of research-based learning, supplemented with quantitative analysis of the perceptions of students, 8) targets the end of step this research is a scientific journal of the ideas of the students that will be published in journals nationally indexed.

Benefits of RBL are concerned that RBL may develop inquiry critical attitude, a lot of ideas, and creative solutions. Other benefits revealed by Dafik (2015) as follows: (1) Encourage faculty to conduct research and is always updating their knowledge; (2) To encourage the role of students in the learning process, and be research partners; (3) Students are accustomed to thinking process with a scientific approach; (4) Students have the independence, logical, critical, and creative; (5) Students are trained ethics, in particular, abstain from plagiarism behavior.

But in fact, it is difficult to motivate students to write a scientific paper, for instance in a journal. Many student do not understand how to write a good journal, and do not have enough knowledge to write journal especially international journals. Other factors are the student's knowledge of the theories used in research is very limited, still based on the old theory, and context used is still based on common sense. That requires a strong effort to shape the mindset of students that writing a scientific paper is one form of improved quality of a university graduates. Basically, the RBL concept is a new learning method that enriches students with a variety of research experience. RBL is not only expected to improve students' academic ability, but also improve motivation, active learning, and development of capabilities, such as critical analysis, teamwork, time management and resources. Based on this, the goal of this research is:

1. Improve the motivation to write scientific journal of students.
2. Change the research scheme from the research which based on old theories to the research based on new theories and research results.
3. Change the students' mindset in writing scientific journal which still based on common sense into a writing based on current relevant research.
4. Improve the students knowledge about the international journal.
5. Improve the students ability in writing scientific journal.

II. IDENTIFY, RESEARCH AND COLLECT IDEA

In the first year of this research, it used research and development design (R and D). The development research consist of several activities, those are collecting, processing, analyzing, and presenting data which were carried out systematically and objectively followed by activities to develop a product to solve the problem occurred. The development research is the research methods used to produce a specific product and test the effectiveness of the product (Sugiyan, 2012: 407).

The research was conducted on Economic Education Master Program Universitas Negeri Padang with samples are students of level X and XI academic year on three subjects, they are Macroeconomic Advanced Theory, The Advanced of Economic Studies Strategy, and International Accounting. This research was conducted with some procedures. These procedures included the planning, exploration, initial product development, validation and final revision. The first stage was the planning which consisted of the formulation and preparation the research steps of research based learning instructional tools development for the subjects of The Advanced of Economic Studies Strategy and Macroeconomic Advanced Theory and International Accounting. The second stage was exploration. Exploration phase included the process of documenting the results of research in areas of topics study based on the syllabus.

The third stage was the initials development of products, such as the revision of the syllabus (if necessary), the construction of lecture unit (SAP), instructional video materials, assignments design, cases, exercises and problems to be discussed in the following classes where learning model applied. The preparations of these learning tools were done with the involvement of a team of lecturers on Economic learning strategies and optimize available e-learning that has been available in e_learning.unp.ac.id.

The first validation steps is validation of theoretical which pursued through expert examination or panelists who assessed the research results selected on the articles downloaded from the source of international journals that were reputable in the last 10 years, and also the instructional tools prepared. This step was conducted through a Focus Group Discussion (FGD) with the lecturer and IT expert.
team as described previously. In addition it will also be involved some students to see the initial responses of students to articles from journals that have been downloaded.

Furthermore, for the second year of this research will develop into a design. Research Design research is considered a research paradigm that aims to develop a sequence of activities and comprehend an empirical understanding of how a learning works (Cobb et al., 2003; Edelson, 2002; Gravemeijer, 2004; Research Advisory Committee, 1996; Widjaja, 2008). Wang & Hannafin (in Wijaya 2008) also defines design research as a systematic but flexible method, aimed at improving teaching practice through repetitive analysis, repetitive design, and implementation, refers to collaborations between researchers and practitioners with daily life situations, and leads to the principles and theories of contextual sensitive design.

III. RESULTS AND DISCUSSION

A. The description of the initial Skill

The initial skill of students was measured with several steps, those are: 1) give the students a topic in the learning process, 2) students were asked to discover the issues related to the topics given through previous relevant research as the reference, 3) and they were asked to make a short contexture article, which consist of problem description, explains the gap theory contained in the referenced journal, and compare with the problems that students encountered. From the results of initial skills test obtained the achievement that students do not have yet the better knowledge and ability to do problem analysis according to the topic given. It attests a necessary to implement the research-based learning model that stimulates students' rational abilities.

<table>
<thead>
<tr>
<th>No.</th>
<th>Interval</th>
<th>Pre-Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fi</td>
<td>Fi%</td>
</tr>
<tr>
<td>1</td>
<td>33.33</td>
<td>42.31</td>
</tr>
<tr>
<td>2</td>
<td>42.33</td>
<td>51.32</td>
</tr>
<tr>
<td>3</td>
<td>51.33</td>
<td>60.32</td>
</tr>
<tr>
<td>4</td>
<td>60.33</td>
<td>69.32</td>
</tr>
<tr>
<td>5</td>
<td>69.33</td>
<td>78.32</td>
</tr>
<tr>
<td>6</td>
<td>78.33</td>
<td>87.32</td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
<td>100%</td>
</tr>
</tbody>
</table>

| Source: Processed Primer Data 2017 |

The table above describes the student's initial ability before being treated experimentally. In the experimental class the number of students who have low ability 1 person and student who has high ability as much as 20 people. Then in the control class there are no students who have low initial ability and students who have high initial ability as many as 11 people.

For the average class, the experimental class is 72.67, while for the control class is 85. The overall experiment class value is lower than the control class. The low average score of the students in the experimental class because the students have not yet understood the concept of the learning given.

B. The Improvement of Students Ability after Treated Experimentally

In the pretest, students were only asked to narrate 1 journal and in the posttest after being treated, the students were asked to make a review of 5 books and 10 journals which internationally accredited. This step was conducted to reveal the improvement of students' rational skill and the ability to write scientific journal, and also to do the test to the implementation of research-based learning development model. Posttest is used to see students' ability in both sample classes after being treated by different learning process.

The assessment method of students skill from the posttest refers to the hierarchy of Bloom's Taxonomy (2002) with 6 indicator students' ability assessment those are: 1) remember (C1), 2) understand (C2), 3) apply (C3), 4) analyze (C4), 5) evaluate (C5), and 6) create (C6).
From the posttest results on research based learning model in experiment class obtained the results decrease on students ability. This caused by the low learning motivation of students start from reading, identifying, rewriting, and evaluating a journal. From those 6 indicator only few students that reached anlysis level.

<table>
<thead>
<tr>
<th>No.</th>
<th>Indicators</th>
<th>Number of Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Knowing (C1)</td>
<td>18</td>
</tr>
<tr>
<td>2</td>
<td>Understanding (C2)</td>
<td>18</td>
</tr>
<tr>
<td>3</td>
<td>Apply (C3)</td>
<td>18</td>
</tr>
<tr>
<td>4</td>
<td>Analyze (C4)</td>
<td>11</td>
</tr>
<tr>
<td>5</td>
<td>Evaluate (C5)</td>
<td>8</td>
</tr>
<tr>
<td>6</td>
<td>Creating (C6)</td>
<td>2</td>
</tr>
</tbody>
</table>

The table above describes from 18 students who are treated with research-based learning model, all students have reached the ability of C1, C2, C3 level. However, for C4, C5, C6 levels, the results are varied. For the analysis (C4) of 18 samples there were only 11 students, the ability to evaluate (C5) only 8 students, and the ability to create (C6) there are only 2 students. This data indicates the level of students ability in writing a scientific journal is still low. The ability to write a scientific journal is an ability categorized at the level of creation (C6) because the development of research-based learning model is product-oriented that include writing scientific journal and qualified research proposals, and also learning modules.

While the students' writing intensity is assessed by several criteria including: 1) quality and quantity of reference used, 2) reference recency, 3) national and international accredited journal reference sources, 4) application used in citation, 5) depth of discussion. Among those five assessment criteria, the researcher concludes that there are 3 competencies that can be used as reference indicators of assessment, including: 1) writing ability, 2) combining relevant research into paragraphs, 3) Critical thinking and writing skills.

Basically the orientation of a learning is a process, not a result. The level of remember, understand, apply included in low ability category of thinking, students will be able to create when they have the ability to analyze and evaluate as a form of critical thinking skills. As expected with the application of research-based learning this will occur a shift in the level of students' thinking ability, from low-level thinking processes to higher-order thinking processes (Krathwol, 2002). In addition, the education level of of this research sample is the Master of Economics Program students with postgraduate level, which at this level students should have a higher order thinking skill level.

Based on the results of the research, there are improvements in the 3 aspects of students' ability related to experiments conducted by implementing research-based learning. The first aspect is students ability to write, the results show that there is an increase in the students ability in writing. The average writing ability of students increased by 30.3%, so the students ability in writing is 68.6% in the category of quite good. This result can be seen from the task of scientific work done by the students. The second aspect of combining relevant research into a series of paragraphs. In this aspect there was an increase in the students' ability up to 46.5%. It can be concluded that the ability improvement amount 22.5% is characterized by the ability in constructing the words in theoritical review on students' scientific writings are categorized well. The third aspect is the ability to think and write critically, research results show there is an increase in the students ability to think and write critically. The final result of students' critical thinking and writing skills is 67.6%.

Based on the experiment implemented, it can be concluded that the research based learning model have improved the students' scientific thinking ability, but it has not achieved a significant improvement. This is proven by the test results obtained in classes of The Advanced of Economic Studies Strategy, Macroeconomic Advanced Theory, and International Accounting. Most of the students have only reached C3 level, that is apply level.

### IV. CONCLUSION

Based on the results of the discussion in this research can be drawn some conclusions are as follows:

1. Research-based learning is a form of learning model which is in the process of its implementation using scientific journals, research results and relevant research related to lecturing materials.
2. In general, the steps in research-based learning consist of the preparation stage, the methodology application stage and the research and publication stage.
3. The main problems faced by students in finding scientific journals are lack of ability to find journals that are relevant to the desired topic, and lack of knowledge related to indexed journal sources.
4. The main problems faced by students in making scientific writing such as lack of motivation and experience for scientific writing, lack of understanding of students about the rules of scientific writing well and correctly, difficulty in avoiding plagiarism and lack.
of ability in using supporting applications in writing such mendeley.

5. The ability to write scientific students of the Master Program of Economic Education FE UNP especially on The Advanced of Economic Studies Strategy, Macroeconomic Advanced Theory, and International Accounting is still relatively low. This is reflected in the scientific writings of students who have not been in accordance with applicable standards of scientific writing rules.

V. SUGGESTION

Based on the results and discussion of research described previously, there are several things that can be recommended, there are:

1. There should be a follow-up to improve the writing skills of students scientific Master Program of Economic Education FE UNP.
2. Lecturer of the courses should provide further insight on how to cite a scientific journal to improve students’ ability in writing a scientific article.
3. It is suggested to give the training for students in using the supporting software in scientific writing as Mendeley etc.
4. Students are required to write a scientific journal continuously to improve the experience of scientific writing.
5. The college should provide a medium for students to acquire journals and scientific articles that were indexed and reliable.

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Assessment of Physico-chemical And Trace Metal Parameters of Reticulated Borehole Water In Abeokuta Metropolis Ogun State, Southwestern Nigeria

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Abstract: Borehole water quality services rendered to the people of the community within Abeokuta Metropolis were assessed. The study aims at determining the concentration of physico-chemical and trace metal parameters present in the water been supplied. Thirty (30) water samples were collected with a sterilized bottle from borehole taps and were labelled according to sampling location. The chemical parameters analysed are Hydrogen ion Concentrate (pH), temperature, conductivity (EC), total dissolved solids (TDS), total alkalinity, total hardness and major cations which includes sodium (Na), calcium (Ca), magnesium (Mg) and potassium (K) as well as major anions comprising of bicarbonate (HCO3), chloride (Cl), sulphate (SO4) and nitrate (NO3), and were later taking to the Laboratory for chemical tests. The spatial locations of each sampled point were determined with the use of handheld GPS and further analysis was carried out to derived the location map. The result of the laboratory analysis showed that all physiochemical and trace metal values fall within the standard limits of the Standard Organisation of Nigeria (SON) and World Health Organisation (WHO). The results of the correlation analysis showed positive and strong significant relationship between parameters studied.

Keywords: Physiochemical parameters, Anions and cations, Correlation Analysis, Significant relationship

I. INTRODUCTION

Water is necessary for man’s developmental health as well as animals and plants growth. Many developing countries are facing changes of ground water potential which leads to other source of portable water. The preference for ground water to surface water must be due to the purification of the latter prior to distribution [1]. Although it is easily accessible from lakes, rivers streams and springs, but borehole water are of better quality. Access to water is widely accepted the world over as a basic human right. A reticulated borehole water system is water system that pumps water to a reservoir from which it is distributed to other standing pipes with a community. The Dublin Conference in 1992 asserted that “it is vital to recognize first the basic right of all human beings to have access to clean water and sanitation at an affordable price” [2]. The contamination of drinking water by diseases-causing microorganisms (pathogens) remains the most widely recognised and important acute threat to human health. [3]. Water for human consumption must be free from all objectionable odours, turbidity, taste, enteric pathogenic bacteria or their indicators and must not fluctuate in its quality.

The human body is made up of 55% to 78% water depending on body size [4]. To function properly, the body requires between one and seven liters of water per day to avoid dehydration; the precise amount depends on the level of activity, temperature, humidity, and other factors. Most of this is ingested through foods or beverages other than drinking straight water. It is not clear how much water intake is needed by healthy people, though most advocates agree that 6–7 glasses of water (approximately 2 litres) daily is the minimum to maintain proper hydration [5]. Drinking water quality has a micro-biological and a physico-chemical dimension. There are thousands of parameters of water quality. In public water supply systems water should, at a minimum, be disinfected - most commonly through the use of chlorination or the use of ultra violet light - or it may need to undergo treatment, especially in the case of surface water. For more details please see the separate entries on water quality, water treatment and drinking water.

WHO, 1997 [6] stated that about 2.3 billion people worldwide have mortality and morbidity associated with water related ailments

Ion exchange systems use ion exchange resin- or zeolite-packed columns to replace unwanted ions. The most common case is water softening consisting of removal of Ca2+ and Mg2+ ions replacing them with benign (soap friendly) Na+ or K+ ions. Ion exchange resins also used to remove toxic ions such as nitrate, nitrite, lead, mercury, arsenic and many others. [7, 8, 9, 10].

It is worthy of that the total alkalinity value of water is an indication of the acid – neutralizing ability and is determined by how much carbonate, bicarbonate and hydroxide is present. Excessive alkalinity values may cause scale formation, the water may also have a distinctly flat, unpleasant taste [11]. pH as a primary standard parameter has no health implication [12]. An elevated TDS concentration is not a health hazard. It may be an indicator of the concentration of dissolved ions which may cause the water to be corrosive, salty or brackish, resulting in scale formation [11]. Although a very TDS concentration is not a health hazard as TDS concentration is a secondary drinking water standard and is more of an aesthetic rather than a health hazard. [11]. Orewole, et al., 2007 [11] stated that total dissolved solids (TDS) comprises inorganic salts (principally calcium, magnesium,
potassium, sodium, bicarbonates, chloride, and sulphates) and some amounts of organic matter that are dissolved solids while total alkalinity value of water is an indication of the acid – neutralizing ability of the water and is determined by how much carbonate, bicarbonate, and hydroxide is present. Ca and Mg are essential elements needed in good quantity by the human body while Ca is used in teeth and bone formation; it also plays an important role in neuromuscular extractability, and for good functioning of the contractibility and also for blood coagulability [13]. The Scientific Committee for Food and the Committee on dietary reference intake has recommended a daily Ca intake of between 700 and 1000mg for adults. Although Ca alongside Mg is a major contributor to water hardness, however calcium is important for strong teeth and healthy bones. It also plays an important role in neuromuscular extractability and for good functioning of the conducting myocardial system, heart and muscle contractibility and also for blood coagulability. [13]. High chloride content in drinking water may indicate possible pollution from human sewage, animal manure or industrial wastes while high sulphate concentrations though not a significant health hazard, can cause scale formation and may be associated with a bitter taste in water that can have a laxative effect on humans and young livestock [11].

The result of the analysis revealed chloride levels to be within the maximum acceptable limit of 250mg/l by [14] this was not a surprise as high chloride content in water could indicate possible pollution from human sewage, animal manure or industrial waste [11]. The health implication of high concentration of Cu is gastrointestinal disorder while that of Cr is cancer [12]. Nkono et al, 1998 [15] stated that K that ranged from 1-3mg/l has no health-based in drinking water standards. Therefore, this study assesses the physio-chemical parameters, heavy metals and trace element within Abeokuta Metropolis Ogun State, Nigeria compared to SON and WHO standard limits.

II. DESCRIPTION OF STUDY AREA
The study area “Abeokuta” Ogun State, Nigeria was founded by the Egbs in 1830. Abeokuta Metropolis lies between geographic location of Latitude 7° 5’ N to 7° 20’ N and longitude 3° 17’ E to 3° 20’ E. Abeokuta has a population growth rate of 3.5 % of the total population of the state. Abeokuta has a total annual rainfall of about 1270mm and the altitude is about 300m above mean sea level.

vi. The pH/EC/TDS meter (used to obtain the values of pH, conductivity and total dissolved solids)

vii. Measuring cylinders and beakers (used during digestion for measuring both samples and chemicals)

viii. 100ml plastic bottles (used to convey digested samples from point of digestion to point of analysis)

ix. Atomic Adsorption Spectrophotometer (AAS) (used to determine the values of heavy metals)

x. Flame photometer (used to determine the values of major cations).

Sampling Procedure/Data processing
Reconnaissance survey of the study area was carried out in other to familiarise with the study area as well in order to be able to design adequate sampling strategy. After the reconnaissance, the field observation followed by collecting thirty (30) water samples with a sterilized bottle from borehole taps. Sample bottles were labelled according to sampling location for easy identification and proper collation of results. The chemical parameters analysed are pH, temperature, conductivity (EC), total dissolved solids (TDS), total alkalinity, total hardness and major cations which includes sodium, calcium, magnesium and potassium as well as major anions comprising of bicarbonate, chloride, sulphate and nitrate and were later taking to the Laboratory for chemical tests. Image of the study area was georeferenced from the coordinate x,y,z of all sampled point and digitized using Google earth imagery (Pro) and processed using ArcGIS 10.2 software figure 1.

Statistical Methods
EVIEWS 9 version statistical software was used to analysed the results of the laboratory test to show the inter-relationship (correlation) between parameters studied. Pearson correlation ‘r’ statistics at 2 tailed significant levels was used. The ‘r’ statistic value for ‘r’ at 1% = 0.463, and at 2% = 0.423. These values...
were compared with the computed analysis table (3 &4) to
determine their correlations.

**Chemical Analysis Procedures**

**Atomic Adsorption Spectrophotometer**
Atomic absorption spectroscopy (AAS) determines the presence
of metals in liquid samples. The instrument measures the change
in intensity.

**Determination of Total Alkalinity**
A 50ml of the water sample was put in a conical flask. 2 drops of
phenolphthalein was added to the sample which gives an orange
colour. The solution was titrated against H2SO4.
Total alkalinity = titre value x 20

**Determination of Total Hardness**
The method used involves the use of disodium ethylene diamine-
tetraacetate (EDTA) in the examination of water. The titre value
was taken and multiplied by 20 to give the total value in mg/l.

**Determination of Calcium Hardness**
50ml of the sampled water was taken into a conical flask. 2ml of
0.1N NaOH was added to standardize the sample water and
afterwards, Ig murexide indicator was also added. The sample
result give purple colour and then it was titrated against EDTA
titrant to give a lilac colour. The titre value was taken and it was
multiplied by 20 to give calcium hardness in mg/l.
Calcium Hardness = titre value x 20

**Determination of Magnesium Hardness**
Total Hardness in water is mainly caused by the presence of
calcium ion and magnesium ion, magnesium hardness can be
gotten by simply subtracting the value of the calcium hardness
from the total hardness i.e.
Magnesium hardness = total hardness – calcium hardness

**Determination of Sodium and Potassium**
Flame photometry was used in the determination of sodium and
potassium in the water samples. Therefore, for sodium,
conversion factor is;
200mole/litre = 4mole/litre  
50
While that of potassium is
10mole/litre = 0.2mole/litre  
50
Therefore actual concentration is then measured and the value
multiplied by the conversion factor for each substance. The
instrument is then shut off by reversing the setup order after use
[16].

**Determination of Chloride**
This involves the use of silver nitrate as titrant and potassium
chromate as indicator. The titre value is then read and multiplied
by 5 to give the result in mg/l.

**Determination of Bicarbonate**
25ml of the water sample was pipetted into a 250ml conical
flask. To the solution, 3 drops of methyl orange indicator was
added and then titrated against HCl until the solution turns from
orange to red.

Calculation:
HCO3 (mg/l) = Titration value x 0.1 x 1000 x 61  
ml of the sample taken

**Determination of Sulphate**
EDTA method was used to determine the sulphate present in the
water sample. First, the total hardness of the water sample is
determined by titration with EDTA. The time taken for the
titration should not exceed five minutes from the time that buffer
solution was added (Ademoroti, 1996).
Calculation

\[ \text{Sulphate (SO}_4^{2-} \text{)} = 961 \left( V_2 + V_3 - V_1 \right) \text{ mg/l} / V_4 \]

where, 
\[ V_1 = \text{Volume of sample taken (ml)} \]
\[ V_2 = \text{Volume of N/50 EDTA equivalent to the hardness in 1ml of the sample (ml)} \]
\[ V_3 = \text{Volume of N/50 barium chloride solution added (ml)} \]
\[ V_4 = \text{Volume of N/50 EDTA used in the final titration (ml)} \]

**Determination of Nitrate**
The NO3 value was determined by extrapolation from calibration
curve [16].

**Calculation:**
\[ \text{NO}_3 (\text{mg/l}) = \text{NO}_3 \text{ read from curve x D} / \text{ml of sample} \]
D = dilution factor for the sample

**IV. RESULTS**
The entire result of the research is given in Tables (1 – 4). The
results include those of the physico–chemical and trace metal
analysis. The result for temperature ranged from 25.9°C and
27.2°C, while the result of pH ranged from 5.68 – 7.46 the
minimum and maximum pH recorded at Asero and Sodeke
respectively. The EC result ranged from 117μS/cm - 210μS/cm
while that of TDS was between 65mg/l and 111mg/l. Total
alkalinity and Total hardness had values ranging from 9mg/l –
34mg/l and from 28mg/l -58mg/l (table 1). Table 2 present the
results of the major cations and it revealed that Na and Mg values
ranging from 4mg/l – 15mg/l and 13mg/l – 42mg/l respectively.
Ca values ranged from 18mg/l – 44mg/l while K values ranged
from 0 – 9mg/l. For anions, HCO3 was not detected in any of the
water samples. SO4 ranges from 7.27-355.66mg/l and also
recorded the highest concentration among the anions at Quarry
sample 28 (S28). NO3 values ranges from between 0.019mg/l and
0.218mg/l. CI values ranged from 15mg/l – 48mg/l. SO4 values
were considerably higher (except for 14 samples S1,3, S7,11, S14,15,
S24,26, & S39).

Table 3 presents the correlation analysis of physio-chemical
parameters of the study. From the results, TDS showed positive
and strong significant relationship with EC with (r = .956), Total
Alkalinity also showed positive and strong significant
relationship with EC and TDS with (r = .726, .694). Others
showed low and negative correlations. Table 4 presents the
results of correlation coefficient matrix of the trace metals. From
the results it showed that SO42- is correlates with Ca2+ with (r =
.500), Total Hardness showed significant relationship with Ca2+,

http://dx.doi.org/10.29322/IJSRP.8.5.2018.p7765  www.ijsrp.org
Mg$^2+$ mg/l, SO$_4^{2-}$ with (r = .558, .525, .423). Others showed weak, low and negative correlations table 3 & 4. Chart (1&2) presents the trend in variation between the physiochemical parameters; temp, pH, EC, TDS and Total Alkalinity and chart 2 presents trend in variation between trace metal parameters; total hardness, Na$^+$, Mg$^{2+}$, Ca$^{2+}$, K$^+$, NO$_3^-$, Cl$^-$, HCO$_3^-$, SO$_4^{2-}$. Figure 2 presents the contour plot and 3D surface contour plot of sampling locations. Figure 3 presents the terrain slope in 3D wireframe of sampling locations.

Table 1: Sampled Locations, Coordinates and Laboratory results of Physio Chemical parameters of the study area

<table>
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<tr>
<th>Sample Code</th>
<th>Sample Location</th>
<th>Northing (m)</th>
<th>Easting (m)</th>
<th>Elevation</th>
<th>Temp. oC</th>
<th>pH</th>
<th>EC μS/cm</th>
<th>TDS mg/l</th>
<th>Total Alkalinity mg/l</th>
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http://dx.doi.org/10.29322/IJSRP.8.5.2018.p7765  www.ijsrp.org
Figure 2: contour plot and 3D surface contour plot of sampling locations

Figure 3: Terrain slope in 3D wireframe of sampling locations.

Table 2: Laboratory analysis of Trace Metals of the study area

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<th>Sample Code</th>
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<th>Mg²⁺ mg/l</th>
<th>Ca²⁺ mg/l</th>
<th>K⁺ mg/l</th>
<th>NO₃⁻ mg/l</th>
<th>Cl⁻ mg/l</th>
<th>HCO₃⁻ mg/l</th>
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Table 3: Correlation coefficient matrix of physio-chemical Parameters of the study area

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* and **Represents 0.010 and 0.020 at two tailed significance level

Table 4: Correlation coefficient matrix of Trace Metal Parameters of the study area

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<td>K (mg/l)</td>
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<td>0.367</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mg²⁺ (mg/l)</td>
<td>0.191</td>
<td>-0.184</td>
<td>-0.256</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Na (mg/l)</td>
<td>0.044</td>
<td>0.407</td>
<td>-0.077</td>
<td>0.132</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO₃ (mg/l)</td>
<td>0.092</td>
<td>-0.148</td>
<td>-0.076</td>
<td>0.023</td>
<td>0.355</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SO₄²⁻ (mg/l)</td>
<td>0.500*</td>
<td>-0.147</td>
<td>-0.544</td>
<td>0.393</td>
<td>0.416</td>
<td>0.084</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Total Hardness (mg/l)</td>
<td>0.558*</td>
<td>-0.106</td>
<td>-0.256</td>
<td>0.525*</td>
<td>-0.109</td>
<td>-0.085</td>
<td>0.423**</td>
<td>1</td>
</tr>
</tbody>
</table>

* and **Represents 0.010 and 0.020 at two tailed significance level

Chart 1: Trend in variation between physiochemical parameter studied
Discussion of results

The results is of the pH from the study were compared with SON standards for drinking water quality (6.5 – 8.5), the values for pH were all found to be within the maximum acceptable limit except for sample 15 (S15) in Asero which recorded a value of 5.68 lower than the SON standard. The pH value of water samples suggests that they tend towards acidity where the Ph value was 5.68 and tend towards alkalinity at 7.46. However, this does not give a cause for alarm since pH as a primary standard parameter has no health implication [12]. pH as a primary standard parameter and has no health implication [12]. The range of values for EC and TDS 117μS/cm - 210μS/cm and 65mg/l and 111mg/l also fell within acceptable limit of (100μS/cm and 500mg/l respectively) set by SON. An elevated TDS concentration is not a health hazard as TDS concentration is a secondary drinking water standard and is more of an aesthetic rather than a health hazard. It may be an indicator of the concentration of dissolved ions which may cause the water to be corrosive, salty or brackish, resulting in scale formation [11]. The values for total hardness and total alkalinity fell within the allowable limit of 150mg/l set by SON and 100mg/l by WHO respectively while excessive alkalinity values may cause scale formation, the water may also have a distinctly flat, unpleasant taste [11]. Ca ranges from 18 mg/l -44 mg/l. Considering the results for Na and Mg, Na values were below the maximum acceptable limit of 200mg/l set by SON however the values for Mg were outrageously higher than the 0.2mg/l and 0.4mg/l set by SON and WHO respectively. Although Mg alongside Ca are major contributors to water hardness, Mg is an essential element needed in good quantity by the human body [13], therefore this does not give a cause for alarm. Ca had values that were within the acceptable limit of 50mg/l set WHO [11], however there is no health-based drinking were standards for K [15]. Very low concentrations were recorded for NO3 which is very good; it had values between 0.019mg/l and 0.218mg/l. The health implication associated with high concentrations of NO3 especially in young children is the blue baby syndrome also known as Metamoglobinemia which can cause death in the children while high chloride content in drinking water may indicate possible pollution from human sewage, animal manure or industrial wastes [11]. Cl values ranged from 15mg/l – 48mg/l. SO4 values were considerably higher (except for 14 samples S1, S3, S7, S11, S14, S15, S24, S26, & S29) that are lower than the SON and WHO limits of 100mg/l and 250mg/l though, there is no health impacts recorded for high sulphate intake [12]. High sulphate concentrations though not a significant health hazard, can cause scale formation and may be associated with a bitter taste in water that can have a laxative effect of humans and young livestock [11]. The high occurrence of sulphate is attributed to the Aluminium Sulphate (Al2(SO4)3) used as a coagulant in water treatment. NO3 and Cl both had values that were within the acceptable limits of 50mg/l and 250mg/l by SON and WHO respectively. Excessive alkalinity values may cause scale formation, the water may also have a distinctly flat, unpleasant taste [11]. At 98% and 99% confidence level, significance relationships exist between parameters of physiochemical and trace metal studied. High correlations show that the parameters are derived from the same source [17].

V. CONCLUSION

The physiochemical and trace metal parameters of borehole water tap in thirty locations in Abeokuta were investigated. The results of the study showed that all bore tap water in all sampled locations were of good quality and portable for drinking as the values of physiochemical parameters were within the Standard Organisation of Nigeria SON and World Health Organisation WHO acceptable limit standard. Breaking of reticulated pipe, waste dump, geological formation, seepage of surface runoff, are likely the major sources contamination as some trace metals showed high value. It is therefore necessary to take cognizance of the aforementioned major source of contamination.

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INFLUENCE OF FINANCIAL REPORTING INSTRUMENTS ON THE FINANCIAL PERFORMANCE OF ENVIRONMENTAL CONSERVATION NGO’S AT NAIROBI CITY COUNTY IN KENYA

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ABSTRACT: The general objectives of the study were to determine the influence of financial reporting instruments on the financial performance of environmental conservation NGOs at Nairobi City County, Kenya. Questionnaires as primary data collection tools and secondary data sheet for secondary data collection were used in data collection process and the data collected was analyzed using Multiple regression analysis (standard), descriptive analysis (means and standard deviations) and inferential statistics. Judgmental sampling technique was used to pick respondents due to the minimal number of employees in many NGOs and in this case only one respondent per NGO from the finance department was picked for this study. This resulted in a sample size of 15 Officers in the 15 Conservation NGOs. With the aid of SPSS (SPSS version 21.0) and Excel software, quantitative results were tabulated and presented in the form of charts, bar graphs, and narratives. The study found that financial reporting instruments disclosure had a positive and significant influence on the financial performance of environmental conservation NGO’s at Nairobi City County in Kenya. Thus financial reporting instruments disclosure influence financial performance of environmental conservation NGO’s at Nairobi City County in Kenya. Hence, NGOs should lean towards disclosure of financial and social and board disclosure to increase their performance. The study also found that financial reporting instruments presentation had a negative but marginally insignificant influence on financial performance of environmental conservation NGO’s at Nairobi City County in Kenya. The results also showed that financial reporting instrument recognition and measurement had a positive and significant influence on financial performance of environmental conservation NGO’s at Nairobi City County in Kenya. The research recommends that all NGOs should lean towards disclosure of financial and social and board disclosure to increase their performance. The NGOs should also publish financial statements frequently. The research also recommends that all NGOs should adopt financial reporting instrument recognition and measurement to increase their performance.

Key Words: instruments disclosure, instruments presentation, instruments recognition and measurement

1. INTRODUCTION
Ayom (2013) conceptualizes a Non-Governmental Organization (NGO) as an organization that is not state-funded and is not part of a government. NGO’s are organizations usually self-governing and independent of governments. Their activities are non – commercial and therefore not for profit. Their primary goal is to ensure that resources are effectively and efficiently used to achieve intended objectives. By virtue of this, Non-Governmental Organizations place much importance on performance.

The term Non-governmental Organization (NGO) defines an agency that has no government control but receives aid and donations from national and international agencies to carry out poverty alleviation activities on humanitarian sectors (Perkins, 2011).Capitalism and failure of states to meet the needs of its citizens is the beginning of NGOs. NGOs have not only grown in number and capacity, but also with regard to their political influence.

The World Bank reports that projects with some degree of civil society’ involvement increased from six percent in the late 1980s to over 75 percent in 2015 (World Bank Report, 2016). NGOs render welfare services and help in all such sectors of society, which aim to improve the life of the people in the community. NGOs can perform a major role because of having features for the promotion of micro-level development (Nzimakwe, 2012). NGOs are often seen as more trustworthy and credible than governments or private firms (Todaro, 2009). NGOs also provide public goods to sections of the population that might be socially excluded.

NGOs play a significant function in the world economy and social system in areas ranging from education, healthcare, disaster relief, social work and overall improvement of the human condition (Williams, 2015). They have to exercise accountability at its highest in

NON-GOVERNMENTAL ORGANIZATIONS (NGOS) ARE INCREASINGLY BECOMING LIKE BUSINESSES, FOR EXAMPLE, CHARITIES (2013) IN IRELAND REQUIRES ALL CHARITIES TO BE FORMALLY REGISTERED AND IN MOST CASES SUBMIT ANNUAL FINANCIAL REPORTS TO A REGISTRAR WHICH IS SIMILAR TO THE REQUIREMENTS OF THE NGO CO-ORDINATION BOARD IN KENYA. FROM MANAGEMENT ACCOUNTING POINT OF VIEW, NGOS CAN, OF COURSE, ADOPT BUDGETARY CONTROL AND OTHER PERFORMANCE MEASURES AS NORMALLY USED IN A BUSINESS.

KATEEBA (2000) STUDIED THE RELATIONSHIP BETWEEN GOVERNANCE AND QUALITY OF FINANCIAL REPORTING INSTRUMENTS IN NGOS IN KOSOVO. ACCORDING TO THE SURVEY DONE IN KOSOVO, THE GROUP QUESTIONS DEALING THE FINANCIAL FACTOR, WHEN ASKED ABOUT THEIR FINANCIAL RESOURCES BASED ON THE LAST FINANCIAL YEAR, MORE THAN 50% OF NGOS DECLARE THAT FOREIGN DONORS ARE THE ONLY OR MAIN FINANCIAL SOURCES OF THEIR PROJECTS AND ACTIVITIES.

ALSHEBEIL (2010) DETERMINED THE ROLE OF FINANCIAL REPORTING INSTRUMENTS IN ACHIEVING COMPETITIVE ADVANTAGE FOR JORDANIAN COMMERCIAL BANKS, AND HIS FINDINGS WERE THAT THERE IS A STATISTICALLY SIGNIFICANT IMPACT FOR FINANCIAL REPORTING INSTRUMENTS ON ACHIEVING THE DIMENSIONS OF COMPETITIVE ADVANTAGE BY IMPROVING THE PRICING PROCESS FOR BANKING SERVICES, REDUCING COSTS OF BANKING SERVICES, INCREASING THE SPEED OF PROVIDED SERVICES, AND INCREASING MARKET SHARE.

EL-DALABEEH (2012) AIMED TO IDENTIFY THE ROLE OF COMPUTERIZED ACCOUNTING INFORMATION SYSTEMS IN REDUCING THE COSTS OF MEDICAL SERVICES AT KING ABDULLAH UNIVERSITY HOSPITAL, AND HIS FINDINGS WERE THAT COMPUTERIZED ACCOUNTING INFORMATION SYSTEMS PLAY AN IMPORTANT ROLE IN REDUCING THE COSTS OF MEDICAL SERVICES AT KING ABDULLAH UNIVERSITY HOSPITAL COMPARED WITH NON-COMPUTERIZED SYSTEMS, WHICH USUALLY REQUIRE BIGGER COSTS AND DO NOT CONTRIBUTE TO REDUCING THE COSTS OF MEDICAL SERVICES.


NGO DONORS MUST, THEREFORE, BE INTERESTED TO KNOW HOW THE ORGANIZATIONS THEY FUND END UP SPENDING THOSE FINANCES: EITHER FOR PERSONAL GAIN OR FOR THE ATTAINMENT OF INTENDED PURPOSE (MOXHAM, 2009). STUDIES IN NGOS BY NASIR (2014) ARGUED THAT TRANSPARENCY AND ACCOUNTABILITY WOULD ONLY BE ACHIEVED IF NGOS ARE SERIOUS IN SUBMITTING THEIR ANNUAL REPORTS AND CONSISTENT WITH ITS FORMAT AND STRUCTURE. A RECENT REPORT FROM CIMA SUGGESTS THAT DEVELOPING FORMAL FINANCIAL REPORTING CAN HELP NGOS TO DEVELOP NETWORKS WITH GOVERNMENT DEPARTMENTS, FUNDING AGENCIES, OTHER SERVICE PROVIDERS AND CLIENTS (CIMA, 2014). THERE ARE CONTRADICTING VIEWS ON THE EXISTENCE OF EFFECTIVE MECHANISMS FOR CONTROLLING AND MONITORING NGO’S HAVE GROWN PHENOMENALLY IN RECENT YEARS BOTH IN NUMBERS AND SIZE.


AYOM (2013) OBSERVED THAT IN SPITE OF SUPPORT FROM DONORS, MOST NGOS ARE NOT PERFORMING WELL AS EXPECTED. FOR INSTANCE, MANAGEMENT SCIENCES FOR HEALTH (MSH); A SUDANESE NGO, COULD NOT ACCOUNT FOR $17,788 INTENDED FOR VULNERABLE PEOPLE OF SOUTH SUDAN Owing TO EVIDENCE OF FRAUDULENT ACTIVITIES. A KEY OBSERVATION WAS THAT MOST OF THE DONOR FUNDS TO NGOS FOR PROJECT IMPLEMENTATION LACKED ACCOUNTABILITY. AYOM (2013) MENTIONED THAT A REPORT CONDUCTED BY MSH BETWEEN 2001-2013 SHOWED CREDIBLE EVIDENCE OF FRAUDULENT ACTIVITIES PARTICULARLY INFLATED WORKSHOP ACTIVITIES/EXPENSES, FORGED RECEIPTS AND INSUFFICIENT SUPPORT DOCUMENTATION. THE REPORT FURTHER INDICATED THAT MANAGEMENT OVERSIGHT RESPONSIBILITY, A KEY CONTROL MEASURE WAS INEFFECTIVELY CARRIED OUT.

CHARITIES (2013) IDENTIFIES SEVERAL CHALLENGES FACING NGOS IN AFRICA. THOSE CHALLENGES ENTAIL LACK OF FUNDS, POOR GOVERNANCE, THE ABSENCE OF STRATEGIC PLANNING, POOR NETWORKING, POOR COMMUNICATIONS, LIMITED CAPACITY, DEVELOPMENT APPROACHES, RELATIONSHIPS WITH INTERNATIONAL NGOS AND POLITICAL INTERFERENCE. CHARITIES (2013) ADDS THAT VERY FEW NGOS HAVE STRATEGIC PLANS WHICH WOULD ENABLE THEM TO HAVE OWNERSHIP OVER THEIR MISSION, VALUES, AND ACTIVITIES. THIS LEAVES THEM VULNERABLE TO THE WHIMS OF DONORS AND MAKES IT DIFFICULT TO MEASURE THEIR IMPACT OVER TIME. MANY NGOS, LARGE AND SMALL, INTERVENE AT COMMUNITY LEVEL WITHOUT ANY COMMUNITY MAPPING AND IMPLEMENT PROJECTS WITHOUT DUE REGARD TO ONGOING COMMUNITY INITIATIVES.

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Although many donors view the NGOs as a better alternative to governmental agencies in getting services and assistance to those in need, especially in countries that are burdened by political favoritism and corruption (Cook, 2013), NGOs have also been involved in scandals that are a result of having less than credible governance structures. In the Eastern Economic Review (2012), the watchdog organization called Sustainability reported that accountability and transparency are issues on which several NGOs are found wanting (Annon, 2013).

As per the AIM program report for the quarter ending December 2015 that the financial reports that were produced by NGOs did not meet the quality standards set by the AIM Programme (AIM, 2015). For example, the AIM Programme required that all financial reports for the July – September 2015 quarter should have been submitted by 15 October 2005. However, by that date, only 55.14% of the expected reports had been received. It was not clear whether this situation of the poor quality of financial reports was a result of non-adherence to good governance requirements or not.

According to American Institute of Certified Public Accountants (2011), Value for Money (VfM) is the term used to assess whether or not an NGOs agency has registered a good or bad financial performance. That is, whether it has obtained the maximum benefit from the goods and services it acquires and/ or provides, within the resources available to it. VfM not only measures the cost of goods and services but also takes account of the mix of quality, cost, resource use, fitness for purpose, timeliness, and convenience to judge whether or not, when taken together, they constitute good value.

2. LITERATURE REVIEW

This section presents the past studies that have been conducted to explain the subject of this study. The empirical review is presented according to the following objectives of the study: to determine the influence of instruments disclosure on the financial performance of environmental conservation NGOs at Nairobi City County in Kenya, to assess the influence of instruments presentation on the financial performance of environmental conservation NGOs at Nairobi City County in Kenya, to establish the influence of instruments recognition on the financial performance of environmental conservation NGOs at Nairobi City County in Kenya and to establish the influence of financial reporting instruments measurement on the financial performance of environmental conservation NGOs at Nairobi City County in Kenya.

2.1 Financial Reporting Instruments’ Disclosure

Gibbins, Richardson, and Waterhouse (1990) defined financial reporting instruments disclosure as any deliberate release of financial (and non-financial) information, whether qualitative or numerical, required or voluntary, or via formal or informal channels. There are different means for companies to disclose information such as annual reports, conference calls, analyst presentations, investor relations, interim reports, prospectuses, press releases, websites, etc. Although on its own is not sufficient in the capital market context, the corporate annual report is considered a very important official disclosure vehicle, (Marston & Shrives, 1991; Epstein & Palepu, 1999; Hope, 2003) since other disclosure vehicles such as conference calls and interim reports can provide more timely disclosure. In addition, there are other sources of disclosure about companies’ performance including, for example, financial analysts’ reports and the press.

Beattie et al. (2004) classified proxies for disclosure quality provided in prior studies into subjective analysts’ ratings and semi-objective approaches. The semi-objective approaches include disclosure index studies, which are characterized in their study as a partial type of content analysis, and textual analysis. Textual analyses include thematic; meaning-oriented content analysis (where the whole text is analyzed), readability studies and linguistic analysis. This approach omits a number of other proxies of disclosure employed in prior studies that cannot be classified as either subjective analyst’s ratings or semi-objective approaches such as the existence of American Depository Receipts (ADR), disclosure frequency, management forecasts, attributes of analysts’ forecasts and many others.

Achoki and Kule (2016) assessed the effect of voluntary disclosure on the financial performance of commercial banks in Rwanda by taking a case study of selected banks in Rwanda. This study adopted a descriptive research design. The study took a sample of 14 commercial banks in Rwanda. Census approach was used to determine the sample size. Data was collected through developing a disclosure index consisting of 47 disclosure items. Secondary data was collected using documentary information from Banks annual accounts for the period 2011 to 2015. Data were analyzed using multiple linear regression models. Results revealed that a strong relationship exists between the voluntary disclosure, firm size and financial performance.

Gatimbu and Wabwire (2016) studied the effect of community involvement disclosure (CID) on the performance of firms listed at Nairobi Securities Exchange in Kenya. Panel data was collected from annual reports and financial statements of listed companies at the Nairobi Securities Exchange. Content analysis of sampled listed companies’ annual reports was undertaken to examine Community Involvement disclosure practices. A checklist of Community Involvement disclosure items and categories was developed and Community Involvement disclosure indices computed. The target population of the study was 61 listed companies. The sample size was 32 listed companies. Findings reveal that community disclosure with P-value <0.05 has a positive significant difference in the mean financial performance. Size and leverage have no significant moderation.

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Wangari (2014) investigated the effect of voluntary disclosure on the financial performance of commercial banks in Kenya. The study adopted a descriptive research design with a study sample of 42 commercial banks in Kenya and the data was collected by developing a disclosure index consisting of 47 disclosure items. Secondary data was collected from annual reports of the 42 commercial banks for a period of 6 years from 2008 to 2013. Data were analyzed using multiple linear regression models. The study found a positive relationship between financial, forward-looking and board and social disclosure and return on equity. On the other hand, the study found a negative relationship between general & strategic disclosure and return on equity this means that a 1% increase in strategic disclosure leads to a 20.2% decrease in return on equity of a firm. The study concluded that firms should lean towards disclosure of financial and social and board disclosure to increase their performance.

2.2 Financial Reporting Instruments’ Presentation

Lopes, Cerqueira, and Brandao (2011) analyzed whether financial statements presentation produces any impact on firm performance by use of accounting data. The researchers used the abnormal accruals methodology to evaluate accounting quality and ROA to determine firm performance. This is important because accounting information guides investment decisions (Bradshaw et al., 2004 and Verdi, 2006). For 17 European countries, findings confirm the mechanical relationship between accruals and accounting measures of performance: income increasing abnormal accruals, which mean decreasing accounting quality, will increase ROA and vice-versa. In addition, the lag effect is analyzed, as per Chan et al. (2004). The results revealed that financial statements presentation didn’t have a significant impact on performance as investors and other stakeholders look deeper into logistics and not just the realized performance.

Heykala and Iswandi (2013) investigated whether the presentation of special items within the financial statements reflects the firm’s underlying economic performance or opportunism. The researchers examined the presentation of recognized special items either as a separate line item on the income statement or aggregated within another line item with disclosure only in the footnotes. The study was motivated by a standard-setting interest in performance reporting and financial statement presentation, as well as prior research investigating managers’ presentation choices in other contexts. The study found evidence consistent across a range of specifications that special items highlighted on the income statement are more transitory than those revealed only in the footnotes.

Mokaya (2012) researched on the effect of financial statements’ presentation on the performance of microfinance institutions at Kisii region in Kenya. The descriptive research design was adopted and secondary data only was used. A sample size of 12 microfinance institutions was purposively selected for analysis based on the existent from 2010 to date. The hypothesis was tested using correlation coefficient. The findings revealed that the financial statements’ presentation can positively impact on financial performance of microfinance institutions; this was supported by 92% of the respondents.

Akinyi (2011) investigated the influence of instruments presentation on the performance of banking industry in Kenya. The study used a population of all the 43 listed banks in Kenya. The research adopted descriptive research design. The study used secondary data sources. The research hypothesis was tested using chi-square (X2). The findings revealed that instruments presentation was directly and positively related to the performance of listed banks since many investors, customers and other stakeholders gained confidence through numbers which portrayed stability of these banks.

2.3 Financial Reporting Recognition and Measurement

It is possible to use a model to determine the expected value of future cash flows, and while the future cash flows themselves do not exist, the currently-held expectations do, and so they are in principle measurable. Barker (2011) cautions that these expected values, based upon forecasts, are ‘not a measurement of wealth unless one defines wealth as a state of mind,’ and an important question is therefore whether (and if so in what way) it is appropriate to base the balance sheet valuation of liabilities upon measures of expectations.

It is in this context that the market mechanism comes into play as a measurement instrument because market prices provide observable and verifiable evidence of currently-held expectations. In effect, the market transforms subjective expectations about the future into currently observable amounts. In contrast, certain other types of expectation, such as those underpinning management’s forecast of the cost of performance, are not directly observable in practice, meaning that they cannot be measured and that they are subjective and nonverifiable (Nagel, 1986).

Nnанami, Onyekwelu, and Ugwu (2017) evaluate the effect of financial instruments’ recognition and measurement on the financial performance of listed manufacturing firms in Nigeria. Firms used for the study were chosen from the Nigerian brewery sector. Data were sourced from the financial statements of three sampled firms. Data were analyzed using the ordinary linear regression. The study reveals that financial instruments recognition and measurement had a positive and significant effect on the financial performance of firms studied. Following the findings, the study recommends that firms in Nigeria should invest a reasonable amount of their earnings on sustainability activities while specific accounting templates are articulated by professional accounting regulating bodies to guide firms’ reportage on sustainability activities. The Financial Reporting Council of Nigeria (FRC) and others alike should make
sustainability reporting compulsory while adequate sanctions are spelled out and enforced on defaulting organizations to serve as a deterrent.

According to Barker (2011), forecast error is not measurement error; it is instead the difference between a current forecast and a future realization that does not yet exist. And to the extent that any given forecast is a matter of individual opinion about something that is unobservable, it is subjective and cannot be verified. Moreover, while measurement can be viewed, in the simplest case, as relating to a single, measurable amount, forecasts can be conceptualized as a probability distribution, making the perceived economic value of the asset or liability equal to expected value. The values determined by measurement and by forecasting are therefore different in nature.

Kaufman, Chapman, and Allen (2013) determined the effect of performance recognition on employee engagement and organizational performance. The study employed survey research design with a review of both primary and secondary data sources. Primary data was collected by use of focus groups while secondary data was collected from published sources. A sample of 2,415 employees in 10 countries was used. This survey solicited respondents’ self-assessment of their own engagement at work, including 18 questions related to their drive and determination, relationships at work, personal standing within the company, and connection to the company. The study examined respondents’ self-ratings on individual topics/questions as well as an aggregated “engagement index.” Respondents whose average score is 8 or higher (57 percent) on a 0 to 10 scale are considered highly engaged. The study revealed underlying insights about the best practices that companies employ to use performance recognition to achieve these results. The study found that recognition and measurement affected performance positively resulting in better employee engagements and more adherence to accounting principles and guidelines.

Mohamed (2015) assessed the effect of financial reporting recognition and measurement on performance. The study was based on Profit and loss sharing theory and Islam Islamic banking theory and theory of interest. The study used descriptive survey method to investigate the effect of Islamic banking product on the financial performance of commercial banks in Kenya. The population of this study comprised seven commercial banks offering Islamic banking products in Kenya. Secondary data was used in this study; specifically, the study used financial statements the data was coded using SPSS (version 21). Descriptive statistics were used to summarize the data. Pearson moment correlation was conducted to establish the linear relationship between study variables. Regression analysis was conducted to establish the nature of the relationship. The study found a positive correlation between the financial performance of IFIs and Islamic financial instruments recognition and measurement. The study concludes that all the Islamic financial instruments had a positive impact on the performance of Commercial Banks in Kenya, the quality of the assets, larger sized banks had a positive influence on the financial performance of Islamic banks in Kenya and that high levels liquidity had a negative impact on financial performance of commercial banks. The research recommends that Islamic financial institutions need to continue offering Islamic financial instruments as they were all found to positively influence the financial performance of Islamic banks.

2.4 Financial Performance of NGOs

NGOs are striving to gain the confidence of their donors and internally create a committed organization. Many NGOs are proactively deciding what more can they inform their stakeholders. The disclosures in the financial statements are better and if any person from anywhere in the world is able to understand the financial statements then the objective of transparency is achieved. In order to align the activities with their objectives and to meet the donor accountability NGO’s need to measure and monitor performances of various groups. An NGO’s performance can be measured by how well it achieves the goals it has set itself and at what efficiencies. The two principal functions of performance measurement systems are, firstly, to ensure that organizations are held accountable for their performance and actions; and secondly, to facilitate learning and improve performance. NGO’s can measure their performance by such ratios as fundraising ratios that measure how much an organization has spent in fundraising activities vis a vis the amount raised. Budget burn rate ratio measures how much an organization has utilized against the annual budget. Such an integrated view would offer a comprehensive link between several units within an NGO (right from resource generation unit to program management unit). Such a comprehensive framework is highly recommended (Epstein & McFarlan, 2011).

Ouko, Nyonje, and Okeyo (2017) researched on the financial domain as a tool in measuring Non-Governmental Organizations (NGOs) performance in Kenya. The study administered 64 questionnaires to all top management of NGO’s. The results revealed four components of financial domains in performance measurement. Accounting processes, audit processes, procurement and asset building, and budget flexibility and adjustment emerged as key issues of finance in performance evaluation base on variance accountability generated by principal axis factor analysis. The study concludes that financial perspective of performance measurement within NGOs would prioritize accounting, audit, procurement and asset building and budget flexibility and adjustment in that order. It recommends that NGO’s and stakeholder need to consider social returns on investment as a quantitative profit equivalent measure of performance.
2.5 Critique of Literature and Research Gaps

It was noted from the study that majority studies have been done on the context of developed nations and very few studies on the context of developing nations thereby generating gaps on the researchers’ empirical content which can be confined and generalized to developing economies. Achoki and Kule (2016) assessed the effect of voluntary disclosure on the financial performance of commercial banks in Rwanda. This study analyzed data using multiple linear regression models. Results revealed that a strong relationship exists between the voluntary disclosure, firm size and financial performance. Jeon (2015) argues that because the dependent variable is one in regression analysis, measurement error occurs. These possible errors in measurement might result in overall faults in the technique and thus making regression not a very adequate analysis tool. However, depending on the study, the model can be considered ideal in some circumstances as it shows optimal results when relationships between the independent variables and the dependent variable are almost linear.

The study also establishes the very minimal presence of literature on financial reporting instruments both on the national and international context. The existing studies have not been able to fill the current gap on the influence of financial reporting instruments on the performance of environmental conservation NGOs at Nairobi City County in Kenya. This study, therefore, sought to fill this gap.

3. RESEARCH METHODOLOGY

A research design is a presentation of the plan, structure or strategy of the investigation, which seeks to obtain or answer various research questions. Kothari (2008) define research design as a detailed plan on how the research will be conducted. Donald (2006) observes that a research design is the structure of the research. It is the “glue” that holds all the elements in a research project together. Gall et al. (2003) define a research design as a plan for collecting and utilizing data so that the desired information can be obtained with sufficient precision. Cooper and Schindler (2008) observe that a research design is a plan and structure of investigation formed to provide answers to research questions.

This study used a descriptive research design. Mugenda and Mugenda (2008) indicated that descriptive research designs are conducted in communities to establish the extent of a range of issues such as health, nutrition, education, crime etc. They argue that in descriptive designs, variables with greater dispersion indicate disparities within the community and provide important clues regarding the issues that the investigator should focus on. Kothari (2001) observes that a descriptive research design is used when one wants to get information on the current status of a person or an object. The study described the financial reporting instruments’ influence on the performance of environmental conservation NGOs in Nairobi Kenya.

Lumley (2004) defines population as a larger collection of all subjects from where a sample is drawn. It refers an entire group of individuals, events or objects having common observable characteristics (Mugenda & Mugenda, 2006). Cooper and Schindler (2008) observe that a population is the total collection of elements about which one wants to make inferences. A similar view is also expressed by Kothari (2006). The total target population of respondents was 15 environmental conservation NGOs based at Nairobi City County in Kenya. There are a total of 15 environmental conservation NGOs based at Nairobi City County in Kenya (Kenya Conservation Service Report, 2016).

A sample is a set of individuals selected from a population and is usually intended to represent the population in a research study (Neuman, 2000). The sampling frame is a list of all elements of this study from which the sample will be drawn. The sampling frame was drawn from the Kenya Conservation Service Report of 2016. According to the Kenya Conservation Service Report (2016), there are a total of 15 environmental conservation NGOs based at Nairobi City County in Kenya. A census study was done on all the 15 environmental conservation NGOs based at Nairobi City County in Kenya. Judgmental sampling technique was used to pick respondents due to the minimal number of employees in many NGOs and in this case, only one respondent per NGO from the finance side will be picked for this study. The researcher picked respondents from the finance team as they are believed to hold the essential information with regard to financial reporting instruments and the performance of this conservation NGOs. The total sample size was thus 15 respondents.

This study collected primary data by use of semi-structured questionnaires. The use of a questionnaire is cost effective, less time consuming as compared to the use of the interview. Kothari et al. (2004) argue that data collected through the use of a well-structured questionnaire is easy to analyze. To be successful, the questionnaires were short and simple (Kothari et al., 2004). Semi-structured questionnaires were used to obtain data from the respondents. Mugenda and Mugenda (2003), posit that when questions are presented in a matrix form, they are easier to complete and hence the respondents are unlikely to be put off, an advantage of structured questionnaires.

Space is also used efficiently and it is easy to compare responses given to different items. This ease of comparability is advantageous to both the researcher and the respondent. On the other hand, unstructured questionnaires are ideal for variability enhancement. The
questionnaire was divided into three sections. Section A captured the general information of the respondents; section B covered the various variables i.e. the influence of financial instruments disclosure, financial instruments presentation and financial instruments recognition and measurement on the performance of conservation NGOs at Nairobi City County in Kenya. Secondary data also reinforced this study. Data was collected by semi-structured questionnaires that will be self-administered to respondents using the drop and pick later technique. Kothari (2008) observes that collecting data through the questionnaires saves time since it is possible to collect a huge amount of information especially when the population of interest is large. The questionnaires had both open-ended and closed-ended questions.

The questionnaires were self-administered to the respondents by the researcher through the drop and pick later method. All questionnaires were accompanied by an introduction letter which explains the purpose of collecting information. A pre-test was conducted to test the validity of the research instrument. The pilot study involved distributing a few samples of the research instrument to the respondents for their response and understanding of the questions to be analyzed. The pilot test constituted 3 respondents who were 10% of the sample size as recommended by Mugenda and Mugenda (2008). Ambiguity and irrelevant information noted in the questionnaire was modified for validity purpose. The respondents were requested to respond to the clarity of the questions presented to them.

Validity is the extent to which inferences made on the basis of numerical scores are appropriate, meaningful and useful. The validity of the study was assessed depending on the purpose, population and environmental characteristic in which measurement takes place (Britt, 2006). Kothari (2004), states that validity is the most critical criterion and indicates the degree to which an instrument measures what it is supposed to measure. Internal consistency reliability will be done after all items have been constructed (Kombo & Tromp, 2006). Cronbach alpha test was used to test for reliability of this study. In this study, if the alpha coefficient of correlation obtained is 0.7 or above, then the questionnaire was accepted as reliable to be used in the study (Boudens & Abbott, 2005). Field (2014) contended that Cronbach’s alpha value that is at least 0.70 is for a reliable research instrument.

Data analysis refers to the process of ordering, structuring and giving meaning to collected data (Mugenda & Mugenda, 2010). Collected data was edited to ensure accuracy and completeness, and then items will be coded and scored. Multiple Regression Analysis (Standard), Descriptive Statistics (means and standard deviations) and inferential statistics were used to analyze data. SPSS software (version 21.0) was adopted to assist in data analysis and presentation. The study used tables and charts to present the findings. The following regression model guided the study:

\[ Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon \]

Whereby:

- \( Y \) = financial performance of environmental conservation NGOs at Nairobi City County in Kenya
- \( X_1 \) = financial reporting instruments disclosure
- \( X_2 \) = financial reporting instruments presentation
- \( X_3 \) = reporting instruments recognition and measurement
- \( \beta_0 \) = Intercept
- \( \beta_1 \) to \( \beta_4 \) = Coefficient
- \( \varepsilon \) = error term

Other statistical tests were also applied in data analysis. To ascertain if two sets of data are significantly different from each other a t-test was conducted. Normality test was used to test for the normality of the dependent variable Y. The study conducted Shapiro-Wilk tests to test the normality of the dependent variable Y. In addition, Analysis of Variance (ANOVA) test was also conducted to analyze the amount of variation within each of the sample relative to the amount of variation between samples. This was considered important since it makes use of the test in terms of the sum of squares effect over sums of squares residual (Sekaran, 2008; Herbert, 2011).

Reliability of the measures was assessed with the use of Cronbach’s alpha. Cronbach’s alpha allows us to measure the reliability of the different categories. It consists of estimates of how much variation in scores of different variables is attributable to chance or
random errors. As a general rule, a coefficient greater than or equal to 0.7 is considered acceptable and a good indication of construct reliability. To assess the scales’ content validity, the researcher subjected the instrument to experts for review and advice.

Kombo and Tromp (2006) observe that data can be presented using statistical techniques, graphical techniques or a combination of both in order to come up with comprehensive conclusions. Quantitative data were presented using statistical techniques such as tables, pie charts, and bar graphs while qualitative data were presented descriptively.

4. DATA ANALYSIS, PRESENTATION, AND INTERPRETATION

4.1 Introduction
This chapter captured study results, interpretation, and presentation of the results obtained from the study. Descriptive and inferential statistics were used to analyze the study results with the view of documenting the findings.

4.2. Results of the Pilot Study
The study used Cronbach’s alpha coefficient to test for reliability of the instrument as indicated in the table below.

**Table 4.1: Results of the Pilot Study**

<table>
<thead>
<tr>
<th>Variable</th>
<th>α=Alpha</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instruments’ Disclosure</td>
<td>0.843</td>
<td>Reliable</td>
</tr>
<tr>
<td>Instruments’ Presentation</td>
<td>0.902</td>
<td>Reliable</td>
</tr>
<tr>
<td>Recognition and Measurement</td>
<td>0.879</td>
<td>Reliable</td>
</tr>
<tr>
<td>Financial Performance</td>
<td>0.865</td>
<td>Reliable</td>
</tr>
</tbody>
</table>

Table 4.1 shows the reliability results. All the statements were reliable since the cronbach alpha was above 0.7 which was used as a cut-off of reliability for the study. Therefore the internal consistency reliability of the measure was excellent. This indicates that the data was reliable since an alpha coefficient higher than 0.7 signifies that the gathered data has a relatively high internal consistency and could be generalized to reflect the respondent’s opinions on the study problem.

The result shows an overall Cronbach’s Alpha value of 0.872. The research instrument was therefore considered as reliable since it surpassed the minimum threshold of 0.7. Nunnly (1978) proposes 0.7 to be an acceptable reliability coefficient.

4.3 Response Rate
The study targeted a population size of 15 environmental conservation NGOs based at Nairobi City County in Kenya representing 15 respondents from which all filled and returned the questionnaires making a response rate of 100%. This response rate was satisfactory to make conclusions for the study. The total response rate was above the 51 percent response threshold for questionnaire surveys in social sciences (Pinsonneault & Kraemer, 1993) and thus the use of the collected data was considered reliable for this study.

4.3 Reliability Statistics
4.3 Diagnostic Tests for use of Regression Analysis
Prior to subjecting the data to inferential statistical analysis, the study conducted various diagnostic tests for use of multilinera regression model to assess whether the collected data violeted some key assumptions of regression models. These were Normality Tests, and Multicollinearity Tests.

Given multiple regression analysis, the study used Shapiro-Wilk to test for Normality of the residuals as shown in the table below.

**Table 4.2: Tests of Normality**

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Shapiro-Wilk</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.964</td>
<td>15</td>
</tr>
</tbody>
</table>

The P-Value is greater than 0.05, so there is no evidence of significance deviation from normality of the residuals.
Table 4.33: Tests of Multicollinearity

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
<th>Collinearity Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Coefficient</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>(Constant)</td>
<td>-4.015</td>
<td>1.162</td>
<td>-3.455</td>
<td>.005</td>
<td></td>
</tr>
<tr>
<td>Instruments Disclosure</td>
<td>.580*</td>
<td>.211</td>
<td>.473</td>
<td>2.750</td>
<td>.019</td>
</tr>
<tr>
<td>Instruments Presentation</td>
<td>-.184*</td>
<td>.189</td>
<td>-.175</td>
<td>-.974</td>
<td>.351</td>
</tr>
<tr>
<td>Recognition &amp; Measurement</td>
<td>.892*</td>
<td>.182</td>
<td>.922</td>
<td>4.896</td>
<td>.000</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Financial Performance

Based on the coefficients output collinearity statistics obtained VIF Values above, meaning that the VIF Value obtained is between 1 and 10 and Tolerance > 0.1, it can be concluded that there are no Multicollinearity symptoms.

4.4 General Information

4.4.1 Gender of respondents

The respondents were asked to indicate their sex to make the study gender sensitive. Their response is indicated in the table below.

Table 4.4: Gender of respondents

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>7</td>
<td>47</td>
<td>47</td>
<td>47</td>
</tr>
<tr>
<td>Female</td>
<td>8</td>
<td>53</td>
<td>53</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

The research study sought to establish the respondent’s gender distribution. From the findings above, the females were slightly above at 53% while the males at 47%.

4.4.2 Age bracket of respondents

To assess the response of the respondents, the respondents were requested to give their age, and the responses were as below.

Table 4.5: Age of respondents

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 30</td>
<td>4</td>
<td>27</td>
<td>27</td>
<td>27</td>
</tr>
<tr>
<td>31-40 years</td>
<td>7</td>
<td>47</td>
<td>47</td>
<td>73</td>
</tr>
<tr>
<td>41-50 years</td>
<td>3</td>
<td>20</td>
<td>20</td>
<td>93</td>
</tr>
<tr>
<td>51-60 years</td>
<td>1</td>
<td>7</td>
<td>7</td>
<td>100</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>100</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

Findings in the table above indicate that 27% of the respondents were below the age of 30 years, 47% were between 31-40 years, 20% were between 41-50 years, and 7% were between 51-60 years. This implies that most of the respondents were youths hence they can easily understand the financial reporting instruments.

4.4.3 Education information

To be sure of the quality of the information given, the respondents were requested to provide their level of education, and the response is portrayed in figure 4.6:

http://dx.doi.org/10.29322/IJSRP.8.5.2018.p77XX
Findings in Table 4.5 indicate that a small number of respondents were highly educated this is shown by the 13% of respondents who had masters degrees, 27% were Diploma holders, however, 60% of the respondents which is the majority were degree holders. By their education structures, the researcher might assume that they know what the organization performance is and the hindrance to effective performance.

**Table 4.6: Academic qualification**

<table>
<thead>
<tr>
<th>Academic qualification</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diploma</td>
<td>4</td>
<td>27</td>
<td>27</td>
<td>27</td>
</tr>
<tr>
<td>Degree</td>
<td>9</td>
<td>60</td>
<td>60</td>
<td>87</td>
</tr>
<tr>
<td>Masters</td>
<td>2</td>
<td>13</td>
<td>13</td>
<td>100</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

**Figure 4.2: A bar graph showing the respondents by level of education.**

**4.4.4 Duration in Employment**

As a precondition to assess the reliability of the data collected, the respondents were requested to indicate the period they have worked with the organization. Their response was as given below.

**Table 4.7: Work Experience**

<table>
<thead>
<tr>
<th>Experience</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 1 year</td>
<td>2</td>
<td>13</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>2-4 Years</td>
<td>6</td>
<td>40</td>
<td>40</td>
<td>53</td>
</tr>
<tr>
<td>5-9 Years</td>
<td>4</td>
<td>27</td>
<td>27</td>
<td>80</td>
</tr>
<tr>
<td>Over 10 Years</td>
<td>3</td>
<td>20</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

From the analysis in the table above, 13% have served the organization for less than one year, 40% between 2-4 years, 27% between 5-9 years and 20% have served the organization for over 10 years. Thus, this analysis indicates that probably they fail to embrace organizational policies as a result of low payments and lack of motivation since the majority of the respondents have only worked in the organization for less than two years.

**4.5 Descriptive Statistics**

This section consists of descriptive findings on the dependent and independent variables as used in the study. Descriptive statistics enable the description of the distribution (mean) and variation (Standard deviation) of responses of the target population as well as...
allowing the researcher to determine average scores on the variables used in the study. The scores in the study used a Likert-type scale where 1=strongly agree, 2=Agree, 3=Not sure, 4=Disagree and 5=strongly disagree.

4.5.1 Instruments Disclosure
To find out, the effectiveness of financial reporting instruments disclosure the respondents were asked their opinion on the statements below. The response observed was as follows:

Table 4.8: Statement in relation to Instruments Disclosure

<table>
<thead>
<tr>
<th>Statement in relation to Instruments Disclosure</th>
<th>N</th>
<th>Min</th>
<th>Max</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Our NGO publishes financial statements frequently</td>
<td>15</td>
<td>1</td>
<td>5</td>
<td>3.20</td>
</tr>
<tr>
<td>Media reports are released by our NGO periodically regarding our financial position and performance</td>
<td>15</td>
<td>1</td>
<td>3</td>
<td>1.93</td>
</tr>
<tr>
<td>Financial reporting instruments disclosure is a requirement by our donors</td>
<td>15</td>
<td>4</td>
<td>5</td>
<td>4.73</td>
</tr>
<tr>
<td>NGOs should not do frequent financial reporting instruments disclosures</td>
<td>15</td>
<td>1</td>
<td>3</td>
<td>1.80</td>
</tr>
<tr>
<td>Financial reporting instruments disclosure is directly and positively related to NGO performance</td>
<td>15</td>
<td>2</td>
<td>5</td>
<td>3.73</td>
</tr>
<tr>
<td>There is a strong relationship between financial reporting instruments disclosure and financial performance.</td>
<td>15</td>
<td>2</td>
<td>5</td>
<td>3.67</td>
</tr>
<tr>
<td>NGOs should lean towards disclosure of financial and social and board disclosure to increase their performance.</td>
<td>15</td>
<td>4</td>
<td>5</td>
<td>4.60</td>
</tr>
</tbody>
</table>

The computed means for the statements range from 1.93 to 4.73 indicating an agreement with most of the statements, with a standard deviation ranging from 0.458 to 1.320. From the table above the majority of the respondents are strongly in agreement that financial reporting instruments disclosure is a requirement by the NGO’s donors. Hence, NGOs should lean towards disclosure of financial and social and board disclosure to increase their performance. Most respondents agree that there is a strong relationship between financial reporting instruments disclosure and financial performance. They also agree that financial reporting instruments disclosure is directly and positively related to NGO performance.

4.5.2 Instruments Presentation
To find out, the effectiveness of financial reporting instruments presentation the respondents were asked their opinion on the statements below. The response observed was as follows:

Table 4.9: Statement in relation to Instruments Presentation

<table>
<thead>
<tr>
<th>Statement in relation to Instruments Presentation</th>
<th>N</th>
<th>Min</th>
<th>Max</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial statements presentation is a requirement by our donors</td>
<td>15</td>
<td>4</td>
<td>5</td>
<td>4.73</td>
</tr>
<tr>
<td>Financial reports presentation is a requirement by our donors</td>
<td>15</td>
<td>2</td>
<td>5</td>
<td>4.13</td>
</tr>
<tr>
<td>There is a strong relationship between financial reporting instruments presentation and financial performance.</td>
<td>15</td>
<td>2</td>
<td>5</td>
<td>3.67</td>
</tr>
<tr>
<td>NGOs should lean towards financial reporting instruments presentation to increase their performance.</td>
<td>15</td>
<td>3</td>
<td>5</td>
<td>4.33</td>
</tr>
<tr>
<td>Financial reports presentation is directly and positively related to NGO performance</td>
<td>15</td>
<td>2</td>
<td>5</td>
<td>3.60</td>
</tr>
</tbody>
</table>

The mean value for the statements on financial reporting instruments presentation ranged from 3.60 to 4.73, indicating a strong agreement with all the statements while the standard deviation ranged from .458 to 1.113 as shown in Table 4.5. From the findings majority of the respondents strongly agree that financial statements and reports presentation is a requirement by the donors and that there is a strong relationship between financial reporting instruments presentation and financial performance. Therefore the NGOs should lean towards financial reporting instruments presentation to increase their performance.

4.5.3 Financial Reporting Instruments recognition and measurement
To find out, the effectiveness of financial reporting instruments recognition and measurement the respondents were asked their opinion on the statements below. The response observed was as follows:
Table 4.10: Statement in relation to Instruments Recognition and Measurement

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Min</th>
<th>Max</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial reporting instruments recognition and measurement is a requirement by our donors</td>
<td>15</td>
<td>1</td>
<td>5</td>
<td>3.20</td>
</tr>
<tr>
<td>It is practically right as per the accounting guidelines that every firm should do financial reporting instruments recognition and measurement</td>
<td>15</td>
<td>4</td>
<td>5</td>
<td>4.73</td>
</tr>
<tr>
<td>There is a strong relationship between financial reporting instruments recognition and measurement and financial performance.</td>
<td>15</td>
<td>3</td>
<td>5</td>
<td>4.33</td>
</tr>
<tr>
<td>NGOs should lean towards financial reporting instruments recognition and measurement to increase their performance.</td>
<td>15</td>
<td>1</td>
<td>5</td>
<td>3.00</td>
</tr>
<tr>
<td>Financial reporting instruments recognition and measurement is directly and positively related to NGO performance</td>
<td>15</td>
<td>1</td>
<td>5</td>
<td>3.27</td>
</tr>
</tbody>
</table>

The mean value for the statements on financial instruments reporting recognition and measurement ranged from 3.00 to 4.73, indicating a strong agreement with all the statements while the standard deviation ranged from .458 to 1.254. From the findings majority of the respondents strongly agree that financial reporting instruments recognition and measurement is a requirement by donors hence it is practically right as per the accounting guidelines that every firm should do financial reporting instruments recognition and measurement.

4.6 Inferential statistics

A multiple linear regression analysis was undertaken to examine the influence of financial reporting instruments on the financial performance of environmental conservation NGO’s at Nairobi City County in Kenya.

Table 4.11: Regression and Model Summary

<table>
<thead>
<tr>
<th>Model Summary</th>
<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></td>
<td>.842&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.709</td>
<td>.629</td>
<td>.2473981</td>
</tr>
</tbody>
</table>

<sup>a</sup> Predictors: (Constant), Measurements, Instruments Disclosure, Instruments Presentation

Significance level=0.05

The study found that the model explained 70.9% of the variance in the financial performance of environmental conservation NGO’s at Nairobi City County in Kenya as shown by $R^2$.

Table 4.12: ANOVA

<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>1.637</td>
<td>3</td>
<td>.546</td>
<td>8.917</td>
<td>.003&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Residual</td>
<td>.673</td>
<td>11</td>
<td>.061</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>2.311</td>
<td>14</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Significance level=0.05

From the ANOVA statistics in table above, the processed data, which is the population parameters, had a significance level of 0.003 (p=0.003), which is below 0.05 an indication that, financial reporting instruments disclosure, financial reporting instruments measurements and financial instruments recognition and presentation jointly have a statistically significant effect on financial performance of environmental conservation NGO’s at Nairobi City County in Kenya. The F value of 8.917 was significant at 5% confidence level. Thus the regression model used in the was significant.
Table 4.13: Coefficient

<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>-4.015</td>
<td>4.015</td>
<td>-3.455</td>
<td>.005</td>
</tr>
<tr>
<td>Instruments Disclosure</td>
<td>.580*</td>
<td>.473</td>
<td>2.750</td>
<td>.019</td>
</tr>
<tr>
<td>Instruments Presentation</td>
<td>-.184*</td>
<td>-.175</td>
<td>-.974</td>
<td>.351</td>
</tr>
<tr>
<td>Recognition &amp; Measurement</td>
<td>.892*</td>
<td>.922</td>
<td>4.896</td>
<td>.000</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Financial Performance

Significance level=0.05

Table 4.11 presents the coefficient results of the regression analysis. The results show that financial reporting instruments disclosure had a positive and significant effect on the financial performance of environmental conservation NGO’s at Nairobi City County in Kenya, p < .05. The results also show that financial reporting instruments presentation had a negative but insignificant effect on financial performance of environmental conservation NGO’s at Nairobi City County in Kenya, p > .05. Financial reporting instrument recognition and measurement had a positive and significant effect on financial performance of environmental conservation NGO’s at Nairobi City County in Kenya, p < .05. From the data in the above table, the established regression equation is extracted as shown below:

\[ Y = -4.015 + 0.580X_1 - 0.184X_3 + 0.892X_4 \]

4.7 Interpretation of the Findings

The study sought to analyze the influence of financial reporting instruments on the financial performance of environmental conservation NGO’s at Nairobi City County in Kenya. The study found that financial reporting instruments disclosure had a positive and significant effect on the financial performance of environmental conservation NGO’s at Nairobi City County in Kenya (\(\beta=0.580, p=0.019\)). Thus, financial reporting instruments disclosure affects financial performance of environmental conservation NGO’s at Nairobi City County in Kenya. The results are consistent with the Achoki & Kule (2016) who found a strong relationship existed between the voluntary disclosure, firm size and financial performance. The study is also in agreement with the study of Wangari (2014) which found a positive relationship between financial, forward-looking board and social disclosure and return on equity.

The study also found that financial reporting instruments presentation had a negative but marginally insignificant effect on financial performance of environmental conservation NGO’s at Nairobi City County in Kenya (\(\beta=-0.184, p=0.351\)). This show that at 5% level of significance, there is a weak evidence that financial reporting instruments presentation affect the financial performance of environmental conservation NGO’s at Nairobi City County in Kenya. The results are consistent with Lopes, Cerqueira and Brandao (2011) which revealed that financial statements presentation didn’t have a significant impact on performance as investors and other stakeholders look deeper into logistics and not just the realized performance.

The study also examined the effect of Financial reporting instrument recognition and measurement on financial performance of environmental conservation NGO’s at Nairobi City County in Kenya. The results showed that Financial reporting instrument recognition and measurement had a positive and significant effect on financial performance of environmental conservation NGO’s at Nairobi City County in Kenya (\(\beta=.892, p=0.000\)). The results are consistent with the studies of Mohamed (2015) which found a positive correlation between financial performance of IFIs and Islamic financial instruments recognition and measurement.

5. SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary of Major Findings

The general objectives of the study were to determine the influence of financial reporting instruments on the financial performance of environmental conservation NGOs at Nairobi City County in Kenya. The specific objectives were to establish the influence of financial reporting instruments disclosure, financial reporting instruments presentation and financial reporting instruments recognition and measurement on the financial performance of environmental conservation NGOs at Nairobi City County in Kenya.

The study found that financial reporting instruments disclosure had a positive and significant influence on the financial performance of environmental conservation NGO’s at Nairobi City County in Kenya. Thus, financial reporting instruments disclosure influence financial performance of environmental conservation NGO’s at Nairobi City County in Kenya. Majority of the respondents were strongly in agreement that financial reporting instruments disclosure is a requirement by the NGO’s donors. Hence, NGOs should lean
towards disclosure of financial and social and board disclosure to increase their performance. Most respondents agreed that there is a strong relationship between financial reporting instruments disclosure and financial performance. They also agree that financial reporting instruments disclosure is directly and positively related to NGO performance.

The study also found that financial reporting instruments presentation had a negative but marginally insignificant influence on financial performance of environmental conservation NGO’s at Nairobi City County in Kenya. From the findings majority of the respondents strongly agree that financial statements and reports presentation is a requirement for the donors and that there is a strong relationship between financial reporting instruments presentation and financial performance. Therefore the NGOs should lean towards financial reporting instruments presentation to increase their performance.

The study also examined the influence of financial reporting instrument recognition and measurement on financial performance of environmental conservation NGO’s at Nairobi City County in Kenya. The results showed that financial reporting instrument recognition and measurement had a positive and significant influence on financial performance of environmental conservation NGO’s at Nairobi City County in Kenya. From the findings majority of the respondents strongly agree that financial reporting instruments recognition and measurement is a requirement by donors hence it is practically right as per the accounting guidelines that every firm should do financial reporting instruments recognition and measurement.

5.2 Conclusion
The study concludes that financial reporting instruments disclosure had a positive and significant effect on the financial performance of environmental conservation NGO’s at Nairobi City County in Kenya. Being a requirement by the NGO’s donors, NGOs should lean towards disclosure of financial and social and board disclosure to increase their performance. Moreover, the study concludes that financial reporting instruments presentation had a negative but marginally insignificant influence on financial performance of environmental conservation NGO’s at Nairobi City County in Kenya. From the findings majority of the respondents strongly agree that financial statements and reports presentation is a requirement for the donors. Finally, the study concludes that financial reporting instrument recognition and measurement had a positive and significant influence on financial performance of environmental conservation NGO’s at Nairobi City County in Kenya. It also concluded that it is practically right as per the accounting guidelines that every firm should do financial reporting instruments recognition and measurement.

5.3 Recommendation
The study having concluded that financial reporting instruments disclosure affects the financial performance of environmental conservation NGO’s at Nairobi City County in Kenya, it is recommended that NGOs advanced to meet all the disclosure requirements and to provide a free and fair documentation to the donors for them to be abreast with the operations of NGOs they finance. Donors should be informed to this effect the advantages of disclosure so that they can be in support of the same.

Since instruments presentation was found to have a negative effect on the financial performance of environmental conservation NGO’s at Nairobi City County in Kenya, the study recommends that NGOs don’t invest more in the same but since this is a requirement for financial statements and reports to be availed to donors who demand this inorder to continue financing NGOs, instruments presentation should be considered an internal tool between NGOs and the donors and not an external tool between NGOs and any other third party for the this function to be achieved.

The research also recommends that all NGOs should adopt financial reporting instrument recognition and measurement. NGOs should also lean towards financial reporting instruments recognition and measurement to increase their performance. It is practically right as per the accounting guidelines that every firm should do financial reporting instruments recognition and measurement.

The present study reveals that financial reporting instruments presentation had no significant effect on financial performance of environmental conservation NGO’s at Nairobi City County in Kenya. Also, studies focusing on the influence of financial reporting instruments presentation on financial performance bring mixed results when compared with other scholars. Moreover, further research should be undertaken to find out why research on financial reporting instruments presentation has a statistically insignificant influence on financial performance of environmental conservation NGO’s at Nairobi City County in Kenya.

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Algorithm Tuning from Comparative Analysis of Classification Algorithms

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Abstract- Machine Learning is the upcoming research area to solve various problems and classification is one of main problems in the field of machine learning. This paper describes various Supervised Machine Learning (ML) classification techniques, compares various supervised learning algorithms as well as determines the most efficient classification algorithm based on the dataset. Wine-quality-white dataset is taken from UCI machine learning repository. Six different machine learning algorithms are considered: Logistic Regression (LR), Linear Discriminant Analysis (LDA), K-Nearest Neighbors (KNN), Classification and Regression Trees (CART), Gaussian Naïve Bayes (NB) and Support Vector Machine (SVM). By tuning of neighbors for KNN, the best configuration is K=1.

Index Terms- Accuracy, Algorithm Tuning, Classification, Machine Learning.

I. INTRODUCTION

Machine learning is a paradigm that may refer to learning from past experience to improve future performance. Learning refers to modification or improvement of algorithm based on past “experiences” automatically without any external assistance from human[3].

Bill Gates, Former Chairman, Microsoft said that a breakthrough in machine learning would be worth ten Microsofts. Machine learning (ML) is getting computers to program themselves. ML is like farming or gardening. Seed is the algorithm, nutrient is the data, the gardeners are like us and plant in the program. If programming is automation, then machine learning is automating the process of automation. Writing software is bottleneck, we don’t have enough good developers. Let the data do the work instead of people. Machine learning is the way to make programming scalable.

Machine learning aims to generate classifying expressions simple enough to be understood easily by the human. They must mimic human reasoning sufficiently to provide insight into the decision process. Like statistical approaches, background knowledge may be exploited in development, but operation is assumed without human intervention [2].

Machine learning techniques are used for data analysis and pattern discovery. Thus play a major role in the development of data mining applications [6]. There are many different methods to compare results and to determine the best classification.

II. WINE-QUALITY CLASSIFICATION

2.1 Wine-quality-white dataset

Wine-quality dataset is taken from real data. There are 11 attributes and 7 classes. All attributes are numeric-valued. The 11 attributes are fixed acidity, volatile acidity, citric acid, residual sugar, chlorides, free sulfur dioxide, total sulfur dioxide, density, pH, sulphates and alcohol.

2.2 Supervised machine learning procedure

One standard formulation of the supervised learning task is the classification problem. Inductive machine learning is the process of learning a set of rules from instances, or more generally speaking, creating a classifier that can be used to generalized from new instances.

The process of applying supervised ML to a real-world problem is described in Figure 1.

Figure 1: The Process of Supervised Machine Learning
This work focuses on the classification of ML algorithms and determining the most efficient algorithm with highest accuracy and precision.

2.3 Classification comparison procedure:
Algorithms compared use same wine quality-white dataset (11 attributes and 7 classes) in order to have fair comparison result. One attribute (class) is set as output (target) while the others as input to algorithms.

There are several steps be done for this comparison:
1. simulate each algorithm by using all attribute dataset and find the best setting to get highest accuracy for each algorithm. Referred as all attributes.
2. Feature selection by removing an attribute, and re simulate for each algorithm. Referred as reduced attributes.
3. Eliminate the worst class recall of the best algorithm found at step 2, and re simulate only for the best algorithm.

III. METHODOLOGY

3.1 Measuring the Central Tendency
Descriptive statistics can give us great insight into the shape of each attribute.
Mean: The common and most effective numerical measure of the center of a set of data is the (arithmetic) mean.
Kth Percentile: The Kth percentile of a set of data in numerical order is the value x_i having the property that K percent of the data entries lies at or below x_i. The median is the 50th percentile. The first quartile, denoted by Q1, is the 25th percentile; and the third quartile, denoted by Q3, is the 75th percentile.
Standard Deviation: It is measures of data dispersion. It indicates how spread out a data distribution is. A low standard deviation means that the data observations tend to be very close to the mean, while a high standard deviation indicates that the data are spread out over a large range of values.
Max-Min Normalization: It performs a linear transformation on the original data. Suppose that min_A and max_A are the minimum and maximum value of an attribute, A.

3.2 Learning Algorithms
Naive Bayes: A naïve bayes classifier is based on the Bayes theorem. A naïve bayes classifier is based on the Bayes theorem. A naïve bayes classifier assumes that the presence of an articular feature of a class is unrelated to the presence of any other feature (input variable is independent).
Naive bayes classification can be trained very efficiently in a supervised learning setting. Parameter estimation for naïve bayes uses the method of maximum likelihood or using bayesian methods.
The assumption that input variable is independent is unrealistic for real data. This technique is very effective on a large range of complex problems [5].

Support Vector Machine(SVM): SVM is categorized as supervised learning which considered as heuristic algorithm. The main idea in SVM is to determine a hyper plan that optimally separates two classes.

Kernel function is used to solve classification function. There are four basic kernels functions [5]:
- Linear : $K(x_i, x_j) = x_i \cdot x_j$
- Polynomial : $K(x_i, x_j) = (y_i^T x_j + r)^d$, $y > 0$
- RBF : $K(x_i, x_j) = \exp(-\gamma ||x_i - x_j||^2)$, $y > 0$
- Sigmoid : $K(x_i, x_j) = \tanh(\gamma x_i^T x_j + r)$
RBF is radial basis function. The $\gamma$, r, and d are kernel parameters. In this paper, Linear Function is used as the kernel function in order to get better accuracy.

k-Nearest Neighbors (KNN): This algorithm, also known as “lazy learning algorithm” is the simplest algorithm of all the machine learning models. It compares a given example ‘X’ with training examples which are similar to it.
The training dataset is stored in a n-dimensional pattern space and the algorithm searches the area for the nearest example (k) from the training dataset that is close to the given example x. This algorithm usually is used for classification and regression. Regarding classification, it classifies according to the majority vote of it is nearest k. K is a positive integer. When k = 1, this means it is assigned to the nearest neighbor.

Decision Tree: The representation of decision tree model is a binary tree. Each node represents a single input variable (x) and a split on that variable. The leaf nodes of the tree contain an output variable (y) which is used to make a prediction. Predictions are made by walking the split of the tree until arriving at a leaf node and output the class at that leaf node.
Trees are fast to learn and very fast for making predictions. Decision Tree is also accurate for a broad range of problems and do not require any special preparation for data. Decision Tree has a high variance and can yield more accurate predictions when used in an ensemble.

Logistic Regression(LR): Linear regression can easily be used for classification in domains with numeric attributes. Indeed, we can use any regression technique, whether linear or nonlinear, for classification. The trick is to perform a regression for each class, setting the output equal to one for training instances that belong to the class and zero for those that do not. The result is a linear expression for the class. Then, given a test example of unknown class, calculate the value of each linear expression and choose the one that is largest. This method is sometimes called multi-response linear regression.

Linear Discriminant Analysis (LDA): Linear Discriminant Analysis (LDA) is a statistical technique for binary and multiclass classification. It too assumes a Gaussian distribution for the numerical input variables. LR and LDA are simple linear algorithms.

3.3 Algorithm Tuning
Machine learning algorithms are parameterized and modification of those parameters can influence the outcome of the learning process. Think of each algorithm parameter as a dimension on a graph with the values of a given parameter as a point along the axis. Three parameters would be a cube of possible configurations for the algorithm, and n-parameters would be an n-dimensional hypercube of possible configurations for the
algorithm. The objective of algorithm tuning is to find the best point or points in that hypercube for our problem. We will be optimizing against our test harness, so again we cannot underestimate the importance of spending the time to build a trusted test harness.

Algorithm parameter tuning is an important step for improving algorithm performance right before presenting results or preparing a system for production.

IV. RESULTS

We use scikit-learn from Python to explore the data both with descriptive statistics and data visualization. We must have a very good handle on how much data we have, both in terms of rows and columns. Too many rows and algorithms may take too long to train. Too few and perhaps we do not have enough data to train the algorithms. Too many features and some algorithms can be distracted or suffer poor performance due to the curse of dimensionality.

We can take a look at a summary of each attribute at Figure 1. This includes the count, mean, the min and max values as well as some percentiles.

We can view the number of instances that belong to each class. We can present a histogram of each input variable at Figure 2. We can view that there are Gaussian-like distributions and perhaps some exponential like distributions for other attributes. We can present same perspective of the data using density plots in Figure 3.

This is useful, we can view that many of the attributes have a skewed distribution. A power transform like a Box-Cox transform that can correct for the skew in distributions might be useful.

4.1 Correlations Between Attributes

Correlation gives an indication of how related the changes are between two variables. If two variables change in the same direction they are positively correlated. If they change in oppositely directions together, then they are negatively correlated.

We can plot the correlation matrix and get an idea of which variables have a high correlation with each other. We can also see that each variable is perfectly positively correlated with each other in the diagonal line from top left to bottom right as shown in Figure 4.
4.2 Evaluation Algorithms : Baseline

We don’t know what algorithms will do well on Wine-quality-white dataset. Gut feel suggests distance based algorithms like k-Nearest Neighbors and Support Vector Machines may do well. We use 10-fold cross-validation. The dataset is not too small and this is a good standard test harness configuration. We evaluate algorithms using the accuracy metric. This is a gross metric that give a quick idea of how correct a given model is. Table 1 shows the accuracy result for each model.

We create a baseline of performance on this paper and spot-check a number of different algorithms. We select a suite of different algorithms capable of working on this classification research. The six algorithms selected include:

- **Linear Algorithms**: Logistic Regression (LR) and Linear Discriminant Analysis (LDA).
- **Nonlinear Algorithms**: Classification and Regression Trees (CART), Support Vector Machine (SVM), Gaussian Naïve Bayes (NB) and k-Nearest Neighbors (KNN).

<table>
<thead>
<tr>
<th>Model</th>
<th>Accuracy Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>LR</td>
<td>0.522722</td>
</tr>
<tr>
<td>LDA</td>
<td>0.525787</td>
</tr>
<tr>
<td>KNN</td>
<td>0.466297</td>
</tr>
<tr>
<td>CART</td>
<td>0.588051</td>
</tr>
<tr>
<td>NB</td>
<td>0.441816</td>
</tr>
<tr>
<td>SVM</td>
<td>0.5564</td>
</tr>
</tbody>
</table>

There are just mean accuracy values. It is always wise to look at the distribution of accuracy values calculated across-validation folds. We can present that graphically using box and whisker plots in Figure 5.

4.3 Evaluation Algorithms : Standardize Data

We evaluate the same algorithms with a standardized copy of the dataset. This is where the data is transformed such that each attribute has a mean value of zero and a standard deviation of one. We also need to avoid data leakage when we transform the data. A good way to avoid leakage is to use pipelines that standardize the data and build the model for each fold in the cross-validation test harness. That way we can get a fair estimation of how each model with standardized data might perform on unseen data. Table 2 describes the accuracy result for each standardized model.

<table>
<thead>
<tr>
<th>Model</th>
<th>Accuracy Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scaled LR</td>
<td>0.528338</td>
</tr>
<tr>
<td>Scaled LDA</td>
<td>0.525787</td>
</tr>
<tr>
<td>Scaled KNN</td>
<td>0.550532</td>
</tr>
<tr>
<td>Scaled CART</td>
<td>0.589077</td>
</tr>
<tr>
<td>Scaled NB</td>
<td>0.439774</td>
</tr>
<tr>
<td>Scaled SVM</td>
<td>0.563555</td>
</tr>
</tbody>
</table>

We plot the distribution of the accuracy scores using box and whisker plots in Figure 6.
4.4 Algorithm Tuning
According to Table 1, the results show a tight distribution for CART and SVM are encouraging, suggesting low variance. The poor results for KNN and NB are surprising. According to Table 2, we can see that SVM, CART are still doing well, even better than before.
We tried to research digging deeper into the SVM and KNN algorithms. It is very likely that configuration beyond the default may yield even more accurate models.
We can start off by tuning the number of neighbors for KNN. The default number of neighbors is 7. Below we tried all odd values of k from 1 to 21, covering the default value of 7. Each k value is evaluated using 10-fold cross-validation on the training standardized dataset.
We can print out configuration that resulted in the highest accuracy as well as the accuracy of all values tried as shown in Figure 7.

Figure 7. Result of Tuning KNN on the Standardized Dataset

We can tune two key parameters of the SVM algorithm, the value of C (how much to relax the margin) and the type kernel. The default for SVM is to use the Radial Basis Function (RBF) kernel with a C value set to 1.0. Like with KNN, we will perform a grid search using 10-fold cross-validation with a standardized copy of the training dataset. We tried a number simpler kernel types and C values with less bias and more bias. The accuracy 64.954% is better than what KNN and CART could achieve.

V. CONCLUSION AND RECOMMENDATION
We worked through a classification predictive modeling in machine learning. We have met our objective which is to evaluate and investigate six selected classification algorithms. The best algorithm based on the data is SVM according to algorithm tuning. In Tuning, k=1 for KNN was good, SVM with accuracy 64.954% was the best.
Machine Learning classification requires thorough fine tuning of the parameters and at the same time sizeable number of instances for the dataset. It is not a matter of time to build the model for the algorithm only but precision and correct classification. Therefore, the best learning algorithm for a particular data set does not guarantee the precision and accuracy for another set of data whose attribute are logically different from the other[4].
This work recommends that we can improve the performance of algorithms by using ensemble methods. Then we can finalize the model by training it on the entire training dataset and make predictions for the hold-out validation dataset to confirm our findings.

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Surviving Trauma Through Perseverance in Crises Situations: Exploring El-Nathan John’s Born on a Tuesday

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Abstract- Various researches have focused on the current crises situations and insecurity in Nigeria and beyond, articulating their respective concerns for this social predicament. Innocent Nigerians, young and old have been subjected to traumatic experiences; carnage, brutality and family disunity resulting from these conflicts. Literary writers are not left out of the attempt to compile and document the literatures of these conflicts, through their creative works. This paper examines the traumatic experience of individuals in the face of insecurity, such as Boko Haram insurgency in Northern Nigeria, as depicted by El-Nathan John in Born on a Tuesday. This he succinctly presents through the character. Dantala whose perseverance throughout the various challenges helps him to survive the crises that featured in his life from adolescence to adulthood. This survival is achievable, the author argues, through the positive significance of perseverance, as the protagonist suffers both family and socially induced trauma.

Index Terms- Surviving trauma, perseverance, crises situations, Boko Haram, insecurity, Northern Nigeria.

I. INTRODUCTION

Insecurity is a serious challenge to nationhood and the peaceful co-existence of Nigerians. It has come to be an area of discourse to both literary and non-literary scholars globally. This is because, it is a serious challenge to nationhood and global peace. The fact that insecurity and crises situations are diverse in both nature and cause creates the need for specification in its study. Since the sub-divisions of insecurity such as food insecurity, environmental insecurity, job insecurity and the like are also in existence, personal (social) insecurity is the primary focus of this paper. Literature utilizes creative imagination in projecting suggestive possibilities of social realities and emergent issues. Kehinde and Mbiopom argue that:

Literature captures the diverse forms of interaction between various parts of a society and its people… African literature constantly reflects an attempt at narrating the African experience, the struggles associated with imperialism and its relics of denigration and oppression which seem to remain visible features of post-independence Africa. This accounts for the African writers’ attempt at foregrounding the tension that exists within the shores of Africa, with the aim of asserting the African nation above all forms and conventions of imperialism and neo-colonialism (62).

The socio-cultural/developmental issues raised by Chinua Achebe and his contemporaries in their novels several years back turned out to be prophecies of our Nigeria of today. This is possible because the writer’s muse/inspiration tends to arise from the emergent issues of his time and environment. Ngugi Wa Thiongo argues that, “Both the writer and his works… try to understand, reflect and interpret” (158), the conflicts of values within and outside Africa, for life and humanity. The use of these works to document or recreate historical events such as colonialism and the Nigerian Civil War has created knowledge and discourse for the younger generation who did not witness these events. In the emergent social realities of various forms of crises and insecurity in Africa and Nigeria in particular, the literary writers “have served not only as chroniclers of contemporary political history but also as advocates of radical social change. Their works thus both reflect and project the course of Africa’s Cultural Revolution” (Lindfors 22).

One of the scores of war and crises situations on victims is the trauma of loss, whether human or material. In addition, the survivors of these crises live with the after effect memories of theses unpleasant experiences. Certainly, these experiences adversely affect the victims’ lifestyle or perception of life. This paper interrogates the lingering psychological consequences of conflicts and how the characters survive and overcome the trauma of such crises in the novel, Born on a Tuesday which focus on Boko Haram insurgency in Northern Nigeria.

II. THEORETICAL FRAMEWORK

The theoretical framework for this study is psychoanalysis. Ordinarily, psychoanalysis is a body of techniques connected to the study of unconscious mind which will be a basis for treating mental health disorders. Established around the 1890s in Australia by Sigmund Freud and greatly developed by writers like Josef Brever, psychoanalysis was basically hinged on dream which the founder said was significant to its later evolution. As a scientific discipline, crucial among its tenets, according to Labov William (27) were: (i) a person’s development is determined by the events of childhood; (ii) human behaviour is shaped by...
irrational drives that are rooted in the unconscious; (iii) there can be mental imbalance when there are conflicts between conscious and unconscious materials and so on.

As a literary theory, psychoanalytical criticism has to do with looking at literature and the psyche as things that are fundamentally entwined. In describing how psychoanalysis works in literature, John Kennedy & Dana Gioia postulate that there are three approaches to the study of works of arts. It investigates the creative process of the arts, it attempts a psychological study of a particular artist and the third, which is more relevant to this paper as it analyzes fictional characters. The theories go further to argue that:

Freud’s study of Oedipus is the prototype of this approach which tries to bring about modern insights about human behavior into the study of how fictional people act. While psychological criticism carefully examines the surface of the literary work, it customarily speculates on what lies underneath the text – the unspoken or perhaps even unspeakable memories, motives and fears that covertly shape the work, especially in fictional characterization (722).

In other words, doing a psychoanalytical study of a work of literature requires a look at the mind of even the author and the characters. Since a look is taken at the traumatic effects of insecurity and how perseverance can be an antidote in such a situation, the psychoanalytical theory will be appropriate.

Reflection on Insecurity and Conflicts in Nigerian Literature

The security problems in Nigeria, such as insurgency, militancy, ethno-religious as well as environmental conflicts, etc have resulted in uncountable human and material waste. It is therefore an issue of concern to literary writers across Nigeria. The portrayal of characters asserts that, while the innocent suffer and however survive through perseverance, the perpetrators get away with the acts or perish in the ensuing conflicts. The victims are left traumatized to either survive the experience or get destroyed by it. The fast spread of social conflicts in Nigeria has over the years inspired several literary writings across the three genres of literature.

Since the bitter experience of the Nigerian Civil War, writers like Isidore Okpewho in The Last Duty, Buchi Emecheta in Destination Biafra, Akachi Ezeigbo in Roses and Bullets, Chimamanda Ngozi Adichie in Half of a Yellow Sun, among others, project in their respective imagination, how some of the war victims survive the trauma through perseverance or not, the bitter experiences of the Civil War, several years after. Beyond the Civil War, other writers have also projected imaginative experiences of their characters’ survival or tragic end as a result of conflict or crises resulting from communal, ethnic or religious clashes. In the famous Niger Delta environmental crisis, Tanure Ojaide in his fiction and poetry, Helon Hablea in Oil on Water, Nwoye in Oil Cemetery, Aliyu Kamal in Fire in my Backyard, Adamu Kyuka Usman in The Death of Eternity, among others have in their respective ways articulated the trauma of environmental insecurity and its resultant conflicts like militancy and man’s vulnerability in these situations.

The emergence of Boko Haram insurgency in Northern Nigeria, which has led to gory human carnage and waste inspired the writing of the novel, Born on a Tuesday, the text of this paper. El-Nathan John’s creative imagination is suggestive of the fact that perseverance is a viable means of surviving the traumatic experience of insecurity as depicted by his protagonist, Dantala.

Perseverance: An Antidote to Personal Insecurity in Born on a Tuesday

El Nathan John’s Born on a Tuesday is a novel whose lead character’s labyrinthine contact with life threatening violence of different faces is iconic of perseverance as a potent panacea in the face of obstructionist realities. As Ben Okri posits, “life does not give you what you want or deserve, it gives you what you see, discover and fight for” (44), we are what we discover, what we find and not what we found ourselves in. The novel’s title, which translates as Dantala in Hausa as a male child that is born on a Tuesday is symbolic of being born to the confines of violence which started on a Tuesday. Dantala’s name is metonymic of a huge predestined struggle that only time can heal.

Dantala’s presence in the habitation of the prepubescent street urchins under the kuka tree in Bayan Layi who “like to boast about the people they have killed” (1) is bad contact with the conventional uncertainties of life which are capable of annihilating the victim. Through perseverance, however, the infant prodigy escapes notorious characters like Gobedanisa who prides himself as a perpetual killer and talks about it in a manner that “you will think he would get aljanna for it (killing), that Allah would reserve the best spot for him” (1-2). The kuka boys’ notoriety is extended to political hooliganism which makes them set ablaze the Big Party office upon the instruction of the Small Party as Banda leads them. The social environment of Bayan Layi affects the protagonist and other characters so much so that he “joined the Kuka Tree Boys who smoked wee-see and didn’t pray” (34). But as a result of the crisis that led to the death of Banda and other boys, Dantala assertively pulls out of the shock of being a social misfit. He retraces his steps by running away from Bayan Layi to Sokoto to live a decent life as an almajiri under the tutelage of Sheikh Jamal. One of Dantala’s Psychological reaction to the trauma of insecurity and crises is to leave the environment in a (symbolic) run, This helps him to overcome the trauma of such experiences and search for safety. When the Kuka Tree Boys were attacked by the police, Dantala runs away from Bayan Layi:

I run, I cut through the open mosque avoiding the narrow straight road.

I run through Mallam Junaidu’s maize farm. I do not stop.
I run past the
Kuka tree. I will not stop even when I can no longer hear the guns, until
I get to the river and cross the farms, far, faraway from Bayan Layi” (17).

Dantala refuses to give up. Rather, he perseveres and runs away from Bayan Layi, He boards a vehicle to Sokoto on a return journey to Dogon Ice, his home town.

Dantala also uses religious perseverance as a means of surviving trauma. He seeks Allah’s forgiveness, for his crimes and for questioning his authority over Banda’s death. “Once I thought, astagfirullah… The thought stayed with me for a long time until suddenly fear gripped me in my chest for questioning Allah and why Banda was destined to die. So I kept saying
astagfirullah, Allah gorgive me”(18-19). This purgation and consciousness of God becomes his saving grace in the lorry accident. Dantala thought aloud after the accident: “I think that I did not die in the lorry because I quickly realized my sin and said astagfirullah many times” (29). His belief in the mercy of God also is also a perseverance tool for survival, as he regrets all he had done in the past. He says during the mid-day prayer:

It feels like Allah hears my whisper and answers. I can feel His greatness this morning and I am feeling sorry for the first time for all I have done. For smoking wee-ee. For breaking into shops into shops with the Kuka tree boys. For striking that man with a machete. For questioning Allah on my way back to Sokoto.(29).

The implication therefore, is that man requires perseverance in order to avert the sordid realities of life such as insecurity. This kind of determination is exemplified by Dantala’s words as he flees Bayan Layi, a symbolic representation of the life of uncertainties carefully orchestrated by insecurity. Dantala says: “I run. I cut through the open mosque avoiding the narrow, straight road. I run through Malam Junaidu’s maize farm. There are boys hiding there. I do not stop. I run past the kuka tree. I will not stop even when I can no longer hear the guns. Until I get to the river and across the farms, far, far away from Bayan Layi” (17).

One can see the prodigy’s resolve in utterances like ‘I do not stop’, ‘I run past the kuka tree’ and ‘I will not stop …. from the extract above. Put more succinctly, John intends to affirm the potency of optimism even when the chips are down and there are psychological worries over survival.

As if the threat to life and intimidation witnessed in Bayan Layi are not enough, Dantala’s uneasy and thorny life continues in Sokoto where he hopes to find a haven. He takes solace in Sheikh Jamal and finds a budding friendship in Jibiril after a journey in which Dantala sustains bruises from the lorry’s involvement in ghastly accident. With the eight thousand three hundred naira on him, there are life threatening scenarios like the death of two almajirai and Bilyaminu whose bodies are interred with only the driver left to convey the sad news “to their parents” (20). These gory experiences are capable of traumatizing a greenhorn. That he still survives them presupposes that when one perseveres, one will always find succour. Hope and providence are therefore symbolic in Dantala’s perseverance and survival of all the traumatic experiences.

The horrible stories shared by co-travelers in the bus that conveys Dantala to Dogon Icce are scary. Apart from destroyed farms, displacement of the inhabitants, homelessness and other havoc wrecked by the flood, motorists are not able to ply the road to Dogon Icce. The driver of the bus recounts:

The floods lasted many days; in fact we couldn’t drive into Dogon Icce and all the surrounding villages until last week. Just two rains and the whole place is destroyed. People are dying of sickness… there is no water or hospital in Dogon Icce and many people, especially children, purge until they die. The water got contaminated after the flood and although the local government chairman promised to bring water tankers, they have not seen any yet. (39)

The devastation caused by flood in Dogon Icce which the driver recounts above and the corroboration from co-travellers are by no means little channels of intimidation to Dantala and his mother. However, he journeys on and in order to cushion the psychological effects of such terrifying revelations, he goes for “a little old booklet on the dashboard”… of the bus and asks the driver if he “can have a look” (39).

With Umma’s deteriorating health and Maccido, Hassan and Huseini’s adherence to the Shiite sect, life becomes unbearable for Dantala, but he remains resilient and even pledges to restore sanity to his own failing society. Like the transcendent Alwan in Tawfiq al-Hakin’s Song of Death who vows to liberate his people with the education acquired abroad by refusing to fulfill his familial duties of avenging the death of his father, Dantala, in the face of these uncertainties, vows to leave Dogon Icce in order to return for liberation. His optimism is revealed when he says: “Even if Umma doesn’t hear me I will tell her I want to leave. Allah knows my intentions. Insha Allah, when I come back she will see me. One day, Insha Allah, I will take her out of this place to the city, where there are hospitals and bright fluorescent lights” (51). Dantala leaves Dogon Icce for Sokoto with a lot of hope for a better tomorrow. Having such high hopes when uncertainties stare at one in the face is a massive weapon in the face of hostilities.

Dantala experiences the pain and trauma of maturity. The psychological consequences of the nefarious homosexual acts around him worries him but, Dantala perseveres and remains steadfast and upright. He witnesses illicit sexual relationships both in the motor park new the mosque and Jibril’s sexual escapades with Abdul-Nur’s wife, but he pulls through without being influenced. Sheikh Jamal’s rift with Mallam Abdul-Nur over a good number of religious ideologies is another stumbling block for him. The personality clash between the duo results in sporadic shootings which send Sheikh to a hospital for medical entreaties. This singular episode casts aspersions upon the young learner’s future as his benefactor is hospitalized. His fears are in what looks like soliloquy after pondering on how to send a text to Jibril. He says in solitary, “I am afraid that if Sheikh dies, Mallam Abdul-Nur will change towards me. Alhaji Usman may stop sending us money and the new movement will die before it has even started. I do not know where I will go or what I will do” (122).

Sheikh’s death obviously means an end of the road to Dantala and that is not out of place. However, though something of a rarity, the character of the oldest patient in the hospital is a psychological re-awakening of the ‘all hope is not lost’ philosophy of life. The nameless character “goes unconscious for months and just when they think he might not make it, he wakes up” (121). Bewildered by the conundrum, Dantala concludes that “only Allah knows what type of sickness that is that makes a man go to sleep for months” (121). The creation of such a character is a deliberate ploy to reinforce the despairing Dantala that sickness, like every other threat to life cannot kill until God wills it. As a confirmation of the veracity of such a premise, Sheikh convalesces and returns home to Dantala’s delight.

Jibril(formerly known as Gabriel), comes from Ilorin as a boy convert and relative of Malam Abdu-Nur.Jibril went through various experiences; beating, sexual molestation and abuse by Abdul-nur, he perseveres and never told Dantala. He received
punishment for Dantala’s crime calmly and says to Dantala; “It is ok. Everything is over now. I already admitted that the book was mine. He has beaten me already” (88).

Dantala perseveres and pulls through the trauma of his mother’s death. “I thought that I would slump over if ever I heard that my mother had died. But hearing now… I feel both sadness and relief in my heart. Relief because, Allah has taken away her suffering. Allah is merciful” (89). On receiving the news of his brother, Hassan’s death, he held on to his fate in God, despite the pain he felt.

Khadija, Dantala’s aunt bears physical evidences of the crises in her life; her husband abandons her for a new wife, she is stressed in the care for her traumatized sister, who suffers in silence until her eventual death. Dantala describes her thus: “She has creases on her forehead and grey hair in her eyebrows. There are no smiles left in her eyes, only dullness. She stoops slightly as she walks…” (106). In her own words, Khadija explains to Dantala all her pain and her efforts to shed tears. She says: “… I cried for my husband, I cried for Umma. I cried for my empty womb. …So when Umma died, I look for tears… but nothing (111).

Aside Jibril’s illicit sexual affair with his own brother’s wife which Dantala witnesses and he is overawed, he is further bewilderingly embarrassed by an encounter with a veteran prostitute that Jibril introduces him to. In his naivety, Dantala, after being cajoled into agreeing to have a ‘taste of haram’ goes to the brothel and had an encounter with a prostitute. What is arguably the crescendo of individual insecurity is Dantala’s detention and incarceration in a cell over the alleged membership of the Mujahideen sect. Sale’s astonishing involvement in the movement marks another of Dantala’s close shave with death since the former was an acquaintance of the later in Sheikh’s custody. There was an ample opportunity to initiate Dantala into the sectarian movement, especially given his being a patsy. The abysmal condition of the cell and how human beings are murdered with reckless abandon are all enough to make any on-looker conclude that it is Dandala’s end of the road. One of the inmates called Samaila “has a running stomach and is throwing up. It looks like Cholera… He has been stooling all afternoon. Now he is too weak to even move. At some point he stretches his hand to me” (242), Dantala narrates. With deaths of other inmates always before him, Dantala is christened a landlord in the captivity. A Mutu, the soldier that brings the ‘catch’ into the cell even refers to Dantala as landlord. He says, “Landlord, I have brought you new tenants” (246). After the heinous use of pliers and screwdrivers all to sniff life out of both guilty and innocent souls, A Mutu renames Dantala as ‘black spirit’. As he regains his freedom, he discovers that his love, Aisha is married to a senator, but he remains unperturbed. Immediately, he, as ever, professes his perseverance and says, “I think of all things I must do: cut my hair, wash with hot water, start writing out my story. Then take a bus and go wherever it is headed (261). This is probably the apogee of Dantala’s resilience in the face of uncertainties. Despite the plethora of forces that try to erode the right to existence of a resolute individual, he remains firm in his decision to live. The author’s creative decision to make Dantala a formidable character is borne out of the need to sustain the authenticity of the narration, the need for someone to tell the story; an insider in the mystery of the insurgency in Northern Nigeria. This is therefore a clarion call to survivors to come forward to tell the real story. Taking a bus to go wherever it is headed is a strong desire and ambition to undertake another journey of life no matter how thorny and narrow the route is. With the plans that Dantala unfurls at the end of his saga, there is a spirit of return, reprocessing fears that are overtly triggered by the societal fragility felt within and outside his own society as its fundamental values are seriously jeopardized from both inside and outside forces. It is observable that Dantala is tested (and he has tasted), his courage re-examined and his perseverance reckoned with through the very dark mirror of uncertainties. Let it be noted that through the confrontations, according to Fred Botting, emerges “a powerful means to reassert the values of society, virtue and propriety; transgression, by crossing the social and aesthetic limits, serves to reinforce or underline their value and necessity, restoring or defining limits” (7).

Elnathan John’s Born on a Tuesday, though a creative piece, delves into the uncharted waters of the Boko Haram insurgency in Northern Nigeria. The novel creates a spider’s web of all the issues, people and places related in one way or the other with the mystery of these religious sects. It presupposes the active and inactive roles of Islamic scholars and politicians in the genesis and existence of these sects. The character Dantala is used to exemplify the immediate and remote experiences of the casualties of the activities of the sects and the effects of these activities of the life of these individuals; family, society and nation. Most importantly, it presents a character’s struggle for survival in the face of life’s challenges and insecurity.

The lingering nature of the scary experience of the homosexual act perpetrated by Abdulkareem and Bilal exemplifies how tortuous sordid realities can be. The psychological burden such experiences bring upon the victim is depicted in the reminiscences Dantala has after witnessing the ungodly act. Dantala recollects, “Astighfirullah, but I find myself still wishing Abdulkareem and Bilal would fall inside a well of soldier ants that will eat them up slowly… though I thought it was all gone, I still have these dreams. I hate them more because the dreams seem to go on forever…” (62). When the dream of witnessing two male adults forcing themselves into each other continues to pummel a tenderfoot like Dantala, there is evidence of psychological torture capable of constituting psychological insecurity. That is seen in the way the feelings surge forward at every slight opportunity. When Mallam Abdul-Nur decides to admonish Dantala over the latter’s avoidance of the boys who smoke around the mosque, he says, “…and it (the experience) all came rushing through my head…” (63). More to the fact that escaping the effects of psychological insecurity is not a Jejune affair is yet another round of psychological torture to which Dantala is exposed. He remembers that

I went into the toilet and locked the door. Then I brought it out. I didn’t want to. I tried hard not to, but the feeling was strong and raging in my body like the fast running water in a river during the rainy season. At first I just held it. Afterwards I shut my eyes and stroked it, slowly, then quickly until a feverish cold passed all over my body and gripped me and made my legs wobbly and I needed to use my left hand to support myself against the wall. When it passed, I had made a mess of the toilet floor, my hands and my trousers (63).
The efforts towards self-flagellation from masturbation as seen in the experience above depicts the concerted efforts required of man in order to move away from the trauma of psychological insecurity. This paper posits that the mess on the floor is symbolic of how the Nigerian land is messed up by the spoils of insecurity of different kinds. When insecurity severs the dreams and aspirations of individuals of a society, there is need to resort to togetherness as a way out of the pit. In other words, when adversaries strike the individual dwellers of a nation state, the spirit of collectivity should be invoked by the members of the society in order to wage the appropriate war against the whims of insecurity. This is what the collective rescue of the woman with grains of wheat on her head who “slips and falls flat” (42) owing to the psychological consequences of their community exemplifies. When she begins to wail over the total loss of the contents of her polythene bag, “the other women take her by the hand to lift her up” (42). Therefore, instead of wailing over the ugly accompaniments of insecurity, the individuals are to take shared responsibility as illustrated by the helping hands lent the falling woman.

Umma’s dementia is a consequence of trauma over the loss of her children: Hassan and Hussein to the flood that ravaged Dogon Icce before Dantala arrives. This depicts environmental insecurity and its psychological effects. When Umma sees Dantala, she only “looks up at him, smiles and without saying a word, gets up and leaves the room” (46). This reaction as a result of a progressive deterioration in cognitive function due to damage in the brain is not unconnected to the untimely death of her twins that were carried away by the flood. The psychological war she wages against this ugly psychological state shows the required perseverance when there is an attack by such environmental insecurity.

The taxonomic upsurge of religious sects across the two major religions in Nigeria: Islam and Christianity constitute some form of insecurity to the populace. In both religions there are sectarian and denominational divisions and these are largely responsible for the palpable unrest among members of society. In Born on a Tuesday, John mirrors some of these sectarian divisions and how they are a part of the causes of insecurity in the nation state. For instance, the upsurge of the Mujahideen and government’s crackdown on it leads to loss of many lives. However, the manner in which Elnathan John incites the people against the movement is a deliberate ploy to reawaken the people’s sense of insecurity. This depicts environmental insecurity. In other words, when adversaries strike the individual dwellers of a nation state, the spirit of collectivity should be invoked by the members of the society in order to wage the appropriate war against the whims of insecurity. This is what the collective rescue of the woman with grains of wheat on her head who “slips and falls flat” (42) owing to the psychological consequences of their community exemplifies. When she begins to wail over the total loss of the contents of her polythene bag, “the other women take her by the hand to lift her up” (42). Therefore, instead of wailing over the ugly accompaniments of insecurity, the individuals are to take shared responsibility as illustrated by the helping hands lent the falling woman.

Elnathan John’s Born on a Tuesday to a thorough literary investigation, it was discovered that the novel x-rays the ugly accompaniments of insecurity in Nigeria and attempts to proffer alternative solutions to the menace instead of the obviously impotent efforts of the government. Looking at the psychological and psychic nature of the effects of insecurity, the author proffers perseverance, that is, the die-hard spirit in the face of life threatening woes. Instead of despairing, the author feels man’s mental firmness as seen majorly in the defiant character of Dantala can only catapult him to the other phase of life. One other angle is the crave for some collectivity in confronting insecurity and its institutions. In other words, there is a clarion call on those reduced to subaltern societies by insecurity to rise up to the challenge and bring it to its heels. Therefore, literature especially the novel can be a tool with which polemics can be provoked, literary artists called upon and the entire populace re-oriented towards fighting insecurity in Nigeria.

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III. CONCLUSION

The scholarly attention of this essay was on interrogating perseverance as an antidote to the trauma that insecurity subjects the individual members of society. After subjecting the novel, the taxonomic upsurge of religious sects across the two major religions in Nigeria: Islam and Christianity constitute some form of insecurity to the populace. In both religions there are sectarian and denominational divisions and these are largely responsible for the palpable unrest among members of society. In Born on a Tuesday, John mirrors some of these sectarian divisions and how they are a part of the causes of insecurity in the nation state. For instance, the upsurge of the Mujahideen and government’s crackdown on it leads to loss of many lives. However, the manner in which Elnathan John incites the people against the movement is a deliberate ploy to reawaken the consciousness of the people to denounce a traumatizing development like sectarian division. Dantala recollects, “Outside the mosque, boys are gathering and piling old tyres. Everyone has a stick or machete. The police have disappeared from the streets. People begin to scream and burn the tyres and write on walls with charcoal: ‘we don’t want Mujahideen’” (229).
Availability, Accessibility and the Road Map for Clean, Affordable, Effective and Efficient Energy for Sierra Leone; A six years Analysis from 2006 to 2011

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Abstract- Sierra Leone has long being struggling to achieve zero energy poverty, but the main obstacle in this struggle is the technical and technological availability. However, the energy situation currently is far better than in the early 2000s. The economy of the country was estimated to have grown by approximately 7 percent in 2011 from 5 percent in 2010. Domestic revenue was believed to increase during the past years, mainly as a result of tax collection efforts and one-off payments of signature bonuses from the energy products (petroleum) exploration activities in the country. Our focus on this paper is to evaluate the range of accessibility of electricity in the country. A period of six years from 2006 to 2011 of energy revolution was carefully studied, which revealed that there is a significant improvement in the energy sector. In compliance with united nation sustainable development goals, the previous government instituted and implemented energy sector as a priority in the agenda for prosperity in 2012, which inculcated private sector companies in the provision and implementation of solar lantern and solar small home systems. This initiative led to the formation of renewable energy association in Sierra Leone.

Index Terms- Accessibility, Energy, Electricity, Implementation, initiative, policy, solar lantern

I. INTRODUCTION
Access to clean and affordable energy is a major challenge in Sierra Leone, where a majority of the population lives below the poverty line and does not have access to affordable modern energy (electricity). According to the Ministry of energy, electricity in Sierra Leone was 3%, 4%, 7.4% and 9% in 1999, 2005, 2008 and 2011 respectively. Ancient uses of biomass, in the form of charcoal and firewood still take over the energy accessibility blended with serious impacts on economic activities, livelihood, human health and environment as a whole[1]. Energy policy in Sierra Leone, is always been impacted by insecurity in hope of resource accessibility and cost, the unpredictability of gas prices and oil prices in the world market only emphasize the critical link[2]. Understanding and determining the cost of energy roadmap as a full may change the policy formulation format over time and allow policy to be directed to adress persistent aspects of the energy market in Sierra Leone. Aims of the term sustainable development and the developmental ideas of frameworks for its effective application in confined and global contexts has always being struggling to survival in Sierra Leone[3], most specially in the energy sector. Debates have been going on in expectation of the post-2015 targets for sustainable development, Millennium Development Goals (MDGs), as set out in the Sustainable Development Goals (SDGs) target for 2030, to provide clean and affordable energy for all.

A comprehensive investigation of the interconnections among energy options, and protection of the natural environment and ecosystem services for Sierra Leone as well as potential social welfares highlights an unquestionable vision for the development and implementations of renewable energy technological capacity to promote the so called green economy[4]. Sierra Leone as a small country, with less than 7.5 million population depends about 90% on fossil fuel and bio energy for its primary energy consumption.

There is consciousness in the world that the challenges linked to the assertion of renewable energy technologies for the diffusion of green energy require appropriate evaluation and dimension of the environmental and social impacts associated with the
installations, operation and maintenance. But yet still the country has a long way to achieve in a stable energy provision even in the capital city, Freetown.

Presently, like other countries, such as Saudi Arabia which produces oil and have enough energy, have introduced a new concept of water desalination to solve the fresh water problem in Saudi[5] which requires a very high energy input. The balance between the growing demand of water and energy in Sierra Leone is progressively becoming a serious challenge nationwide. The main focus of this is to assess energy situation, accessibility and the road map for clean, affordable and efficient energy for Sierra Leone; A six years Analysis from 2006 to 2011

1. BACKGROUND

Sierra Leone is located in Western Africa with a total land region of 72,325 sq. km. Stat Sierra Leone (2012), the population is projected at 6.0 million in 2011 with a growth rate of approximately 3.4%. The capital city of Freetown is placed in the western area of the country and is home to approximately 1.25 million people (~21% of the total population in Sierra Leone). Sierra Leone has a temperate climate with hot and humid weather in the wet season, which habitually start from June to November and a waterless (dry) season, which typically start from December to May. Sierra Leone has an ambient temperature range of 20°C - 35°C and relative humidity varying from an average of 75% in the wet season to about 45% in the waterless (dry) season.

Sierra Leone is measured by the UN classification as a Least Developed Country (LDC) with considerable inequality in income distribution among its people. While Sierra Leone has substantial minerals, agricultural, and fishery resources, its economic and social roadmap are not well developed, which hampers the country’s economic progress.
The economy was estimated to have grown by approximately 6 percent in 2011 from 5 percent in 2010. Home revenue increased during the past year, mainly as a result of tax collection efforts and one-off payments of mark bonuses from the energy products (petroleum) exploration activities. Inflationary pressures were however high during the first half of the year on account of the continued raise in the international prices of food and energy (fuel) and consequently pass through into domestic prices. However, the pressures eased in the second half of the year as international prices of commodities (goods) stabilized as financial and economic policies were tightened.

2. SIERRA LEONE ENERGY SCENARIO

The input priority of government in 2009 was to build up the energy sector with the endeavor of motivating both the small, medium and large economic activities in Sierra Leone. To effectively accomplish this dream, the Government switched the funds of the Ministry of Energy and Water Resources in 2009 from recurrent to domestic development expenditures in 2009. The total revised funds for non-salary/non-interest recurrent expenditures allocated to the Ministry of Energy and Water Resources amounted approximately to Le72.6 billion in 2009. Despite the fact that looking at the linkages among energy, water and land resources comprehensively[6], with the aim of improve the living standard in the country.

The government flexes the funds of the Ministry specifically for the Emergency Power Project, when it was well-known that the completion of the national hydro (Bumbuna Hydro) Electric Project would be delayed for a period of months in 2009. As a result, the funds implementation rate of the Ministry was close to the revised target with a difference of only 5.6% below the revised budget in 2009. The multipurpose utilization of water and energy from multiple sources in the country is a reality in rural settings of developing countries[7].

The total non-interest persistent expenditures in the Ministry amounted roughly to Le68.9 billion in 2009 compared to the revised funds of Le72.6 billion. The emergency power project was to be discontinued around half in 2009 after the completion of the national hydro (Bumbuna Hydro) electric project in 2009. But government resolute to broaden the emergency energy project programme to the end of 2009 as appraise when it became obvious that the full commissioning of the national hydro (Bumbuna Hydro) Electric Project would be delayed.

Governance theory can help to fill the basic needs of a country, taking into account the wider governance setting, the processes that take place within it and how they influence the
acquaintances between technical information and implementation[8].

The electricity grid production increased nearly 3.2 percent to 175.9 GWh in 2011 compared to 170.4 GWh in 2010 as a result of government commitment. Industrial utilization of electricity increased toward 32.1 GWh from around 25.6 GWh in the preceding years, an increase of 22.9 percent. Line losses remained highly projected at about 42 percent of unit generated from the generation source.

The European Investment Bank disclosed plans to team up with other donor associates namely: the World Bank, African Development Bank and Kreditanstalt fur Wiederaufbau in the region of Sierra Leone's energy sector, in the course of the West Africa Power Pool Project which upon completion will elevate the energy situation in Sierra Leone.

The global human requirement for energy is expected to increase significantly with the raise in world population that is estimated to arrive at 9.4 billion by the middle of this century, according to the intermediate modification of the 2012 Revision of World Population Prospects, the official United Nations (UN) population projections arranged by the Population dissection of the Department of Economic and Social Affairs (UNDESA, 2013)[9].

2.1. RENEWABLE ENERGY IN SIERRA LEONE

Renewable energy has become popular and intensively utilized in Sierra Leone by both government, and private individual companies with the aim of achieving clean and sustainable energy. Despite the energy poverty in the country, the demand for solar energy for the pass years has grown on a very high scale. The uptake of solar PV has been growing rapidly which led to the formation of renewable energy association (REASL) over the past few years, driven largely by the need to reduce greenhouse gas emissions from energy generation[10]. Photovoltaic (PV) systems convert the radiation coming from the Sun to the Earth’s surface into electricity which is use by the consumer.

The human life needs energy (electricity) to accept the desired in instruction to brand sure energy safety and environmental superiority[11]. At the end of 2013, the global installed capacity of solar PV reached 138 GW, with 37 GW added in 2013 alone, a 35% increase on the previous year. Achieving clean energy globally is one of the aims of many countries including the organs of United Nation (UN) such as UN-Environment (UNEP), food and agriculture organization (FAO), United Nation Development Program (UNDP) and UN-Energy.

It is unclear how the impacts connected with the fabrication and application of solar pv components (batteries, pv panels, and charge controllers) would affect the environment in comparison with the conventional supply of electricity from the grid. Solar energy has involved almost all the countries for the advantages such as clean, carbon free and inexhaustible cultivation[12].

It is suggested that renewable energy production has a very large outlook of growth, stand-alone photovoltaic (PV) system is one of the most significant applications in renewable power production, and has high realistic value in the regions which are un-electrified by national power grid, such as remote areas, desert and border outpost. However, the power of PV cell is significantly influenced by the climate of the region such as light intensity and temperature.

The optimum solar way out resolve contain a strong cyclic component which reflects the daily request profiles of electricity power consumers and the variation in the solar production. A feature of community power bank (battery storage) systems is relatively minute figure of customers which often falls into the array of 20 to 200 households[13]. Among all sustainable and renewable energy resources, solar energy has potential to fulfil these needs in Sierra Leone, because it is free and clean.

Therefore, photovoltaic cells are extremely important for the conversion of solar energy into electricity in Sierra Leone. According to the latest surveys, 90% of the solar photovoltaic products in the world market are based on first-generation crystalline (monocrystalline and polycrystalline) silicon (Si) wafers with power conversion efficiency (PCE) between 15 and 20% on the module level of 1.6 m2[14]. Sierra Leone has struggled to installed solar street light in the capital city Freetown and the entire district headquarters towns.

2.2. ENERGY UTILIZATION IN SIERRA LEONE
Energy (electricity) utilization in Sierra Leone is conquered by firewood and charcoal (biomass), which accounts for over 82% of energy used most specially in the poor communities. The largest supply of biomass energy is from wood fuel followed by charcoal. Imported energy Products (Petroleum) such as diesel, petrol, kerosene and gasoline are the next leading sources of power at approximately 14%. National grid-generated electricity makes up the rest of the power supplied to the country’s general public. Any major political change at a national level can have serious implications on the broad range of energy sector in Sierra Leone[15].

Wood fuel is known as the traditional form of energy in Sierra Leone and is used more or less exclusively by households for cooking, lighting at night in the poor rural communities and craft activities. Petroleum products are the most significant source of energy for the modern industrious energy sector including transportation and personal electricity production. Recently, foreign exchange difficulties had restrained Petroleum products importation, which were subsidized by Government. Just like in other countries, the environmental tribulations by fossil fuels and scarcity of these energies cause many governmental organizations to put motivation, encouragement conditions to create a center of attention for private companies to invest in renewable energies[16].

Presently, the Electricity sub-sector in Sierra Leone faces challenges with less than 15% access in the city and the major towns across the country. Good organization and access are constrained by high technical losses on the transmission and distribution network, which are additional compounded by low voltage quality due to overburdening of infrastructure by criminal users in the city and the three regional headquarters[17]. The stockpile of energy efficient appliances and equipments also remains low in the country. Additionally, the growth and use of Renewable Energies from Hydro, Solar, Biomass, wind and other facilities has been a slow process in Sierra Leone.

The level of energy utilization in the Sierra Leone has grown significantly between 2005 and 2011 from 1,249 ktoe to 1,865 ktoe respectively[18]. On the other hand, there remains a huge gap of suppressed demand for energy especially in the electricity sub-sector across the country. Economic expansion in mining, agriculture, trade and industry is also accelerating demand for electricity.

2.3. SIERRA LEONE ELECTRICITY SITUATION

The electricity division in Sierra Leone is rigorously challenged across production, transmission and distribution due to the poor energy infrastructure development[19]. It is estimated that less than 12% (Ministry of Energy report, 2012) of the population have access to electricity in Sierra Leone. Production capacity is inadequate and transmission and distribution networks are largely not enough and aging since the colonial time which leads to massive lose of power[20]. The largest part of the energy (electricity) network suffered harm during the eleven years civil war in Sierra Leone. Actions in recent years have determined on bringing the accessible network back to action to serve the massive demand for energy (electricity). The present energy (electricity) system covers mainly the western region (capital city) of the country and some major districts head quarter towns namely Makeni, Kono, Bo and Kenema. The bulk of energy (electricity) utilization takes place in Freetown, the capital city due to the high population concentration.

The Western area, is supplied by the Electricity Distribution and Supply Authority (EDSA) through the Electricity Generation Transmission Company (EGTC) using the national hydro (Bumbuna Hydro) Power. Bo and Kenema, two major cities in the southeast of Sierra Leone, are served by a hybridized system, the Bo-Kenema Power Services – BKPS from the generation to distribution of electricity with the rationale to alleviate energy poverty[21].

The generation capacity of BKPS consists of a thermal power plants with an installed capacity of 5 MW (Ministry of Energy report, 2012) located in the city of Bo town and a hydro power station with approximately 6 MW (Ministry of Energy report, 2012) situated in the region of Dodo village in Kenema district. Originally, there were provincial systems consisted of nearly 12 independent isolated systems located in district headquarter towns across the country. But, most of these systems were shattered during the eleven years civil war, with the exception...
of the Bo-Kenema Power Station - BKPS; some of the isolated systems have been restored such as Kono town.

Transmission and distribution lines are more than 52 years old and are poorly maintained, as a result, these networks are presently not capable of transmitting more than 37 MW of power. This poses a serious restricted access for additional generation capacity being added to the grid or in planning[22], with particular attention paid on the rising strategies to improve the abilities of electricity.

1. RESULT

Sierra Leone is extensively enriched with renewable energy potential such as (biomass, solar, hydro and wind) which is estimated at approximately 1,362,000 toe (UNDP Sierra Leone Energy profile, 2012) for the year 2011 and has a capacity of producing closely 15,674 GWh based on population baseline of 3.55 million, growth rate of 3.5% in 2011, per capita expenditure of 0.32m³/cap/ annum and 0.13m³/cap/ annum for fire wood and charcoal respectively. Most of the energy (electricity) generation and use in Sierra Leone is concentrated in the household sub-sector, where biomass, in the form of fuel wood and charcoal is used for cooking and kerosene is used for lighting by the poor rural local villages. Only around 10% of the population has access to electricity from the national power grid in Sierra Leone[23]. The mass of fire wood utilization takes place in the household sector, mainly for cooking and lighting in poor rural communities. Charcoal is also devoted in the residential sector and little percentage in the commercial sector such as bakery and fish smoking. There is some minute utilization of fuel wood and charcoal in the manufacturing sector which is normally difficult to account for.

Table 1; development of energy utilization in Sierra Leone from 2006 to 2011

<table>
<thead>
<tr>
<th>Year</th>
<th>Biomass Consumption'000 toe</th>
<th>Petroleum Products Consumption'000 toe</th>
<th>Electricity (Grid Connected) Consumption'000 toe</th>
<th>Final Energy Consumption'000 toe</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>1,254</td>
<td>196.7</td>
<td>4.4</td>
<td>1,455.1</td>
</tr>
<tr>
<td>2007</td>
<td>1,275</td>
<td>176</td>
<td>4.21</td>
<td>1,455.21</td>
</tr>
<tr>
<td>2008</td>
<td>1,297</td>
<td>199.4</td>
<td>16.79</td>
<td>1,513.19</td>
</tr>
<tr>
<td>2009</td>
<td>1,218</td>
<td>165.5</td>
<td>17.26</td>
<td>3,109.5</td>
</tr>
<tr>
<td>2010</td>
<td>1,241</td>
<td>189.3</td>
<td>19.22</td>
<td>1,449.52</td>
</tr>
<tr>
<td>2011</td>
<td>1,262</td>
<td>189.8</td>
<td>20.15</td>
<td>1,471.95</td>
</tr>
</tbody>
</table>

Source: Ministry of Agriculture and Food Security (MAFFS), 2012

1.1. THE ENERGY UTILIZATION PATTERN IN SIERRA LEONE

The structure of the energy utilization in Sierra Leone by sectors and energy carriers as reported by the national energy strategic plan of the Ministry of Energy and Water Resources (2009), it is noticed that numbers for the year 2008 and 2011 have been extrapolated from original records given in a reading by the World Bank for the year 1986 energy structure in Sierra Leone. Fire wood still represents the main power source in Sierra Leone[23]. The mass of fire wood utilization takes place in the household sector, mainly for cooking and lighting in poor rural communities. Charcoal is also devoted in the residential sector and little percentage in the commercial sector such as bakery and fish smoking. There is some minute utilization of fuel wood and charcoal in the manufacturing sector which is normally difficult to account for.

Table 2; Energy utilization pattern in 2011

<table>
<thead>
<tr>
<th>Sector</th>
<th>Fuel</th>
<th>Char</th>
<th>Petroleum</th>
<th>Elec</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOMASS</td>
<td>2006</td>
<td>2007</td>
<td>2008</td>
<td>2009</td>
<td>2010</td>
</tr>
<tr>
<td>FUEL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WOOD</td>
<td>1,212</td>
<td>1,128</td>
<td>1,146</td>
<td>1,154</td>
<td>1,166</td>
</tr>
<tr>
<td>CHARCOAL</td>
<td>44</td>
<td>55</td>
<td>66</td>
<td>78</td>
<td>86</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>`000'toe</td>
<td>1,256</td>
<td>1,183</td>
<td>1,212</td>
<td>1,232</td>
<td>1,252</td>
</tr>
</tbody>
</table>
1.2. RATE OF BIOMASS CONSUMPTION IN SIERRA LEONE

Biomass is the major source of energy used in Sierra Leone for cooking and lighting in many households and a minute percent in the commercial sector[24]. This energy source carries the highest volume of consumption in the whole energy system, representing over 80% of total energy consumed in Sierra Leone.

Table 3; Trend of biomass consumption in Sierra Leone from 2006 to 2011 ('000'toe)

| Source: Ministry of Agriculture and Food Security (MAFFS), 2012 annual report |

1.3. UTILIZATION AND SUPPLY PETROLEUM PRODUCTS IN SIERRA LEONE

Petroleum products (diesel, Petrol, gasoline and kerosene) importation has been done through refined products like Gasoline or Petrol, Diesel, Marine Fuel Oil, Kerosene and Jet A-1 due to the nonattendance of a refinery plant in Sierra Leone. The Petroleum Products are utilized mainly in the transport, industrial and residential sector. Sierra Leone at present importing all of its petroleum products, the only refinery plant in the country is no longer in operation. As shown in the table 4, Petroleum Products importation volume per annum decreased by more than 100% between 2006 and 2011. Petroleum products utilization averaged 185,295toe per annum

Table 4; Imported Petroleum Products 2000 to 2011 in (MT)

| Source: National Petroleum Unit (PU) Sierra Leone, 2012. |

Table 5; Consumption development of petroleum products from 2006 to 2011 ('0000'toe)

| Source: National Petroleum Unit (PU) Sierra Leone, 2012. |

Table 6; Grid generated electricity utilization from 2006 to 2011 ('000'toe)

| Source: Ministry of Energy, 2012 annual report |

Table 7; Power capacity installed as of may, 2012

| Source: Ministry of Energy, 2012 annual report |

http://dx.doi.org/10.29322/IJSRP.8.5.2018.p7769
### Table 8: Ownership and connection status of power plants

<table>
<thead>
<tr>
<th>Power Plant Type</th>
<th>Capacity in MW</th>
<th>Owned</th>
<th>Connected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal Plant</td>
<td>38</td>
<td>State</td>
<td>Grid</td>
</tr>
<tr>
<td>Large Hydropower plants (&gt;10MW)</td>
<td>55</td>
<td>State</td>
<td>Grid</td>
</tr>
<tr>
<td>Small Hydropower Plants (&lt;10MW)</td>
<td>6.75</td>
<td>State</td>
<td>Grid</td>
</tr>
<tr>
<td>Auto-Generators (135+39 imports)</td>
<td></td>
<td>Owned</td>
<td>Connected</td>
</tr>
<tr>
<td>Mining Company Gen.</td>
<td>88.5</td>
<td>Unknown</td>
<td>Isolated</td>
</tr>
<tr>
<td>Photovoltaic</td>
<td>0.025</td>
<td>Unknown</td>
<td>Mixed</td>
</tr>
</tbody>
</table>

**TOTAL MW:** 356.3


### POPULATION

<table>
<thead>
<tr>
<th>Year</th>
<th>Freetown</th>
<th>BO-Kenema</th>
<th>Makeni</th>
<th>Total</th>
<th>Customer</th>
<th>Population connected</th>
<th>Grid</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>38,262</td>
<td>8,752</td>
<td>315</td>
<td>47,469</td>
<td>47,469</td>
<td>284,57</td>
<td>340,734</td>
<td>4,937,456</td>
</tr>
<tr>
<td>2007</td>
<td>47,291</td>
<td>9,078</td>
<td>530</td>
<td>56,889</td>
<td>56,889</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td>54,126</td>
<td>9,555</td>
<td>621</td>
<td>63,202</td>
<td>63,202</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>64,406</td>
<td>10,280</td>
<td>621</td>
<td>75,092</td>
<td>75,092</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>67,522</td>
<td>11,309</td>
<td>696</td>
<td>79,426</td>
<td>79,426</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td>83,551</td>
<td>12,693</td>
<td>602</td>
<td>87,284</td>
<td>87,284</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## CONCLUSION

Generation capacity of reliable electricity is still too little as compared to potential require in Sierra Leon. Insufficient production capacity in combination with the poor capacities of the transmission lines led lots of industries as well as commercial and residential consumers to purchase imported diesel generators for self energy support in the country. Small generators cost on average US$350. These small generators are costly to run, because fuel costs are at present too high in Sierra Leone.

Several private investors are forced to self-generate power in order to meet their own power requirements. For example, cement manufacturing, mining companies and mobile phone operators are currently generating their own power requirement to meet the power demand of their factories, which make the living standard too high for the poor and average Sierra Leonean.

The power capacities installed by these private investors are substantial ranging from 180 to 300MW when compared to the total national installed production capacity. The necessity to self-generate makes it more costly for these companies to run company in the Sierra Leone.

In 2009, additional generation capacity was added, the Bumbuna I hydro plant about 55 MW installed capacity, about 20 MW firm production capacity in the dry season entered into operation late 2009. The Government of Sierra Leone 2009 signed a Heads of Terms with Joule Africa to further develop Bumbuna II and the additional room of Bumbuna I and a pre-feasibility study was done which reveals that the project could generate power up to 390MW with a firm capacity of 115MW in the dry season to the main national distribution system.

The government was pursuing more options to add more production capacity to enhance adequate energy for the country. Major power plants projects for power production were being developed; these power plants will run on an amalgamation of natural gas and heavy fuel oil. These projects were expected to partly tackled grid reinforcements, in order to reduce the grid...
power outage that would put a stop to the electricity from reaching potential households.

Improving the country’s energy (electricity) sector was one of the Government’s principal objectives from 2007 to 2012, this critical priority was expressed in the Government’s Agenda for Change, which was unveiled in 2008. Further than political support, the Government anticipated to devote financial resources to improve the energy (electricity) sector because of the clear positive impacts on social, environment and economic growth in the country. The Government was committed to work with the private companies, International Energy improvement Programmes and the donor society to accomplish these essential dream in the energy sector.

Figure 1; DEVELOPMENT OF ACCESS TO GRID CONNECTED ELECTRICITY FROM 2006 TO 2011

However, from the graph there is an enlargement in the access to electricity in the city and the three regional administrative headquarter towns. The increase of the population in Makeni in 2011 was as a result of the mining companies that were located in the district. As a result, the access for electricity in Makeni town was increased. The populations in Freetown keep rising as it is capital city of Sierra Leone.

Figure 2; PETROLEUM PRODUCTS UTILIZATION FROM 2006 TO 2011

As the country depends solely on petroleum products and biomass for primary energy consumption, gasoline and diesel keep raising in demand. However, the liquefied petroleum gas (LPG) consumption is still low in the country. The decrease in the consumption of kerosene from 2006 to 2011 could be as the result of the introduction of solar lantern lamps in the country in 2010 under the implementation of the renewal energy policy, which inculcated private sector companies in the provision and implementation of solar later and solar small home systems. This initiative led to the formation of renewable energy association in Sierra Leone.
1. **RECOMMENDATION**

As the world is moving toward a green economy, renewable energy is one of the pillars that is used to achieve this big dream. Therefore Sierra Leone should endeavor to follow the route that most countries in the world are using. As one of the poorest countries in the world, Sierra Leone has renewable energy potentials across the country throughout the year. Hence government should implement the renewable energy policy and set indicators in achieving the set energy priorities. Efficient and affordable energy accessibility in the country will aid the living standard and economic growth. Government should empower the energy sector by investing in the technology and providing adequate skills to carry out the administrative and technical affairs of the energy sector.

**ACKNOWLEDGMENT**

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Inhibition of Seawater Steel Corrosion Via Colloid Formation

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Abstract— The main purpose of this research was to establish the effectiveness of the V844* corrosion inhibitor for seawater on various metallic materials: carbon steel, aluminum and copper alloy at different concentrations via colloid formation. The changes in both physical and chemical properties of seawater, including pH, total hardness, alkalinity, total dissolved solids (TDS) and conductivity at different concentrations of V844 were assessed, too. The test procedure involves dissolving the V844 corrosion inhibitor (CI) powder provided by Magna International Private Limited in seawater to obtain a stock solution of 4% V844 in seawater, which was further diluted to obtain the remaining concentrations. The analysis of parameters begun when various metal species, polished beforehand, were placed into the solutions. The analysis was observed over a period of 26 days and a total of 9 sets of readings were obtained. From our observation and ear power stations burning fossil-fuels generating acidic rains, the pH can diminish to 6.

Key words- Colloidal Corrosion Inhibitor, Corrosion Inhibition Efficiency, Vappro 844 and Volatile Corrosion Inhibitors,

I. INTRODUCTION

Corrosion is a worldwide problem that strongly affects natural and industrial environments, in particular the oil and gas industry. All its numerous and diverse facilities, equipment and installations require products, methods and techniques to protect, mitigate and prevent the corrosion damage (Hummel, 2014; Raichev et al., 2009). Corrosion inhibitors (CI) are one of the modern technologies applied for the management of corrosion, for the benefit of the global economy (Garcia, 2013). II The world and Mexico in particular are undergoing an intense reformation process in the energy sector that is involving its oil, natural gas, and electricity industries. The abundant resources, such as deep-sea oil and shale gas, will be utilized; and additional refineries and pipelines will be built with the active participation of heavy foreign investments. The reform was recently approved by the Mexican parliament and is setting Petroleos Mexicanos (PEMEX), the national oil company, on the way to becoming a world oil enterprise (Layoza, 2014).

II SEAWATER CORROSION

The sea is a dynamic system in permanent motion, with complex surface currents and winds blowing over its surface generating waves that reach the coast and its facilities and installations. Seawater consists of a solution of many salts and numerous organic and inorganic particles in suspension. Its main characteristics are salinity and chlorinity and, from the corrosion point of view, dissolved oxygen (DO) content which ranges from 4 to 8 mg/L, depending on temperature and depth. Its minor components include dissolved gases – CO2, NH3 and H2S – found in seawater contaminated by urban sewage. The oceans house algae, bacteria and phytoplankton that generate about half of the oxygen in the atmosphere.

Ocean surface salinity is determined by the balance between water lost by evaporation and water gained by precipitation. The salt concentration, particularly NaCl, varies from 2.0% to 3.5%, according to the sea location and the massive addition of fresh river water. For instance, in the Red Sea, an enclosed basin, salinity at high summer temperatures is 4.1%, but in the Baltic Sea it is about 2.0% since many rivers feed into it. Seawater is slightly alkaline, with a pH about 8.0 but when it is contaminated by acids, such as in coastal regions near power stations burning fossil-fuels generating acidic rains, the pH can diminish to 6.

II. CORROSION INHIBITORS

In the last years the use of CI is rapidly expanding worldwide, for numerous technological and industrial applications; as cooling water systems (Schorr et al., 2012), steel reinforced
concrete, protected storage of military and electronic equipment (Valdez et al., 2003), acid pickling and cleaning (Carrillo et al., 2012) oil and gas industry, as additives to coatings, paints and elastomers, for corrosion avoidance in oil pipelines (Hilleary et al., 2014; Murthy, 2014). The importance and relevance of the CI technology are evident from the many patents gathered in published reviews (Inzunza et al., 2013; Bastidas et al., 2005).

To prevent atmospheric corrosion, vehicles are covered, during long periods of time, with plastic sheets impregnated with vapor phase corrosion inhibitors (VPCI), also called Volatile CI (VCI). CI slows the rate of corrosion reactions when added in relatively small amounts to the treated system. They are classified into three groups:

- Anodic inhibitors, which retard the anodic corrosion reactions by forming passive films.
- Cathodic inhibitors, which repress the corrosion reaction such as reduction of DO.
- Adsorption inhibitors, such as amines, oils, and waxes, which are adsorbed on the steel surface to form a thin, protective film that prevents metal dissolution.

IV. A COLLOIDAL CORROSION INHIBITOR

This polymolecular CI is added to seawater as a powder; then it converts into a colloidal suspension with nanoparticles dispersed in the water. These particles are adsorbed on the steel wall, forming a thin protective film. The performance of this inhibitor depends on physical, biological and chemical factors. The factors under analysis for this study include hardness, alkalinity, conductivity and pH. Other factors such as dissolved oxygen, etc. contribute as well but is not within our scope of this investigation.

We propose that the mechanism of colloidal formation functions by combining of VAPPRO 844 with Ca2+ ions present in seawater to form an inert colloidal particle which is cationic in nature. 

c2+ + Vappro 844 → Ca2+-Vappro 844 complex (1)

The colloidal particles formed adhere to the metal and prevent the onset of corrosion by preventing the loss of electrons. This causes the electrochemical cell to be incomplete and corrosion cannot occur.

The CI VAPPRO 844 powder was specially developed to combat corrosion on mild-steel and iron structures in stagnant seawater found in ballast tanks of ships and rigs.

In this study the CI was tested to establish its effectiveness, the changes in both physical and chemical properties of seawater which include pH, total hardness, alkalinity and total dissolved solids/conductivity at different concentrations, with the purpose to find the optimum CI concentration and to provide recommendations on how the effectiveness of the inhibitor can be improved to reduce corrosion.

V. RESULTS AND DISCUSSION

The practices recommended in the ASTM (ASTM, 2013) and NACE (NACE, 2000) standards were followed for evaluating the steel corrosion resistance. The measured weights for carbon steel show that at 0.05% concentration, there was the least weight loss, indicating the least corrosion. Over the period of 26 days, the steel control specimen in seawater had lost 0.58g, while those with inhibitor on the average had reduced the metal loss to about 0.10g. This was even lower than the tap-water control of 0.15g metal loss. The most effective CI concentration was 0.05% as the metal loss was only 0.03g (Table 1).

### TABLE 1

<table>
<thead>
<tr>
<th>Inhibitor Concentration, %</th>
<th>Corrosion Extent, g</th>
<th>Inhibitor Efficiency, %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.0125</td>
<td>0.19</td>
</tr>
<tr>
<td></td>
<td>0.025</td>
<td>0.11</td>
</tr>
<tr>
<td></td>
<td>0.05</td>
<td>0.03</td>
</tr>
<tr>
<td></td>
<td>0.10</td>
<td>0.05</td>
</tr>
<tr>
<td></td>
<td>0.25</td>
<td>0.09</td>
</tr>
</tbody>
</table>

The inhibition efficiency (IE) was determined using the equation:

\[ IE\% = \frac{M_u - M_i}{M_u} \times 100 \]

Where \( M_u \) and \( M_i \) are the weight loss of the steel in uninhibited and in inhibited solutions.

VI. CARBON STEEL CORROSION REACTIONS

A drop-in water hardness was observed; however, this was not reflected in the conductivity. This means that other ions present in seawater had interacted other than Ca2+ and Mg2+ ions. The proposed reactions include:

Vappro 844 + Ca2+/ Mg2+ → Gelatinous white precipitate (3)

Vappro 844 + Ca2+/ Mg2+/ Fe2+/ Fe3+ → Insoluble complex (4)

As iron underwent the anodic reaction, the cathodic reaction expresses the oxygen reduction reaction:

\[ Fe^{2+} \rightarrow Fe^{3+} + e^- \] Anodic reaction (5)

\[ O_2 + 4H^+ + 4e^- \rightarrow 2H_2O \] Cathodic reaction under acidic condition (6)

\[ O_2 + 2H_2O + 4e^- \rightarrow 4OH^- \] Cathodic reaction under neutral-alkaline condition (7)

\[ Ca^{2+} + HCO_3^- + OH^- \rightarrow H_2O + CaCO_3 \] (8)

\[ Mg^{2+} + 2OH^- \rightarrow Mg(OH)_2 \] (9)

In all the above reactions, the reduction of the hydrogen ions or the production of hydroxyl ions raised the pH of the electrolyte in fresh water. Whereas, in seawater, the cathodic reduction observed by equations 8 and 9 produced a slightly alkaline surface condition which precipitated CaCO3 and Mg(OH)2.

In both mild steel pieces at 0.25% and 0.1% Vappro 844 in seawater, with pH range 5-6, dark pits were visually observed on
the metal towards the end of the analysis. These pits were much likely to be formed at the anodic area, due to the formation of the precipitate layer.

At 0.025% Vappro 844 in seawater and below, at pH 7.5-8.0, the steel pieces started to corrode. Thus, the inhibitor was not useful at such low concentrations.

At 0.05% Vappro 844 in seawater, the pH range was about 7.0. With support from ferroxyl indicator test and weight loss test, it proved that there was optimum corrosion inhibition at this concentration of Vappro 844 in seawater, though with some staining of the metal (Figure 1).

Figure 1: Carbon steel samples exposed to seawater and 0.05% Vappro 844 before (a) and after (b) immersion in ferroxyl indicator.

VII. APPLICATIONS

Oil tankers, also called petroleum tankers, are ships specially designed and constructed at American and Asian shipyards, for the bulk transportation of crude oil from the extraction sites (onshore and offshore) to the refineries. Smaller tankers are used to move refined products: fuel derivatives to the market. Since oil tankers were involved in damaging oil spills in the last years they are strictly regulated and controlled (Heiderbach, 2011; Chilingar, 2008).

Petroleum steel tanker (Figure 2) are cheaper and more efficient for oil transportation than submarine pipelines installed on the seabed, for instance to deliver oil from North Africa to South Europe. In its way back, the tanker holds are full of seawater to provide adequate stability to the tanker (Figure 3). The CI is added to this ballast water. Pipes, storage tanks (Figure 4) and pumps, using water for hydro test are dosed with the same CI (Schorr et al., 2015).

Figure 2: Petroleum transportation tanker showing holds.

Figure 3: Ballast water tank

Figure 4: Fire protection water storage tank.

VIII. CONCLUSIONS

From the experimental observations, mild steel was protected with Vappro 844 corrosion inhibitor at 0.05% inhibitor concentration, having only slight stains after a period of 26 days. Changes in seawater parameters were observed when the powder CI was introduced.

Vappro 844 powder contributed to the increase of conductivity when it was introduced into the solution, however, when it reacted with the ions in seawater to form colloids, the conductivity dropped. The introduction of CI made the solution more acidic due to the mild acidic properties of Vappro 844.

The higher concentration of inhibitor added, the lower the alkalinity. For hardness, it showed that the calcium and magnesium ions were indeed used up in the reaction. This proved that the Vappro 844 powder followed the proposed reaction mechanism to form colloids.

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A Novel method of Stabilization of Anthocyanins using Beetroot peel and Red cabbage

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Abstract:
Anthocyanins are phytochemicals belonging to class of flavonoids and polyphenolic molecules. In the current investigation, extraction of Anthocyanin pigments from beetroot peel and red cabbage leaves by cold maceration method was more effective expressing 4.2% yield when compared to Soxhlet method of 2% yield. Various methods of fractionation were implied namely column chromatography, analytical thin layered chromatography and preparative thin layered chromatography. The separated compounds in analytical TLC showing fluorescence with reference to flavanoid property were isolated through purification. Stabilization was achieved through self-association with co-pigmentation technique. Co-pigment yielded high anthocyanin (0.878mg/l), flavanoid (10.4mcg/ml) and antioxidant content (706mcg/ml) when compared to red cabbage and beetroot peel extracts. Co-stabilized anthocyanin pigment was analysed further with pH indicator method for authentication.

Key words : Phytochemicals, Anthocyanins, cold-maceration, co-pigmentation, pH indicator

1. Introduction:
Phytochemicals are naturally occurring plant chemicals that provide odour, colour and flavour. Some of the commonly identified phytochemicals are carotenoids, flavanoids (anthocyanins, quercetin), indoles and glucosinolates etc., Anthocyanins are defined as floral secondary metabolite pigment ranging from blue to red intensity depending on pH and exists as glycosides in combination with glucose or cellulose molecules.[1] Anthocyanins are stored in vacuoles which are slightly acidic in nature.[2] They check the imbalance of oxidative and antioxidative factors, thus protecting health against higher risk of several cancer forms. They help in lowering blood glucose by improving insulin resistance, protecting beta cells and also reduces obesity.[3] they are helpful in treating chronic inflammation, which is related to cardiovascular illness, arthritis, joint diseases, type 2 diabetic issues, Alzheimer’s disease, dementia and many other illnesses. Anthocyanins are found to have 150 types of flavanoids having antioxidant property, hormone supplementation property (reduces menopausal symptoms and osteoporosis), stimulating property for few enzymes and interference with DNA replications.[4] Flavanoid metabolism and anthocyanin synthesis takes place in the cytosol of plant cell and finally accumulates in cell vacuole.

Stability of anthocyanins are widely studied with reference to minimizing processing difficulty and economic viability. As Anthocynins are water soluble, they are unstable and easily susceptible to degradation through factors such as light, oxygen, temperature and pH.[4] Various methods have been theoretically explained for the stabilization of anthocyanin pigment. Among them, association and encapsulation methods are strongly considered. Association is the combination of two or more pigments bound chemically to increase stability and coloration ; which is further sub divided into self association, metal complexation, inter and intra association co-pigmentation.

Beetroots have a class of red and yellow indole derived pigments found in Caryophyllales plants where they replace anthocyanin pigments. Red cabbage is a rich source of anthocyanin and contains 36 different types of anthocyanins. Hence it is used for purpose of co-pigmentation. Beetroot peel is selected as one of the pigment source as it is non-edible and proved to contain many functional properties such as antioxidant, phenolic, and flavanoid content which can be utilized for economic purpose in industries.

The aim of the study is to develop the most effective and efficient method of stabilization of anthocyanins pigments from a non -edible beetroot peel and whole red cabbage. Also Different functional properties were compared to optimize a novel method of co-pigmentation for industrial production.

2. Materials and methods:
Plant materials such as red cabbage and beetroot were procured from a local supermarket and surface sterilized with mild detergent (0.1% tween-20)

2.1. Extraction methods: Two methods of extraction were used such as cold maceration and Soxhlet method.

2.1.1. Soxhlet method: 25g of 72 hours shade dried source were placed in soxhlet apparatus for 14 hours under 45°C.

2.1.2 Cold maceration method: 25g of fresh chopped source were incubated at 4°C for 14 hours with frequent stirring.

The filtrates from both methods were filtered through Whatman’s filter paper No1 Further evaporated through Rotary evaporator and yield in terms of percentage was compared.

\[ \% \text{ yield} = \frac{\text{weight of extract(g)}}{\text{weight of dry powder(g)}} \times 100 \]

2.2. Purification of anthocyanins: Fractionization was done by Column and Thin layered chromatography.

2.2.1. Column Chromatography: A wisp of cotton followed by silica hexane slurry was filled to 3/4th of the column without any air gap. The extracts were passed through the column and fractions was collected.

2.2.2. Analytical TLC was performed to check for fluorescne under UV light. Mobile phase included butanol: glacial acetic acid: water (3:2:1/v/v/v). The fluorescene induced analyte was scarred, diffused in HPLC grade methanol further the filtrate was rotary evaporated (Preparative TLC). The Rf value was calculated and compared.

2.3. Stabilization of Anthocyanins: This was done by following the theoretical principles of Cavalcanti(2011).[9] Two equal extracts were self associated in a stabilized condition of 4°C air tight dark glass container with 4 hours incubation. The partially purified beetroot peel and red cabbage extracts along with co-stabilized pigment was evaluated in triplicates.

2.4. pH Indicator: The obtained co-pigment were checked for pH indicative property using the protocol of Bondre, 2012[11]

2.5. Estimation of anthocyanin by pH differential method was done by AOAC method followed by Lee and Durst, 2005[5] with slight modification of 1:1 dilution of sample and buffer. 1ml of sample was taken in two different aliquots and diluted separated with pH1 and pH4.5 buffer; absorbance was read at 520 and 700nm.

2.6. Antioxidant property: Quantification of ascorbic acid/vitamin C was done by DNPH method and reducing power assay.

2.6.1. DNPH Method: By using 0.1ml of Brominated sample against a standard graph of ascorbic acid. 1ml of 2%DNPH reagent and 2 drops of thiourea was added and incubated, further red osazones crystals were treated with 80% sulphuric acid. Absorbance was read at 450nm

2.6.2. Reducing Power Assay was done with different concentration of samples(0.2-1ml) by the following the protocol of Jayanthi and Lalitha (2011)[4]. Reducing power was measured by varying concentration of the extract and contact time.

2.7. Flavanoid Property was quantified by Aluminium Chloride Method followed by Pallab (2012)[6]; 0.5ml of sample ,1.5ml of methanol was mixed with 0.1ml of 10% aluminium chloride ,0.1ml of 1M potassium acetate; Incubated for 30 minutes and absorbance read at 415nm against standard gallic acid curve.

2.8. Phenolic Property: Phenolicacid content was estimated through Folin-Ciocalteu method followed by Ronald (2011)[8].

3. Results and discussion:

3.1. In the present study, Extraction of anthocyanin pigments from beetroot peel, red cabbage leaves by cold maceration method was more effective when compared to Soxhlet method. This indicates that anthocyanin pigments are less stable at high temperature and they get degraded fast (browning) at increased temperature (80-90degree). Cold maceration method being more efficient showed yield of 4.2% while Soxhlet method expressed 2% of yield.

3.2. The extracted pigments were purified by passing through a packed column prepared with silica hexane slurry. A small aliquot of the sample was loaded to the column and different fractions of elute was collected and further these fractions were purified by Thin layer chromatography using butanol, acetic acid and water as the mobile phase. Rf value of the beetroot peel extract was 1.96(red-purple band);red cabbage extract was 1.39 (red-purple band) and 1.96(yellow band). TLC guided approach was used to screen and purify bioactive compounds showing fluorescenc under UV transluminator. (Plate :1)
3.3. Total anthocyanin content was found to be more in red cabbage (34.64mg/l) and moderate in co-stabilized pigment (0.878mg/l) and less in beetroot peel (0.638mg/l); and was compared with standard (44.8mg/l). The pH differential method is based on the structure of anthocyanins at different pH. Although nearly all monomeric anthocyanins are in the hemiketal form at pH 4.5, a small proportion are in quinoidal form or the flavylum form, which will contribute to the absorbance.

3.4. Antioxidant property (Vitamin C) was estimated from the regression equation in the standard plot of ascorbic acid (\( y = 0.005x + 0.028, \ r^2 = 0.990 \)) (figure:2a) in 3 sources. Beetroot peel contained less antioxidant property and co-pigment contained higher antioxidant. (figure:2b) The absorbance of red colourosazones formed is proportional to the quantity of ascorbic acid present in the solution before oxidation. The anthocyanins are the major of flavanoids in plants. Beetroot peel expressed 336.6±11.5, red cabbage expressed 386.6±5.7 and copigment showed 706.6±5.7.

3.5. Reducing capacity of a compound may serve as a significant indicator of its potential antioxidant activity. At the minimum concentration (2mcg/ml) co-pigment ascorbic acid and other sources showed less activity and at the maximum concentration (10mcg/ml) co-pigment has an increased amount of reducing power compared to standard and other sources. (Figure:3) The reducing capabilities of the anthocyanin pigments of beetroot peel and red cabbage was found to be in dose dependent manner to each other. The co-pigmented anthocyanin was in correlation with the Standard Ascorbic acid activity.

3.6. The result of total flavanoid content was calculated from regression equation of the standard plot (\( y = 0.051x - 0.003, \ r^2 = 0.998 \)) (figure:4) Flavanoid content was more in co-pigment and least in red cabbage similar to the phenolic content. Characterization of Red cabbage showed an concentration of 3.4mcg/ml flavanoid content; 59mcg/ml of vitamin C; and 75mcg/ml of phenolic content. Beetroot peel expressed increased amount of flavanoid (3.5mcg/ml) and phenolic content (170mcg/ml) and decreased amount of antioxidant (37mcg/ml) when compared with red cabbage extract. Characterization of co-stabilized anthocyanin pigments showed an increase amount of flavanoid (4.8mcg/ml) (figure:5), increased antioxidant vitamin C content (75mcg/ml) and increased amount of reducing power (10mcg/ml) and reduced amount of phenolic content (90mcg/ml) when compared to other sources (figure:5).
Figure 3: Reducing power assay compared between standard ascorbic acid, copigment, red cabbage, and beetroot peel. Copigment showed highest concentration among all.

Figure 4 & 5: Gallic acid standard curve for flavonoid analysis.[left] Flavonoid quantification done by aluminium chloride method, n=06. Beetroot peel expressed 6.4mcg±1.08, red cabbage 6.93mcg/ml±0.9 and copigment 10.4±0.5 [right]

Figure 6: Phenolic acid assay by FC method, n=06. Beetroot peel expressed 2.5g/ml±0.2; red cabbage 1.03g/ml±0.05 and copigment 1.26g/ml±0.2 [mean±S.D].

Conclusion:

Outcome of the present study showed that a commonly available plant material which goes as waste in every house hold, like beetroot peel can be a good source of pigmentation. We noticed that the cold maceration extract method was very effective for the optimization of anthocyanin pigment by reporting its functional properties when compared to other methods. Self association means of co-pigmentation was achieved to be most efficient method for the industrial production of stabilized anthocyanins.

In future, this method can be extrapolated to commercial purpose in food and pharmaceutical industries to attract consumers with high benefits and aesthetic properties.

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References


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Integrated Management of Faba Bean Chocolate Spot (*Botrytis Fabae Sard.*) Through Host Resistance, Intercropping and Fungicide Applications in Arsi, Ethiopia

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Abstract - Chocolate spot causes substantial yield losses in various cropping seasons in Ethiopia and in many parts of the world wherever faba bean grows. Thus, integrated management of faba bean chocolate spot (*Botrytis fabae Sard.*) was studied using the moderately tolerant variety, ‘Degaga’ (R-878-3) and local cultivar during the 2012/13 main cropping season at Bekoji and Kulumsa Agricultural Research Centers in Arsi, Ethiopia. The experiment was laid out in a randomized complete block design in a factorial combination of two faba bean cultivars, two cropping systems (Degaga- and Local-barley intercropping in 1:1 ratio) and four spray intervals of fungicide (Chlorothalonil) applied at 7, 14 and 21 days after the onset of disease at a rate of 2.5kg a.i ha-1 and unsprayed control with three replications. Chocolate spot infection was more prevalent at Kulumsa with a significant (P<0.001) amount of disease observed as compared with Bekoji (P < 0.05). Applications of fungicide and cropping systems considerably reduced disease incidence, severity, area under the disease progress curve, disease progress rate, and increased faba bean grain yield and system productivity by a mean relative yield advantage of 31 and 39% at Bekoji and Kulumsa, respectively. Reduction in disease severity was observed in all fungicide sprayed intercropping systems and sole crops compared with the corresponding unsprayed intercrops and sole controls, with a general disease reduction from 35.4 to 23.4% at Bekoji and 68.9 to 40.9% at Kulumsa. However, considering the economics of fungicide application against the faba bean chocolate, maximum net profit was recorded from medium spray intervals (Local FB:BA 14 -days) as compared with the other treatments at both locations. Faba bean-barley integrated management practice proved to help in reducing chocolate spot and increasing productivity and income especially under subsistence farming conditions in the country.

Index Terms - *Botrytis fabae; Chocolate spot; Epidemics; Fungicide; Intercropping; Vicia fabae*

I. INTRODUCTION

Faba bean (*Vicia fabae* L.) is one of the major pulse crops grown in the highlands of Ethiopia and covers nearly 370,000 hectares of land with annual production of about 450,000 metric tons. The crop grows from middle to high altitude areas of Ethiopia, 1800 to 3000 m as l with annual rainfall of 700-1000 mm [11]. The growing importance of faba bean as an export crop in Ethiopia has led to a renewed interest by farmers to increase the area under production [14]. However, the average yield of this crop under small-holder farmers in Ethiopia ranges from 1.0 to 1.2 t ha-1 [1], as compared with its potential (3 t ha-1) under farmers’ conditions that employ improved crop management [8].

In spite of its huge importance, the productivity of faba bean has been constrained by several biotic and abiotic factors. Among the biotic factors chocolate spot of faba bean is considered to be the most important and destructive in Ethiopia causing the yield loss of up to 61% on susceptible cultivars [5]. In unprotected crops, the disease can reduce yields by 30-50 per cent under conditions favorable for disease development [13]. Varied cropping systems and production situations can also influence disease occurrence, epidemic development and damage to crops. The mixed cropping of faba bean with barley and maize contributed to the slowing of chocolate spot epidemics and increased yield of faba bean [15].

Early sowing integrated with fungicide application can be recommended for effective management of chocolate spot on faba bean [4, 6]. Fungicides are used because they provide effective and reliable disease control, deliver production benefits in the form of crop yield and quality at an economic price, and can be used safely [12]. Chlorothalonil should provide a base of preventative fungicide control with applications made two or more usually three sprays throughout the season [10]. Short fungicide spray intervals (7-days) reduced the disease epidemics and increased faba bean grain yield and system productivity [15, 17].
Therefore, this experiment was designed to evaluate the effect of host resistance; intercropping and fungicide applications alone and in integration on epidemics of faba bean chocolate spot management and yield of faba bean as well as land equivalent ratio, and cost and benefit of fungicide application.

II. MATERIALS AND METHODS

Experimental site

Field experiment was conducted at Bekoji and Kulumsa Agricultural Research Centers (KARC), Arsi Zone, Oromia Regional State during the 2012/13 main cropping season. Agro-ecological and edaphic data of the study sites are indicated in the table below.

Table 1. Description of the study sites

<table>
<thead>
<tr>
<th>Description</th>
<th>Bekoji</th>
<th>Kulumsa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Altitude (m.a.s.l)</td>
<td>2800</td>
<td>2200</td>
</tr>
<tr>
<td>Latitude and Longitude</td>
<td>7° 32’N and 39° 15’E</td>
<td>8° 02’N and 39°10’E</td>
</tr>
<tr>
<td>Temperature (°C) (min. and max.)</td>
<td>7.9 and 18.6</td>
<td>9.1 and 23.1</td>
</tr>
<tr>
<td>Average Annual Rainfall (mm)</td>
<td>1015</td>
<td>787</td>
</tr>
<tr>
<td>Soil Type</td>
<td>Reddish brown to clay</td>
<td>Verticluvisol and Luvsols</td>
</tr>
<tr>
<td>Distance from A.A and Asella (km)</td>
<td>231 South-east, 56 South-east and 56 North</td>
<td>167 South-east, and 9 North</td>
</tr>
</tbody>
</table>

Source: Kulumsa Agricultural Research Center

Experimental design and treatments

The experiment was laid down in a randomized complete block design (RCBD) in a factorial combination of two faba bean cultivars (Degaga, and local), two cropping systems (intercropping and sole faba bean) and four levels of fungicide sprays with three replications. Improved faba bean cultivar, Degaga (R-878-3) which is moderately tolerant to chocolate spot and improved six-row food barley (EH-1307) that was used as a component of the experiment for intercropping were planted. The treatments were intercropping of faba bean with barley in 1:1 ratio, i.e. between each row of faba bean 1 row of barley at the recommended seed rate of 200kg ha\(^{-1}\) for faba bean in both sole and intercrop culture. One faba bean seed per hole was planted at 0.4m distance between rows and 0.1m within a row. Barley seed was sown in rows at a distance of 0.2m between the rows. Each treatment assigned randomly to each plot. Each plot has an area of 6.4m\(^2\) (4.0m length and 1.6m width) and contained a total of 4 rows of faba bean with two harvestable central rows. Standard agronomic practices were followed and 100kg ha\(^{-1}\) of fertilizer (DAP) was applied for all treatments.

Disease assessment

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Year released</th>
<th>Plant height (cm)</th>
<th>Days to maturity</th>
<th>Yield (t ha(^{-1}))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degaga (R-878-3)</td>
<td>2002</td>
<td>122</td>
<td>125</td>
<td>3.2</td>
</tr>
<tr>
<td>Local DNA</td>
<td>2002</td>
<td>122</td>
<td>125</td>
<td>3.2</td>
</tr>
<tr>
<td>Barley (EH-1307)</td>
<td>2006</td>
<td>109</td>
<td>130</td>
<td>1.0</td>
</tr>
</tbody>
</table>

DNA = Data not available
Degaga = moderately tolerant faba bean (FB)
Local = susceptible local faba bean (FB)
Barley = Improved food barley (BA)

Area under the disease progress curve (AUDPC) values was calculated for each treatment by mid point rule between assessed dates [2] using the following formula.

\[
\text{AUDPC} = \sum_{i=1}^{n-1} [0.5 (x_i + x_{i+1})] [t_{i+1} - t_i]
\]

Where, \(n\) = the total number of observation, \(t_i\) = the time of the \(i\)th assessment in days from the first assessment date and \(x_i\) = disease severity index at \(i\)th assessment. Disease severity was expressed in percentage and AUDPC in %-days. Apparent infection rate was obtained from disease progress curve after disease severity data fit to Logistic Model \(\ln [y/(1-y)]\) [18].

Grain yield assessment

Faba bean grain yield was harvested from two middle rows of each plot, leaving two outer rows on both sides to avoid the border effect. The yield data of each plot was converted to tones per hectare. The yields of faba bean and barley were used to calculate Land Equivalent Ratio (LER), Partial LER (individual crop’s LER) and total LER (sum of individual crop LER) as indices to evaluate the productivity of cropping system using the following formula [19]:

\[
\text{Partial LER} = \frac{Y_{ii}}{Y_{jj}} \text{ Total LER} = \frac{Y_{ij}}{Y_{ii}} + \frac{Y_{ji}}{Y_{jj}} \text{ Where } Y_{ii} \text{ and } Y_{jj} \text{ denote yields of crops } i \text{ and } j \text{ in sole culture, and } Y_{ij} \text{ and } Y_{ji} \text{ the corresponding yields of intercropping.}
\]

Cost and benefit analysis

Prices of grain per 100 kg and total sale from one hectare, price of Chlorothalonil to spray one hectare for each treatment, and cost of labor for spray were considered. Prices of grain were
obtained from local markets and total average sale from one hectare was computed. Price of Chlorothalonil was birr 287.50 kg⁻¹. The total price incurred to spray one hectare land in every 7, 14 and 21 days intervals was also calculated. Cost of labor rent for fungicide spray was 28 birr per man-days. Based on the recorded data, cost and benefit analysis was performed using partial budget analysis [9].

**Data analysis**

Analysis of variance was performed for disease parameters (percentage severity, AUDPC and disease progress rate), seed yield and 100-seed weight to know the effect of main treatments and their interactions. The progress of disease severity for different treatments was analyzed after it was transformed using logistic model ln \[\frac{y}{1-y}\] [2] to determine the disease progress rate from the linear regression. The initial and final percentage severity values presented in the tables were based on the transformed data. Linear regression and ANOVA were analyzed using the SAS GLM procedure [16]. Means were separated using least significant differences (LSD).

### III. RESULTS

**Disease assessment**

**Chocolate spot severity**

Variation among the mean initial and final disease severities indicated in Table 3. Faba bean chocolate spot severity on moderately tolerant, Degaga and local susceptible cultivars at different DAP (Days after planting) had shown in Table 4.

Analysis of variance for mean final disease severity resulted in a significant difference (\(P < 0.05\)) at Bekoji and (\(P < 0.01\) and \(0.001\)) initial and final disease severities at Kulumsa among the treatments. Maximum mean final disease severities (35.4) at Bekoji and (68.9) at Kulumsa were observed on Local:BA unsprayed treatments.

**AUDPC and disease progress rate**

Significant variations (\(P < 0.001\)) were observed among the cultivars, cropping systems and fungicide applications in AUDPC during the crop season at the two locations (Table 3). The highest AUDPC (28.2%) at Bekoji and (45.8%) at Kulumsa were recorded on local FB:BA unsprayed treatments. The rate of disease progress was also significantly varied among the treatments at the two locations in most of the days after planting. The highest disease progress rates (0.059 and 0.058 units per day) had shown from cultivar Local:BA unsprayed and Local:BA:21-days spray interval, respectively, at Bekoji. Similarly, the highest rate (0.105 units per day) was recorded at Kulumsa. The lowest disease progress average rates (0.032 and 0.034 units per day) and (0.060 and 0.064 units per day) were observed on sole Local:7- and 14-days spray interval, and non-intercropped Degaga:7- and 14-days spray interval at Bekoji and Kulumsa, respectively.

![Figure 1. Faba bean chocolate spot (Botrytis fabae) progress curves on susceptible local cultivar as affected by cropping systems and different levels of chlorothalonil application at Bekoji and Kulumsa during the 2012/13 cropping season](http://dx.doi.org/10.29322/IJSRP.8.5.2018.p7770)
DAP: Days after planting

Figure 2. Faba bean chocolate spot (*Botrytis fabae*) progress curves on moderately tolerant cultivar as affected by cropping systems and different levels of chlorothalonil application at Bekoji and Kulumsa during the 2012/13 cropping season.

Table 3. Effect of cropping systems and different levels of chlorothalonil application on faba bean chocolate spot (*Botrytis fabae*) severity, AUDPC and disease progress rate.
Grain yield

Faba bean grain yield was significantly affected (P < 0.001) by the cropping systems and spray intervals at Bekoji and Kulumsa (Table 4). The highest yield (4.1 t ha\(^{-1}\)) was obtained from Degaga:7-days spray interval at Bekoji and (3.1 t ha\(^{-1}\)) both from Degaga:7- and 14-days spray interval at Kulumsa. The lowest yields (1.2 and 0.3 t ha\(^{-1}\)) at Bekoji and Kulumsa were obtained from Local:BA unsprayed similar treatments, respectively.

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Cropping System</th>
<th>Spray Frequency</th>
<th>BEKOJI (PSI)(^{1})</th>
<th>BEKOJI (PSI)(^{1})</th>
<th>AUDPC C (%-days)</th>
<th>Average (r)</th>
<th>KULUMSA (PSI)(^{1})</th>
<th>KULUMSA (PSI)(^{1})</th>
<th>AUDPC C (%-days)</th>
<th>Average (r)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local</td>
<td>Sole Faba bean</td>
<td>7-day</td>
<td>2.9</td>
<td>23.4</td>
<td>16.8</td>
<td>0.034</td>
<td>14.7</td>
<td>49.0</td>
<td>37.0</td>
<td>0.074</td>
</tr>
<tr>
<td></td>
<td></td>
<td>14-day</td>
<td>2.8</td>
<td>24.1</td>
<td>15.1</td>
<td>0.032</td>
<td>18.7</td>
<td>59.9</td>
<td>42.6</td>
<td>0.091</td>
</tr>
<tr>
<td></td>
<td></td>
<td>21-day</td>
<td>2.5</td>
<td>29.1</td>
<td>17.5</td>
<td>0.035</td>
<td>16.9</td>
<td>65.7</td>
<td>42.9</td>
<td>0.095</td>
</tr>
<tr>
<td>Faba</td>
<td></td>
<td>7-day</td>
<td>3.5</td>
<td>27.4</td>
<td>19.3</td>
<td>0.041</td>
<td></td>
<td></td>
<td>35.4</td>
<td>0.068</td>
</tr>
<tr>
<td>Barley</td>
<td></td>
<td>14-day</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>58.1</td>
<td>0.089</td>
</tr>
<tr>
<td></td>
<td></td>
<td>21-day</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>68.4</td>
<td>0.105</td>
</tr>
<tr>
<td></td>
<td>Unsprayed</td>
<td>7-day</td>
<td>4.1</td>
<td>29.4</td>
<td>23.9</td>
<td>0.050</td>
<td>17.8</td>
<td>58.1</td>
<td>42.2</td>
<td>0.089</td>
</tr>
<tr>
<td></td>
<td></td>
<td>14-day</td>
<td>4.0</td>
<td>32.6</td>
<td>28.2</td>
<td>0.058</td>
<td>19.1</td>
<td>68.4</td>
<td>45.8</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>21-day</td>
<td>4.8</td>
<td>35.4</td>
<td>27.2</td>
<td>0.059</td>
<td>22.1</td>
<td>68.9</td>
<td>45.5</td>
<td>0.105</td>
</tr>
<tr>
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<td>7-day</td>
<td>3.0</td>
<td>28.8</td>
<td>18.4</td>
<td>0.038</td>
<td>17.4</td>
<td>66.6</td>
<td>42.8</td>
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</tr>
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<td>3.3</td>
<td>25.2</td>
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<td></td>
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<td>4.8</td>
<td>29.6</td>
<td>22.4</td>
<td>0.048</td>
<td>14.4</td>
<td>57.2</td>
<td>37.2</td>
<td>0.078</td>
</tr>
<tr>
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<td></td>
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<td>5.1</td>
<td>27.5</td>
<td>18.8</td>
<td>0.049</td>
<td>13.5</td>
<td>43.2</td>
<td>31.6</td>
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</tr>
<tr>
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<td>28.4</td>
<td>23.8</td>
<td>0.052</td>
<td>19.8</td>
<td>51.6</td>
<td>38.6</td>
<td>0.078</td>
</tr>
<tr>
<td></td>
<td></td>
<td>21-day</td>
<td>4.3</td>
<td>31.6</td>
<td>25.7</td>
<td>0.054</td>
<td>22.1</td>
<td>61.3</td>
<td>43.1</td>
<td>0.099</td>
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<td>5.1</td>
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<td>19.9</td>
<td>59.9</td>
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<td></td>
<td>59.9</td>
<td>0.085</td>
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<td>21-day</td>
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<td></td>
<td>59.9</td>
<td>0.085</td>
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<td>7-day</td>
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<td>29.7</td>
<td>21.1</td>
<td>0.046</td>
<td>16.7</td>
<td>56.4</td>
<td>37.3</td>
<td>0.078</td>
</tr>
<tr>
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<td>Sole Faba bean</td>
<td>7-day</td>
<td>4.0</td>
<td>28.6</td>
<td>21.5</td>
<td>0.03</td>
<td>17.9</td>
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<td>39.3</td>
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</tr>
<tr>
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<td>7-day</td>
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<td></td>
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<td></td>
<td></td>
<td>14-day</td>
<td></td>
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<td></td>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

\(^{1}\)Initial percent severity index at 65 and 57 DAP at Bekoji and Kulumsa, respectively

\(^{2}\)Final percent severity index at 114 and 99 DAP at Bekoji and Kulumsa

AUDPC: Area under disease progress curve

(r): Disease progress rate

NS: Non-significant

**Grain yield**

Faba bean grain yield was significantly affected (P < 0.001) by the cropping systems and spray intervals at Bekoji and Kulumsa (Table 4). The highest yield (4.1 t ha\(^{-1}\)) was obtained from Degaga:7-days spray interval at Bekoji and (3.1 t ha\(^{-1}\)) both from Degaga:7- and 14-days spray interval at Kulumsa. The lowest yields (1.2 and 0.3 t ha\(^{-1}\)) at Bekoji and Kulumsa were obtained from Local:BA unsprayed similar treatments, respectively.
Table 4. Effect of chocolate spot on faba bean grain yield and 100SW under intercropping and chlorothalonil applications at Bekoji and Kulumsa

<table>
<thead>
<tr>
<th>TREATMENT</th>
<th>BEKOJI</th>
<th>KULUMSA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Grain yield (t/ha)</td>
<td>100 SW (g)</td>
</tr>
<tr>
<td>Local:7d</td>
<td>3.0&lt;sup&gt;b&lt;/sup&gt;</td>
<td>61.8&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Local:14d</td>
<td>3.1&lt;sup&gt;b&lt;/sup&gt;</td>
<td>59.4&lt;sup&gt;ab&lt;/sup&gt;</td>
</tr>
<tr>
<td>Local:21d</td>
<td>2.6&lt;sup&gt;bcd&lt;/sup&gt;</td>
<td>60.1&lt;sup&gt;ab&lt;/sup&gt;</td>
</tr>
<tr>
<td>Local:BA:7d</td>
<td>1.4&lt;sup&gt;ef&lt;/sup&gt;</td>
<td>55.1&lt;sup&gt;bc&lt;/sup&gt;</td>
</tr>
<tr>
<td>Local:BA:14d</td>
<td>1.3&lt;sup&gt;ef&lt;/sup&gt;</td>
<td>54.5&lt;sup&gt;bc&lt;/sup&gt;</td>
</tr>
<tr>
<td>Local:BA:21d</td>
<td>1.3&lt;sup&gt;f&lt;/sup&gt;</td>
<td>54.5&lt;sup&gt;bc&lt;/sup&gt;</td>
</tr>
<tr>
<td>Local:BA</td>
<td>1.2&lt;sup&gt;f&lt;/sup&gt;</td>
<td>58.7&lt;sup&gt;ab&lt;/sup&gt;</td>
</tr>
<tr>
<td>Local (Sole)</td>
<td>3.2&lt;sup&gt;b&lt;/sup&gt;</td>
<td>58.7&lt;sup&gt;ab&lt;/sup&gt;</td>
</tr>
<tr>
<td>Degaga:7d</td>
<td>4.1&lt;sup&gt;a&lt;/sup&gt;</td>
<td>54.9&lt;sup&gt;bc&lt;/sup&gt;</td>
</tr>
<tr>
<td>Degaga:14d</td>
<td>3.4&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>55.0&lt;sup&gt;bc&lt;/sup&gt;</td>
</tr>
<tr>
<td>Degaga:21d</td>
<td>3.3&lt;sup&gt;b&lt;/sup&gt;</td>
<td>55.4&lt;sup&gt;bc&lt;/sup&gt;</td>
</tr>
<tr>
<td>Degaga:BA:7d</td>
<td>1.9&lt;sup&gt;def&lt;/sup&gt;</td>
<td>50.4&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>Degaga:BA:14d</td>
<td>2.2&lt;sup&gt;cde&lt;/sup&gt;</td>
<td>50.4&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>Degaga:BA:21d</td>
<td>1.8&lt;sup&gt;ef&lt;/sup&gt;</td>
<td>50.8&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>Degaga:BA</td>
<td>1.9&lt;sup&gt;ef&lt;/sup&gt;</td>
<td>49.7&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>Degaga (Sole)</td>
<td>2.9&lt;sup&gt;bc&lt;/sup&gt;</td>
<td>57.3&lt;sup&gt;ab&lt;/sup&gt;</td>
</tr>
<tr>
<td>Mean</td>
<td>2.4</td>
<td>55.4</td>
</tr>
<tr>
<td>LSD (0.05)</td>
<td>11.7</td>
<td>4.0</td>
</tr>
<tr>
<td>C.V</td>
<td>18.8</td>
<td>5.5</td>
</tr>
</tbody>
</table>

100 seed weight was also significantly affected (P < 0.001) at Bekoji whereas it wasn’t at Kulumsa (Table 4).

Partial and total LERs for faba bean and barley were significantly varied (P < 0.001) at both locations except the total LER at Bekoji (Table 5). The highest total LER of 1.36 was recorded from Degaga:BA:14-days spry interval followed by 1.27 from both Degaga:BA and Local:BA:7-days spray interval at Bekoji and the highest LERs of 1.65 and 1.41 were obtained from Local:BA:7- and 14-days spray interval, respectively, at Kulumsa.

Table 5. Effect of cropping systems (FB cultivars and barley) on partial and total land equivalent ratios (LERs)

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Bekoji</th>
<th>Kulumsa</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Partial LER</td>
<td>Total</td>
</tr>
<tr>
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<td>0.44</td>
<td>0.83</td>
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<tr>
<td>Local:BA:14d</td>
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<td>0.72</td>
</tr>
<tr>
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<td>0.93</td>
</tr>
<tr>
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<td>0.58</td>
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<tr>
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</tr>
<tr>
<td>Barley (Sole)</td>
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<td>1.00</td>
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</tr>
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<td>Degaga:BA:14d</td>
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<tr>
<td>Degaga:BA</td>
<td>0.66</td>
<td>0.41</td>
</tr>
<tr>
<td>Location</td>
<td>Treatment</td>
<td>No. of Sprays</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------</td>
<td>---------------</td>
</tr>
<tr>
<td>Bekoji</td>
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<td>7</td>
</tr>
<tr>
<td></td>
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<td>Local: 21d</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Local: BA 7d</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Local: BA 14d</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Local: BA 21d</td>
<td>2</td>
</tr>
</tbody>
</table>

| Mean         | 0.5       | 0.6          | 1.1           | 0.6              | 0.5              | 0.1                           |               |     |                 |
| LSD (0.05)   | 31.7      | 5.5          | NS            | 23.4             | 15.0             | 13.6                          |               |     |                 |

| C.V          | 19.6      | 18.3         | 26.5          | 20.2             | 16.3             | 8.3                           |               |     |                 |

http://dx.doi.org/10.29322/IJSRP.8.5.2018.p7770  www.ijsrp.org
Table 6. Partial budget analysis for integrated management of chocolate spot on faba bean cultivars

<table>
<thead>
<tr>
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<th>Cost and benefit ratio</th>
<th>Significance</th>
<th>LSD (0.05)</th>
<th>Significance</th>
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<tr>
<td>Degaga:7d</td>
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<td>1.7</td>
<td>3573</td>
<td>1.2</td>
</tr>
<tr>
<td>Degaga:14d</td>
<td>3</td>
<td>1.5</td>
<td>11273</td>
<td>1.7</td>
</tr>
<tr>
<td>Degaga:21d</td>
<td>2</td>
<td>0.7</td>
<td>1263</td>
<td>1.7</td>
</tr>
<tr>
<td>Degaga:BA:7d</td>
<td>7</td>
<td>0.9</td>
<td>2873</td>
<td>1.2</td>
</tr>
<tr>
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<tr>
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<td>1.7</td>
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<td>0.9</td>
<td>-</td>
<td>1.7</td>
</tr>
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<td>Mean</td>
<td>1.5</td>
<td>1.0</td>
<td>-</td>
<td>2.5</td>
</tr>
<tr>
<td>LSD (0.05)</td>
<td>***</td>
<td>***</td>
<td>***</td>
<td>NS</td>
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Kulumsa

<table>
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<tr>
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<th>Significance</th>
<th>LSD (0.05)</th>
<th>Significance</th>
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<td>Local:7d</td>
<td>7</td>
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<td>3573</td>
<td>1.2</td>
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<td>3</td>
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<td>11273</td>
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<td>1263</td>
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<td>7</td>
<td>0.9</td>
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<tr>
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<td>5286</td>
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<td>Local:BA:21d</td>
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<td>1.7</td>
</tr>
<tr>
<td>Local:BA</td>
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<td>0.3</td>
<td>3693</td>
<td>1.7</td>
</tr>
<tr>
<td>Local (Sole)</td>
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<td>0.9</td>
<td>-</td>
<td>1.7</td>
</tr>
<tr>
<td>Mean</td>
<td>1.5</td>
<td>1.0</td>
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<td>2.5</td>
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<tr>
<td>LSD (0.05)</td>
<td>***</td>
<td>***</td>
<td>***</td>
<td>NS</td>
</tr>
</tbody>
</table>

Significant variation (P < 0.001) was obtained from total yield at Kulumsa (Table 6). The CBR (1:8.1 & 1:10.4) was recorded from similar treatments (Local).
BA: 21-days spray interval) at bekoji and Kulumsa, respectively. However, maximum net profit (10186 ETB) was recorded at bekoji and (12986 ETB) at Kulumsa both from Local:BA:14-days chlorothalonil spray treatments (Table 6 and Fig 3).

Fig. 3 Mean cost and benefit ratio of fungicide application on chocolate spot at Bekoji and Kulumsa
IV. DISCUSSION

Chocolate spot occurrence was detected at the two locations during the experimental period, but a faster at Kulumsa than Bekoji. Foliar sprayed chlorothalonil and the cropping systems had significantly reduced the disease severity, AUDPC, disease progress rate and thereby increased faba bean grain yield. The magnitudes of disease severity were significantly different among the cultivars, cropping systems and chlorothalonil spray intervals. Short day spray intervals were significantly reduced final disease severity from 35.4% to 23.4% on Local FB:BA unsprayed and sole local FB:7-days spray interval, respectively at Bekoji. Similarly, Degaga:BA integrated with short day spray intervals had reduced the final disease severity from 68.9% on Local FB:BA unsprayed to 40.9% at Kulumsa. This showed that short day chlorothalonil application resulted in a reduced disease severity in both locations as compared to the other treatments. This result is in agreement with previous research document [15, 17] that faba bean-barley intercropping without the application of Chlorothalonil as a part of an integrated disease management resulted in the aggravation of chocolate spot severity as compared to the sole controls.

It was also observed that the AUDPC was reduced from the highest value 28.2 % -days to the lowest 15.1 % -days at Bekoji and from 45.8 % -days to 31.6 % -days at Kulumsa using the integrated chocolate spot management. The above maximum AUDPC values were recorded from Local FB:BA-21days spray interval and Local FB:BA unsprayed similar treatments at both locations. However, the lowest AUDPC was obtained from sole Local:14-days spray at Bekoji and Degaga:BA:7-days spray interval at Kulumsa. Study by Samuel et al. [15] also revealed that short day spray interval (7-days) had a lower AUDPC than the other fungicide spray intervals. Shiferaw [17] also reported the same result that the highest AUDPC was recorded from local-barley unsprayed treatments while the lowest from sole Degaga integrated with 7-days spray. Chlorothalonil application was found to be reduced disease progress rates in integration with faba bean cultivars. Spray intervals at 7- and 14-days had significantly affected mean disease progress rates on sole local and moderately tolerant cultivars at the two locations. This is because the lowest mean disease progress values (0.032 and 0.034 units per day) were recorded on local cultivar at Bekoji and (0.060 and 0.064 units per day) on Degaga at Kulumsa. In comparison, the fastest mean chocolate spot progress rates (0.059 and 0.058 units per day) at Bekoji and (0.105 units per day) at Kulumsa were recorded from same sole local and Local FB:BA unsprayed plots. Rates of disease progress were relatively slower at Bekoji as compared with Kulumsa. This shows that chocolate spot developed at a faster rate may be due to favorable environmental conditions at Kulumsa than Bekoji. This study showed that a short day (7-days) fungicide spray intervals had significantly influenced chocolate spot epidemics and faba bean grain yield similar report [15]. Higher grain yield was also obtained from short day fungicide spray intervals followed by medium (14-days) at both locations when integrated with moderately tolerant cultivar, Degaga. The moderately tolerant cultivar gave the highest mean yields of 4.1 and 3.1 t ha\(^{-1}\) with short day spray intervals than the Local FB:BA unsprayed plots (1.2 and 0.3 t ha\(^{-1}\)) at Bekoji and Kulumsa, respectively.

The highest grain yield (4.7 t ha\(^{-1}\)) was recorded at Bekoji from Degaga-barley intercropping combined with short day spray intervals as compared with local-barley unsprayed intercrop [17]. In contrast to faba bean grain yield, the highest 100 seed weight (61.8 g) was obtained from Local FB:7-days spray interval at Bekoji and Local FB:14-days spray interval at Kulumsa. Thus, it is possible to see that higher grain yield and 100 seed weight were obtained from chlorothalonil sprayed plots than unsprayed intercropping of the two cultivars.

In this study, applications of fungicide and cropping systems considerably reduced disease severity and increased faba bean grain yield and system productivity (LER) by a mean relative yield advantage of 31 and 39% at Bekoji and Kulumsa, respectively. It was also reported [17] that faba bean barley intercropping and fungicide spray intervals reduced the disease epidemics and increased faba bean grain yield and yield components, and system productivity by a mean relative yield advantage of 32% at Bekoji. As the reduction in arable land is unavoidable, increasing LER and food production per unit area is crucial for securing food supply [3]. It is crucial that such a simple, effective approach to boosting crop yields and increasing LERs is widely adopted in the global challenge of securing the food supply. Considering the economics of fungicide application against the faba bean chocolate spot, maximum net profit (10186 ETB) was obtained at Bekoji and (12986 ETB) at Kulumsa both from Local:BA:14-days fungicide spray treatments.

V. CONCLUSION

Chocolate spot causes substantial yield losses in various cropping seasons in Ethiopia and in many parts of the world wherever faba bean grows. Thus, host resistance, cropping systems and fungicide applications were considered to enhance chocolate spot control and reduce yield losses. Reduction in disease was observed in all fungicide sprayed intercropping systems and sole crops compared with the corresponding unsprayed intercrops and sole controls in this study. Intercropping also resulted in a mean relative yield advantage of 31% and 39% at Bekoji and Kulumsa, respectively. As the reduction in arable land is unavoidable in this days agriculture, increasing land equivalent ratio and food production per unit area is crucial for securing food supply. Intercropping practices offer many advantages when associated with planned spatial diversity and so that it is needed to enhance the benefits achieved. The integrated system in general increased faba bean productivity and income benefit which can be recommended especially under subsistence farming system in Ethiopia.

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REFERENCES


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“from the certainty of turmoil [to the] turmoil of uncertainty”*: Articulating Childhood Trauma in Khaled Hosseini’s *The Kite Runner*

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Abstract-Often castigated for their Eurocentric tendencies, trauma studies offer a rather universal paradigm that can be adapted to culture-specific contexts once their idiosyncratic characteristics are taken into consideration. With the most disturbing traumatic experiences relegated to the domain of the unsaid, traumatic events and their effects remain within the confining shackles of taboo and societal norms that inhibit victims from relating the incidents they have endured. Literature provides an alternative method to gain access to these testimonies. This paper aims at exploring the issue of child abuse and its traumatic effects upon the victims and societal norms that inhibit victims from relating the incidents they have endured. Literature provides an alternative method to gain access to these testimonies.

I. INTRODUCTION

Venturing into Khaled Hosseini’s fictionalized Afghan abyss of terror is likely to arouse in the reader an acute sense of “compassion fatigue”*. Indeed, relegated to the role of a bystander in this dystopian realm “where angels fear to tread”*, the latter is likely to fall prey to “vicarious traumatization”† due to the frustrating discrepancy between the highly realistic aspect with which the novel is marked and the “learned helplessness”‡ with which the reading experience is characterized. Witnessing the agonizing atrocities committed against children as narrated in *The Kite Runner*, Hosseini’s 2003 debut novel, the reader is likely to be haunted by the harrowing images of child abuse featured therein. This paper thus constitutes an attempt at redemption, in the protagonist’s fashion, a pursuit of atonement for the passivity of the onlooker by partaking in the diagnosis and analysis of the traumatic experiences endured by Amir, Hassan, and Sohrab, the major characters in the narrative. Indeed, the “unspeakability” of their plight further indicates the urgency of voicing their predicament and the alarming situation in a country that has a “lot of children...but little childhood” (Hosseini 318). This endeavor is premised upon a close reading of Hosseini’s text in light of the tools provided by neo-critical, psychoanalytical, reader-response, and trauma theories. An interdisciplinary approach is therefore adopted as the envisaged literary analysis is informed by a variety of disciplines with the view of gaining novel insights into the book’s attempts at defying the “irrepresentability” of childhood trauma. Indeed, the paper traces the lives of three traumatized Afghan boys, unveils the effects of these distressing experiences upon their psyches, and examines the coping mechanisms and healing strategies adopted to overcome them. This article aims at providing an in-depth examination of the enigmatic nature of the traumatic experience and its psychological repercussions upon child victims by scrutinizing the ordeals to which Hassan, Amir, and Sohrab have been subjected. Indeed, the peculiar aspect marking the individual experiences of each of these fictional characters serves as a reminder of the fact that trauma escapes overgeneralizations and manifests itself in miscellaneous forms rather than predefined universal patterns as it is highly intimate in essence as stressed by Caruth in her introduction to *Trauma: Explorations in Memory*. Indeed, the latter emphasizes the necessity of “responding to traumatic stories in a way that does not

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1 The title is inspired from the protagonist’s mounting anxiety regarding the intricate situation in which his nephew is trapped. Indeed, the latter can neither survive within Afghanistan’s “certainty of turmoil “nor easily adapt to life in the United States and adjust to American culture (Hosseini 356).

2 According to the *Encyclopedia of Trauma and Traumatic Stress Disorders*, “secondary traumatization is also referred to as vicarious traumatization and compassion fatigue, and it affects those who care for people who have been directly traumatized. Examples of individuals who may experience secondary traumatic stress are medical responders, therapists, and others who seek to help the person who suffered a primary traumatization” (28).

3 This is an allusion to Forster’s 1905 novel, *Where Angels Fear to Tread*.

4 The term “vicarious traumatization” is often used interchangeably with the terms “compassion fatigue”, and “secondary traumatization”.

5 In keeping with the paper’s central theme, the term “learned helplessness” is figuratively used to refer to the reader’s frustrating incapacity to actively intervene in the fictional realm. Despite its fictionality, the novel stirs its readers into swift action and sensitizes them to the paramount importance of putting an end to the humanitarian crisis in a country blighted by obscurantism. According to the *Encyclopedia of Trauma and Traumatic Stress Disorders*, the term literally designates the “imposed feeling of incapacity and inevitable failure that initially occurs when individuals seek to act in some normal way, but they are (or feel that they are) coerced or otherwise prevented from attempting actions which they are fully capable of performing” (162).

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Addressing this issue requires the provision of a summary of the story. Amir, the narrator of the novel, is the son of a self-made affluent Pashtun businessman whose wife dies in childbirth. Amir, the protagonist, finds solace in the company of a Hazara boy, Hassan, the son of Ali, the family servant and childhood friend of Baba, Amir’s father. Enduring the pangs of maternal deprivation because of his mother’s elopement upon his birth, Hassan finds refuge in Amir’s friendship and the boys become inseparable. Hassan’s loyalty to his playmate is further proven in a highly indicative scene where he threatens Assef, a sadistic bully, with his slingshot to protect Amir against his gratuitous hatred and uncalled-for violence. Amir’s frailty, sensitivity, and literary inclinations provoke his father’s increasing concern, annoyance, and indignation. In a desperate attempt at gaining his father’s approval, the protagonist strives to win the kite tournament, a competition that holds a great importance for Afghans and constitutes an integral part of their customs and traditions. Hassan, a peerless kite runner, vows to help Amir fulfill his dream. The latter ends up winning the kite but the kite has to be retrieved as it testifies to the winner’s victory and serves as proof of his prowess and valor. Hassan volunteers to fetch it. He is caught by Assef who decides to deprive him and Amir of the kite that symbolizes their success as a punishment for their previous attempts at self-defense that prevented him from harming Amir. Amir refuses to betray his friend’s trust and adamantly rejects Assef’s offer to give him the kite in return for his freedom and safety. Amir overhears their conversation and refrains from intervening lest he should be hurt. Assef ends up raping Hassan in an attempt at subduing his defiant spirit and reclaiming sovereignty after being challenged by Hassan’s threats. Guilt-ridden, Amir fails to relish in the long-awaited moment of paternal approval. He dodges any potential interaction with Hassan and ends up planting some of his birthday presents in Hassan’s room with the view of getting rid of him once he is accused of theft. To Amir’s surprise, Hassan admits that he has committed theft and Ali, his father decides to quit the job and move to Hazarajat. His confession is preceded by an intimate moment of disclosure after which the father decides to leave with his son while paying a deaf ear to Baba’s desperate attempts at convincing him not to abandon his second family. Upon the Soviet invasion of Afghanistan, Amir and his father flee to Pakistan then to the United States where they start a new life. Amir finishes his education. His father is stricken by a fatal cancer. Amir falls in love with Soraya Taheri. His father passes away shortly after their marriage. Amir becomes a published novelist. The couple struggles with infertility. One day, he receives a phone call from an old family friend, Rahim Khan, asking him to come to Pakistan. Once there, Amir finds out that Hassan is his half-brother, an illegitimate son to Baba. He also discovers that Rahim Khan knows about his failure to intervene to help Hassan who has always been there for him. Rahim Khan informs Amir that his nephew, Sohrab, is the only survivor of a family tragedy committed by Talib terrorists. Indeed, in an attempt at defending his master’s house from being looted by Talibs, Hassan is killed along with his wife who tries to defend him. Sohrab is sent to a dismal orphanage. Rahim Khan urges Amir to save Sohrab but the latter is reluctant to go to Afghanistan. Then, he sets off on a journey to Kabul along with Farid, the driver. Once in the orphanage, Amir finds out that his nephew has been kidnapped by a Talib and that the man in question would be present at an adultery stoning in a stadium in Kabul. The one who executes the punishment is the Talib holding Sohrab captive. Amir asks for an appointment with him. Once there, he discovers that his nephew has been sexually abused by the Talib and his men. The Talib is none but Assef, a pervert sadist who takes pleasure in revealing his identity to Amir and boasts about raping the child the way he raped his father. Assef promises to free Sohrab and his uncle if the latter manages to defeat him. Pleading Assef to have mercy on his severely-wounded uncle, Sohrab realizes that the only way to save Amir is by using his slingshot and aiming at Assef’s eye. Amir and Sohrab escape the Talibs and flee to Pakistan. Once there, Amir starts considering adopting his nephew. Unfortunately, the legal procedures are very complex. Suspecting that he might be taken to an orphanage once more, Sohrab commits suicide. He survives and retreats into a realm of silence and detachment. They travel to the United States where Sohrab remains aloof from his surroundings till a kite tournament insufflates life within his tormented soul.

6 According to the Encyclopedia of Trauma and Traumatic Stress Disorders, this concept “is synonymous with what today is called “single incident” trauma, whereas complex posttraumatic stress disorder (CPTSD) refers to multiple or chronic abuse or trauma that leads to PTSD. The idea of “circumscribed” does not mean that an event was a minor event. On the contrary, the traumatic event could range from a relatively minor or distant event to one that is very intense and intimate, such as a rape, kidnapping, sniper attack, and so on” (71).

7 The aforementioned source defines sequential traumatization as “Traumas that appear one after the other, such as a death in the family, which is immediately followed by a natural disaster. Multiple or “pile-on” tragic events are not only difficult for an individual to cope with but also take a long time to process and resolve. Furthermore, they can lead to symptoms of posttraumatic stress disorder (PTSD) that persist for those people who are vulnerable to developing PTSD and for those who are less vulnerable but are hit with many traumas at the same time” (234).

8 Pashtuns “are the most populous ethnic group in Afghanistan, numbering approximately 7.5 million; for that reason, they sometimes are simply called Afghans” (Danver 559).

9 According to the Encyclopedia of the Peoples of Asia and Oceania, “the Hazaras are a unique people living primarily in central Afghanistan, where they make up 9 percent of the population...They are physically unlike all other people of Afghanistan...They also constitute a religious minority in Afghanistan as Shii Muslims, while the majority of their fellow citizens are Sunni. These differences have led to significant discrimination for many centuries in Afghanistan” (272).
III. “It was the look of the lamb\textsuperscript{10}”: Forgiveness as Therapy

Hassan’s traumatic experience does not merely represent the first traumatizing event in a series of assaults against children as featured in the novel. Opting for this specific incident in the first section of the paper is not driven by chronological concerns but rather by causality. Hassan’s rape is the traumatic event that unleashes a series of misfortunes which end up affecting and altering the lives of his half-brother and son. Indeed, there are various hints foreshadowing his impending tragedy to build the readers’ “horizon of expectations” in the Jaussian sense and help them anticipate the shocking incident. The soothsayer’s episode is highly significant in this regard as his refusal to divulge any information regarding Hassan’s future further confirms the reader’s suspicions regarding what fate holds in store for the meek child. The detailed depiction of the fortune-teller’s ritual of divination and response to the revelation forebodes imminent doom:

He takes Hassan’s hand first, strokes the palm with one hornlike fingernail, round and round, round and round. The finger then floats to Hassan’s face and makes a dry, scratchy sound as it slowly traces the curve of his cheeks, the outline of his ears. The calloused pads of his fingers brush against Hassan’s eyes. The hand stops there. Lingers. A shadow passes across the old man’s face. Hassan and I exchange a glance. The old man takes Hassan’s hand and puts the rupia back in Hassan’s palm. (Hosseini 74)

Caught by a bully whose solely motivated by an unquenchable thirst for power, Hassan falls prey to “child-on-child sexual abuse”. Obsessed with maintaining his image as an invincible leader, the sadistic child feeds his deflated ego by humiliating the boy who has challenged his authority while attempting to save his friend. He gives free rein to his outspoken Hitlerian tendencies that find their target in the Hazara community, a marginalized ethnic minority group. Stressing that ethnic cleansing is the “final solution” to “purify” the land of the Pashtuns, Assaf’s sexual abuse of his peer is an attempt at asserting his absolute domination and authority over the helpless child. His perverted fantasies and racist views are concretized in this act of sexual violence. Though deemed sinful by his friends who refuse to actively partake in his plan, Assaf’s sexual assault is guided by a staunch belief in the inferiority of Hassan whom he regards as a mere “donkey” (Hosseini 75). Paying no heed to the child’s emotions and dehumanizing his victim, the monstrous aggressor objectifies the helpless boy whom he perceives merely as a tool with which to mark his territory and regain his position which has previously been challenged by the boy’s resistance to intimidation and threats. In addition to its racist nature, the juvenile’s crime takes on another dimension, one that further aggravates the victim’s torment. Indeed, the sexual offence is witnessed by Wali and Kamal, Assaf’s accomplices. Hassan’s sense of violation is further accentuated through their contribution in the rape by holding him firmly to allow the “Ear Eater”, as Assaf is nicknamed, to feed his “sense of manhood” as he perceives the assault as proof of his masculinity (Hosseini 42). It should also be noted that through Amir’s gradual revelation of the circumstances in which Hassan’s rape occurs, by assembling the fragmented account of the unsettling event, the reader not only discovers that the protagonist has secretly witnessed the crime but also that Hassan is fully aware of the fact that the friend for whom he selflessly put his life at stake has not attempted to save him. The immediate emotional effects of the incident upon the victim vary therefore between shame, embarrassment, helplessness, disappointment, and distrust. In keeping with the very etymology of the word trauma\textsuperscript{11}, the rapist’s crime not only affects its victim psychologically but also physically damages him. Indeed, the verbs used to depict his gait, now impeded by injury, highlight the severe physical harm inflicted upon him by the pervert “sociopath”:

He began to say something and his voice cracked. He closed his mouth, opened it, and closed it again. Took a step back. Wiped his face. And that was as close as Hassan and I ever came to discussing what had happened in the alley. I thought he might burst into tears, but, to my relief, he didn’t, and I pretended I hadn’t heard the crack in his voice. Just like I pretended I hadn’t seen the dark stain in the seat of his pants. Or those tiny drops that fell from between his legs and stained the snow black.

“Agha sahib will worry,” was all he said. He turned from me and limped away. (Hosseini 78)

Hassan, the eponymous kite runner, soon collapses into a depressive state as he starts manifesting symptoms of circumscribed post-traumatic stress disorder. Indeed, upon being sexually abused, Hassan grows detached from his immediate surroundings. He intentionally dodges any potential confrontation with Amir, the passive accomplice in his victimization. Escapism through oversleeping is his major defense mechanism against the bitterness of what he has endured. Indeed, their previous routine is turned upside down and the serenity of their childhood is lost within the escalating tension of disappointment, betrayal, and guilt. Hassan gradually starts recovering and regaining his former routine. Trying to approach Amir, he is met with constant rejection as the latter is trapped in self-blame and remorse. The strong bond between the playmates gradually dissolves and eventually the ties are severed after Hassan’s departure upon being falsely accused of theft. Offered a panoramic view of Hassan’s life, the reader is likely to deduce that he has managed to overcome his plight and undergo a thorough process of healing. There are various hints at his recovery. Indeed, this is to be inferred from Rahim Khan’s description of his happy marriage and his wife’s admiration for him as she seems to hold her husband in great esteem: “She was a shy woman, so courteous she spoke in a voice barely higher than a crack in his voice. Just like I pretended I hadn’t seen the dark stain in the seat of his pants. Or those tiny drops that fell from between his legs and stained the snow black.

“Agha sahib will worry,” was all he said. He turned from me and limped away. (Hosseini 78)

\textsuperscript{10} The title of this section is based on the recurrent use of the lamb motif by the protagonist to depict Hassan’s resignation as he likens his gaze to that of a lamb (Hosseini 76).

\textsuperscript{11} Campbell and Mason define trauma as “a Greek word that means a “wound”, a “lesion”, or an “injury”, and it comes from the verb “to pierce” or “to penetrate” (171).
have been sitting on the throne at the Arg” (Hosseini 205-206). This testifies to the fact that Hassan has managed to overcome the suffering induced by the assault as traumatized children who fail to overcome the traumatizing event often confront relationship issues as adults and fail to establish sound, permanent ties with their partners. His son’s remorse at having been forced to harm his aggressor sheds light on Hassan’s success in starting afresh after the traumatic incident. Indeed, Sohrab’s remorseful lamentation of the damage he has caused to Assef emanates from his father’s teachings. The latter instilled love, forgiveness, and tolerance in his child. He warned him against the pitfalls of enmity, grudge and hatred as he taught him that “it’s wrong to hurt even bad people. Because they don’t know any better, and because bad people sometimes become good”, a message that outlined the father and that the traumatizing experience Sohrab endured did not manage to erase (Hosseini 318). The recurrent use of the Biblical allusion in which Hassan is associated with “the lamb” and the Koranic allusion in which he is metaphorically likened to Ismail, Ibrahim’s son who offered himself as a scapegoat following God’s commands, go beyond the idea of scapegoating and sacrifice. The utter resignation displayed in his response to Assaf’s rape as an “absent witness”, a victim upon whose psyche trauma is inscribed before being prepared to receive it, is transformed through the redeeming force of reconciliation, acceptance, and forgiveness (Alford 2). Indeed, far from eliciting sympathy, Hassan emerges as a dignified figure, a Christ-like hero, a savior who manages through altruism, and loyalty to ensure the triumph of love over hatred and reach reconciliation unlike his friend, the Judas-like figure of the traitor who betrays his friend and descends into self-flagellation.

IV. “There is a way to be good again”12: Witnessing, Guilt, Redemption

Witnessing trauma is itself a highly traumatizing experience thatdamages the witness’s psyche and is likely to have long-lasting psychological effects that are challenging to cure. Present at the crime scene, Amir is torn between the urge to assist Hassan, and his fear for his own safety. Privileging the latter over the former, he ends up refraining from saving his friend, a decision he regrets, a turning point that ushers in a radical shift in his life. The child’s inner turmoil and self-blame is translated through the following confession:

I ran because I was a coward. I was afraid of Assef and what he would do to me. I was afraid of getting hurt. That’s what I told myself as I turned my back to the alley, to Hassan. That’s what I made myself believe. I actually aspired to cowardice, because the alternative, the real reason I was running, was that Assaf was right: Nothing was free in this world. Maybe Hassan was the price I had to pay, the lamb I had to slay, to win Baba. Was it a fair price? The answer floated to my conscious mind before I could thwart it: He was just a Hazara, wasn’t he? (Hosseini 77)

Probing into Amir’s family circumstances and personality is likely to unravel the different factors contributing to that paralyzing sense of fear with which he witnesses his friend’s rape. Indeed, the boy has always been envious of his playmate for receiving his father’s attention and admiration, the privilege he has always aspired for Despite being the family’s servant and belonging to an ethnic minority that is socially deemed to be inherently inferior, Hassan has always enjoyed Baba’s fatherly affection. Seeking his father’s approval in vain, Amir’s kite tournament trophy, the kite, is the sole means of winning his father’s heart, a goal he desperately tries to achieve despite the dire consequences. It’s only upon returning home with the kite that the child discovers the gravity of the incident. Indeed, upon meeting Hassan for the first time after the assault, Amir’s attention is focused on the kite, the object that stands for the possibility of earning his father’s approval. This is highlighted in his reaction when he sees him: “He had the blue kite in his hands; that was the first thing I saw. And I can’t lie now and say my eyes didn’t scan it for any rips. His chapan was dirty down the front and his shirt was ripped just below the collar. He stopped. Swayed on his feet like he was going to collapse (Hosseini 78). It is only upon gradually assimilating the shocking event that Amir starts losing interest in everything that used to fascinate him and fails to relish in his father’s pride. The child finally realizes the magnitude of his loss as trauma is but a “belated” experience in the Caruthian sense. Hassan’s withdrawal from his life creates a sense of void and emptiness that alters his self-perception. The child’s post-traumatic stress disorder symptoms are manifested in his chronic insomnia, loss of interest in the activities he used to enjoy before the incident, avoidance of any contact with Hassan whom he considers to be his own victim, shame, embarrassment, along with an overwhelming sense of guilt that prevents him from leading a normal life as he is haunted by the traumatic event and trapped in a maze of negative self-perception. This state of unrest and anxiety is illustrated through Amir’s obsessive brooding over his memories with Hassan and the sharp contrast he establishes between the latter’s genuine kindness and abnegation and his own passivity. This idea is expressed through his reinterpretation of Hassan’s pre-tournament dream, as he identifies himself as the monster in the nightmare:

I thought about Hassan’s dream, the one about us swimming in the lake. There is no monster, he’d said, just water. Except he’d been wrong about that. There was a monster in the lake. It had grabbed Hassan by the ankles, dragged him to the murky bottom. I was that monster.

That was the night I became an insomniac. (Hosseini 86)

Devising a plot to get rid of the unsettling presence of his victim, a constant reminder of his misdeed, Amir succeeds in dispatching Hassan and his father but fails to erase the traumatizing memory. Plagued by a traumatizing past, the protagonist’s attempts at wiping off the harrowing images of the traumatic incident prove inefficient as they keep resurfacing through flashbacks that betray his inability to overcome the disturbing memories he has tried to repress and the qualms of conscience with

12 The title is inspired from Rahim Khan’s attempt at urging Amir to atone for his misdeed by saving his nephew (Hosseini 226).
which he is constantly seized as a child, an adolescent, and an adult. According to Cathy Caruth, “to be traumatized is precisely to be possessed by an image or event” (Caruth 4-5). Amir seems to fit within this definition of the pathology as he remains haunted by the traumatizing images associated with the rape episode. In fact, he is possessed by a recurrent image of bloodstains which he visualizes even when they do not exist. He even insists on witnessing the slaughtering of the sheep on Eid day as it is reminiscent of the incident in terms of the associations he establishes between the bloodstains on the grass and Hassan’s bleeding after the assault, between the scapegoat, and Hassan. This is clearly indicated in this excerpt where he tries to fathom the reasons behind his insistence upon attending the slaughtering of the sheep despite its repugnant aspect:

I don’t know why I watch this yearly ritual in our backyard; my nightmares persist long after the bloodstains on the grass have faded. But I always watch. I watch because of that look of acceptance in the animal’s eyes. Absurdly, I imagine the animal understands. I imagine the animal sees that its imminent demise is for a higher purpose. This is the look . . . (Hosseini 76-77)

Offered the chance to redeem himself and make amends, Amir sets out on a journey of healing and salvation, a mission that constitutes his sole refuge against the burden of the past. The hazardous trip of atonement culminates into a highly symbolic scene of purgation and relief. Indeed, when confronting Assef and falling prey to his ruthless aggression, Amir starts laughing frantically. Masochistically rejoicing in suffering for the misdeeds he has committed, Amir seems to relive the traumatizing event but also its sequel, the one which he had failed to finalize in the past. Assef’s attack provides him with the opportunity to reenact the incident and compensate for what he did not manage to achieve. In this regard, Sohrab functions as his father’s substitute. Paradoxically, the pain Assef inflicts upon him becomes liberating:

He had knee-high boots with steel toes that he wore every night for his little kicking game, and he used them on me. I was screaming and screaming and he kept kicking me and then, suddenly, he kicked me on the left kidney and the stone passed. Just like that! Oh, the relief!” Assef laughed. “And I yelled ‘Allah-u-akbar’ and he kicked me even harder and I started laughing. He got mad and hit me harder, and the harder he kicked me, the harder I laughed. They threw me back in the cell laughing. I kept laughing and laughing because suddenly I knew that had been a message from God: He was on my side. He wanted me to live for a reason. (Hosseini 284-285)

The protagonist’s reconciliation with the past is thus achieved and the brothers are reunited despite Hassan’s death. Indeed, the permanent scar on Amir’s lip, a wound he receives while defending his nephew against the pedophile Talib, is reminiscent of his late brother’s harelip. The two seem to reach oneness at the moment he accepts his past and decides to adopt Hassan’s son. The latter’s psychological wounds are far deeper than his uncle’s.

V. “I’m so dirty and full of sin¹³”: The Guilt of Survival

Unlike Amir and Hassan whose victimization is to be traced back to one major incident, namely, the rape, Sohrab’s plight is not restricted to circumscribed post-traumatic disorder, it is rather sequential traumatization that defines his experience. Indeed, Hassan’s son undergoes a series of highly traumatizing events that culminate in a suicide attempt aimed at sheltering himself against a cruel reality he can no longer endure. Zooming in on his life, the reader is likely to notice that Sohrab’s tragedy does not start with the Taliban’s perversion pedophilic practice of bacha bazi, a form of child slavery and prostitution, but rather before. Sohrab witnesses his parents’ murder at the hands of Talib terrorists. He endures the trauma of witnessing, loss, bereavement, but also that of survival. Indeed, he often mourns the loss of his family wishing to join them. Before his parents’ murder, the child used to lead a serene life of tranquility in the peaceful haven Hassan and Rahim Khan created for themselves. The utter chaos and havoc that the Taliban regime introduced in their lives exceeds the boundaries of the family to encompass a whole culture. Sohrab is indeed a victim of cultural trauma as he fails to fathom the radical shift incurred by the forces of darkness, a major change that is to be felt at the microscopic level of his daily routine that vanishes with the triumph of barbarity. Sent to an orphanage, the child is soon kidnapped by Assef who exploits him sexually with his friends. The Talib distorts the child’s identity, violates his intimacy, and shatters his self-esteem. This is clearly highlighted through the dance routine the Taliban members teach him in order to satiate their perverted fantasies:

Sohrab raised his arms and turned slowly. He stood on tiptoes, spun gracefully, dipped to his knees, straightened, and spun again. His little hands swiveled at the wrists, his fingers snapped, and his head swung side to side like a pendulum. His feet pounded the floor, the bells jingling in perfect harmony with the beat of the tabla. He kept his eyes closed. (Hosseini 280)

Sohrab’s closed eyes are his sole defense mechanism, his only refuge against the harshness of the dire circumstances of his bondage. The boy’s traumatization is further accentuated by witnessing the lethal combat between Assef, his aggressor, and Amir, the friend his father has always praised. Forced to intervene to prevent Assef from killing Amir, the child falls prey to another traumatizing memory. For him, harming people is equated with violating his father's

¹³ Upon being sexually abused, Sohrab starts feeling alienated from his own body which he perceives to be contaminated with the acts of violations exerted upon him by the Talibs (Hosseini 319).
teachings, the values he cherishes, the only remaining heirloom he has of his family. Engaging in a daily purgation ritual, the child perceives his body as the site of sin and corruption, a shame to his lost family. As he gradually starts regaining trust and accepts the uncle’s attempts at helping him, the latter unwittingly triggers his relapse into depression. Trying to persuade the boy to temporarily stay at an orphanage in order to facilitate the adoption procedures, Amir steals away the last glimmer of hope left for the boy who anticipates the tragedy to be repeated once he is left to his own devices in an orphanage. Though he survives, he enters a phase of numbness, depression, and disconnection that is only aggravated as they move to the United States where he falls into utter silence, alienation, and lifelessness. The prospects of healing are associated with the kite, a relic of the halcyon days of Pakistan, a reminder of a golden past that can be retrieved, an object that succeeds in bringing light back to Sohrab's lifeless eyes.

VI- Conclusion

This fictional account of the demise of a land is thus to be interpreted as a history from below of the devolution of Afghanistan and its descent into chaos. The plight of the children the novel depicts takes on a figurative dimension in addition to the literal one. Indeed, much like its traumatized children, Afghanistan is divested of its innocence. The land is violated, its future hijacked, and the deteriorating conditions in which its future generation is entrapped are ominous indicators of doom if swift measures are not taken to reverse the tide. The Healing processes through which the abused children go in the novel symbolically promise a possibility of healing, of moving beyond the trauma despite its devastating effects.

References


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ED-TRACKER: ACCEPTS FINGER PRINT AND DISPLAY THE EDUCATIONAL DETAILS OF USER ON SCREEN OF SYSTEM

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Abstract- In this project, we are creating a mechanism for efficient retrieval of the document using fingerprint & data mining over the cloud. Fingerprint is a technology that helps to find information similar to the reference data by some criteria (features). It is used for tracking the fact of illegal copying of multimedia or electronic documents. The basic algorithm of a “fingerprint” is the statistical evaluation of different features in document mapping, the presence of characteristic elements, and frequently encountered character combinations. Digital fingerprints are very sensitive even to the trivial replacement of symbols in text. In this project we propose the fuzzy search algorithm application in digital fingerprinting technology to fix some of the Fingerprint shortcomings for document mapping.

Keywords: Data mining, Fingerprint, Cloud Computing

INTRODUCTION

ED-Tracker is a system which is useful to check/verify document of user. In traditional way of document verification process user has to present all documents which is very time consuming and hectic process as user need to travel to that place as well as he/she to carry all documents even when attending interview user need to carry all documents. When user/authorized person wanted to appoint any employee then previous working details or behavior of employee need to know so for that authorized person has to contact previous places where that employee worked which is time consuming process so this ED-Tracker will helpful to get that details. If user lost his/her documents then he/she has to visit all universities and state board through which he/she complete his/her education and has to do lot of paperwork. This invention present new way for educational details tracking in this authorized person will ask user for finger print or voice pin which is use to extract users documents from ED-database. As ED-Tracker uses finger print or voice pin of user which is unique identity of user so it is easy to check and identify fraud documents. The educational global data base can store the all education detail (Like, 10th, 12th, UG, PG, PHD, etc.). Original documents store by only authorized person of the education organization with the help of user biometric input.

PROBLEM STATEMENT

To prepare an architecture for various types of document oriented process for secure and automate document verification and uploading process using finger print authentication.

LITERATURE SURVEY

Fingerprint is one of the most important biometrics that has been employed for verification systems. Fingerprint is a technology that helps one to find information similar to the reference data by some criteria (features). This article is an overview of a current research based on fingerprint recognition system. In this paper we highlighted on the previous studies of fingerprint recognition system. We the authentication system uses multimodality feature extraction with techniques with
neural network as classifier. Biometric identification suffers a lot of problems such as the storage of user’s biometric template. Fingerprints are the most widely used biometric identifier because of their ease of acquisition, storage and further processing for identification/verification.

SYSTEM ARCHITECTURE
Uploader and downloader are the two users of the system. The uploader have to firstly upload the documents using fingerprint on the ED-database by logging in the system. On the uploader side the uploader have two options as uploading documents and displaying own documents. Uploader can retrieve documents from the ED-database. When downloader needs the document details of uploader the uploader needs to be present their only then and then the downloader can download the documents.

FLOW OF ARCHITECTURE

SCOPE OF PROJECT
• Document mapping is major time consuming and human intensive task and this has been since the invent of paper based verification all the areas.
• In this paper we suggest to link the document mapping and retrieval with the fingerprint impression.

Outcome
As ED-Tracker uses fingerprint of user which is unique identity of user so it is easy to check fraud documents.

References
The Effectivity of Maternal and Child Health Care Center Management in Sampang Regency

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Abstract- Maternal and child health care center is developing form of Purnama or Mandiri maternal and child health care that adds Early Childhood Education and Family Planning Coordinating Board (BKB) service. About 33.5% of 191 maternal and child health care center in Sampang Regency has gone optimal. The research approach used is descriptive qualitative research with cross-sectional sample using Slovin formula. This research was conducted in Sampang. The result of this research shows that the management of Maternal and child health care center in Sampang is 77.89% effective including 59.52% in planning, 66.84% in Monev. The financial budget for Maternal and child health care center in Sampang has been 96.03% effective, overall.

Index Terms- Maternal and Child Health Care, Management, Budget, Childhood Education

I. INTRODUCTION

In the future, the challenge of national health development is the increasing of Indonesia human resource quality which is measured by Human Development Index (IPM). Health and education development is one of the human fundamental need (Handoko, 2014). It also takes the role to increase the quality of human resource (Hapsara, 2014).

Since March 2012, East Java government proclaims 10.000 Maternal and child health care service that will be available in every village. This program is the form of Early Childhood Education holistic integrative including Early Childhood Education that does not only give education but also the fulfillment of nutrient, health, character, prosperity, and protection. The essence of Early Childhood Education Holistic integrative is the awareness of children’s growth is not only supported by education but many more (Lydia Freyani, 2013).

Holistic and integrative means education is not only for children but also the elderly. Furthermore, In the implementation, it corporates or integrated with Department of Education, Health, National Family Planning Coordinating Board (BKKBN), National Development Planning Agency (Bappenas), Library official, BPPKB which then teach them about living healthy, building prosperous and happy family.

Maternal and child health care center is developing Purnama or Mandiri maternal and child health care added with Early Childhood Education service and BKB (kid’s family maintenance). Maternal and child health care center is not a new organization for society. Instead, it is the function and activity expansion of Purnama and Mandiri Maternal and child health care, including Maternal and child health care itself, BKKBN and Early Childhood Education. This organization takes care of kids’ health, education and parenting.

Maternal and child health care center is made to build future generation which has international quality, better character and Indonesia’s personality. There are about 2.744.132 (68.22%) children under age in East Java that do not get Early Childhood Education Holistic Integrative service. In another side, about 1.278.206 children get partial Early Childhood Education service that does not include children’s essential growth such nutrient, health, care, protection and education (BKKBN, 2012).

The government will face a serious problem of children’s growth if they do not immediately fix this service expansion within early childhood. The problem occur probably influence children’s growth and development which then worsen human resource’s quality and become country’s burden, in the end. Hence, the government of East Java seriously try to fix the problem of children’s growth. Their action is proven by the new regulation of Governor number 63, 2011, about the development of Holistic and Integrative children. That new regulation becomes the pointing law for maternal and child health care center which aims to fulfill all essential need so that they can grow optimally and become the leading province (Kominfo, 2013).

The implementation of maternal and child health care center in East Java precede President’s regulation number 60, 2013. It shows the government of East Java toward children’s education. The education in maternal and child health care center is included in Regional Medium-Term Development Plan (RPJMD) of East Java 2014-2019.

The main target of maternal and child health care center right now is still focusing on kids whose aged 0 to 2 years old. Yet, the utility of maternal and child health care center is still low which is proven by 7.41% of rough participant number (APK) for Early Childhood Education (Lydia Freyani, 2013). This case becomes the current problem in developing maternal and child health care center program (UNICEF, 2009).

In Sampang, the maternal and child health care center which is optimal is still 33.5% from 191 existing maternal and child health care center (Dinkes Sampang, 2016). It is shown that the management of it is still low. This problem is caused by the
quality of management which is not really professional, the limitedness of organized institution number, distribution and quality of organizer and unfulfilled service in essential need aspect (Handayani, 2011).

Moreover, appropriate management is needed to solve the problem and to increase the role and function of maternal and child health care center. Due to the problem above, a research about the causes of maternal and child health care center utility effectiveness is needed by taking attention to its management.

II. REVIEW OF LITERATURE

2.1 The concept of holistic-integrative maternal and child healthcare

The importance of early childhood’s handling holistically and integrative stated by Gutama (2003) child’s handling need to be managed holistically and integrated. It is strengthened from medical, neurology, psycho-sociocultural and education sight. Then, Sumarno (2003) strengthens Gutama’s statement whether a brain must get good and balance stimulation. Wrong mind setting will cause bad behavior in their adulthood. In contrast, Alisjahbana (2003) clarified that growth considers many aspects such as health, nutrient, emotion, social and education. All of this aspect depends on one other. The succeeded and failed development in one aspect will influence other aspect development.

The development of holistic-integrated early-aged children is seen from the continuous service in term of service system that must be coordinated and integrated well. Another way of seeing its development is the implementation of child’s maternal education and society’s participant. Further, there must be an occasion to access the program as well as their culture and give service to incapability children.

Based on the National Development Planning Agency (2008), the service for holistic early-aged children can be created by: (1) the complement of service to fulfill children’s essential needs based on the age segmentation (from 0 to 6 years old), (2) the quality aspect of all service for children, including: health and nutrient, education, nurture and protection for them. Meanwhile, the service for holistic and integrative early-aged children can be created by (1) the corporation of early childhood development institutes to fulfill children’s essential needs well, (2) the implementation of early childhood development in one institution.

III. RESEARCH METHOD

This research uses qualitative approach by taking some samples from a population using questionnaires about maternal and child health care center. The respondents for this case are the active members of maternal and child health care center. The sample is taken with cross-sectional using Slovin formula.

\[
n = \frac{N}{1 + N (e^2)} = \frac{191}{1 + 191 (0,01)^2} = 65,64 \approx 66 \text{ people}
\]

Note:
- \(n\) : sample size
- \(N\) : population size
- \(e\) : the percentage of not being careful in sampling that can be tolerated at least 10%

In this research, the writer only takes 126 members who are leading the management of maternal and child health center as the representative for the population in Sampang.

IV. RESULT AND DISCUSSION

4.1 Management

The management of maternal and child health care center include the plans, implementations, and coordination concerning its activities so that it will be running as well as its plans. This management also aims to achieve the goals of maternal and child health care center.

Table of respondent distribution toward maternal and child health care center management in Sampang 2017

<table>
<thead>
<tr>
<th>Management</th>
<th>Yes</th>
<th>No</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Organization</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Organization structure</td>
<td>(100%)</td>
<td>-</td>
<td>Very effective</td>
</tr>
<tr>
<td></td>
<td>126</td>
<td></td>
<td>(Yes, &gt;80%)</td>
</tr>
<tr>
<td>2. Job division based on the organization structure</td>
<td>(100%)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>126</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

http://dx.doi.org/10.29322/IJSRP.8.5.2018.p7775  www.ijsrp.org
The officer’s commutation based on the organization structure

<table>
<thead>
<tr>
<th></th>
<th>(100%)</th>
<th>-</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>126</td>
<td>100%</td>
<td>0%</td>
<td>100%</td>
</tr>
</tbody>
</table>

b. Plans

<table>
<thead>
<tr>
<th>Plans</th>
<th>(100%)</th>
<th>-</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Well plans</td>
<td>126</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>2. Target determination/ goals for the plans</td>
<td>32</td>
<td>25,39%</td>
<td>74,61%</td>
</tr>
<tr>
<td>3. Plans change</td>
<td>67</td>
<td>53,17%</td>
<td>46,83%</td>
</tr>
<tr>
<td>126</td>
<td>59,52%</td>
<td>40,48%</td>
<td>100%</td>
</tr>
</tbody>
</table>

c. Implementation

<table>
<thead>
<tr>
<th>Implementation</th>
<th>(100%)</th>
<th>-</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Plans compatibility</td>
<td>126</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>2. Preparation</td>
<td>126</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>3. Job division</td>
<td>126</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>4. Officers’ activeness and creativeness</td>
<td>126</td>
<td>100%</td>
<td>-</td>
</tr>
<tr>
<td>5. Target compatibility</td>
<td>126</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>6. House visits</td>
<td>126</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>7. Evaluation</td>
<td>126</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>8. Activity report</td>
<td>126</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>126</td>
<td>100%</td>
<td>0%</td>
<td>100%</td>
</tr>
</tbody>
</table>

d. Control

<table>
<thead>
<tr>
<th>Control</th>
<th>(100%)</th>
<th>-</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Controlling</td>
<td>126</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>2. Educatice</td>
<td>126</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>3. Routine</td>
<td>89</td>
<td>70,63%</td>
<td>29,37%</td>
</tr>
<tr>
<td>126</td>
<td>90,21%</td>
<td>9,79%</td>
<td>100%</td>
</tr>
</tbody>
</table>

e. Monitoring and evaluation

| Monitoring and evaluating    | 110 (87,30%) | 16 (12,70%) |   |
| 2. Routines                  | 110 (87,30%) | 16 (12,70%) |   |
| 3. Evaluation standard       | 126 (100%)  | -           |   |
| 4. Feedback                  | 126 (100%)  | -           |   |
| 110                          | 93,65%     | 6,35%       | 100% |

Source: primer data of 2017

The organization management on maternal and child health care center is seen by its structure and job division. The data above shows that 126 or almost 100% respondents said that the maternal and child health care center has clear organization structure even the officers’ regeneration. It shows that its management has been effective due to the existence of organization
structure and job division there. By this, it is hoped that there will not be any responsibility missing in among the members of maternal and child health care center organization. It is appropriate with Robbin’s opinion (2009) that organization structure determines how the job is divided, reports slot, formal coordination mechanism and interaction form followed. Meanwhile, Kusdi (2009) mentioned whether the organization structure is a way to organize the elements in an organization as well in order to achieve the goals (Gammahendra, et.al, 2014).

The plan here means all things about how things are well-planned, goals determinations, and plan to change. Based on the data above, 126 (100%) respondents have done the activity of maternal and child health care center. Unfortunately, those plans are not balanced with the goals in the active management, that is 94 respondents or 74.61% respondents said that there is no goals determination in plans. This case will cause the infectivity of maternal and child health care center management in term of plans which then affects activity’s failure. Similar to the previous case, the change of plans, while the activity is ongoing, will also cause its failure. 59 respondents or 46.83% respondents said that the structured planned in the first is chanced due to the evaluation after the activity conducted. To make the maternal and child health care center management effective in its utility, there must be good plans so that the organization plans can find obvious goals based on their capability.

This case is in contrast with the research of Nurhapna and Setya (2014) that strategic plans can give whole control for all jobs, functions, roles, and motto from hospitals. It also can strengthen the focus of organization so that the organization sources can be used optimally to serve hospital mission. The existence of strategic plans will ease the leaders to make good decisions. Good work starts with good plans.

Implementation included how appropriate the activity with the plans, checking the preparation, members’ involvement including their activeness and creativity, goals and activity appropriation, home visits to family who does not attend and activity reports. The data above shows that 126 respondents or about 100% members have conducted effectively the activity of maternal and child health care center. This effectiveness may be possible to affect society to then utilize the existence of maternal and child health care center. Similar to Akbar Nasution’s research (2015) who stated that there is an influence among good governance principles toward the affectivity of member’s working performance in Unified Investment Service Unit, Medan. Further, the improvement of good governance principles affectivity will better the members’ performance.

Then, controlling included activity controls related to the plans’ goals, routines and mentoring the activity of maternal and child health care center. In fact, the data above shows that 126 respondent or resemble 100% respondents implied that the control has been conducted very well. Unfortunately, about 37 respondents or 29.37% respondents said that the controls can not commit every day. However, the control is still effective according to 80% respondents’ interview results. According to Areros (2015), top-down control really affects the affectivity of bureaucracy which is supported by Nawawi’s theory (1995) that top-down control is the process of controlling, checking and evaluating toward the faction of all components to achieve maximally activity performance of maternal and child health care center. Furthermore, Nawawi (2015) also stated that society can also participate in top-down control such as giving critics, suggestions and questions so that the controllers can serve people better based on the regulation of maternal and child health care center.

Meanwhile, monitoring and evaluation include how often it is conducted, its indicators presence, and feedbacks. 93.65% respondents from the data above, the monitoring and evaluation have been well done. As seen from its service improvement feedback. It is alike with Nindy Syafrilia, et.al (2013) that the monitoring and evaluation of merit service conducted in Kulon Progo regency are effectively done.

4.2 Regulation and Letter Decision of Maternal and Child Health Care Center

The regulation and letter decision of maternal and child health care center aim to strengthen the position of it as an activity that purposes to detect children’s growth as country’s generation.

Table of respondents distribution toward regulation and letter decision of maternal and child health care center in Sampang

<table>
<thead>
<tr>
<th>Regulation and Letter Decision</th>
<th>Yes</th>
<th>No</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Letter decision to strengthen the existence of maternal and child health care center</td>
<td>(100%)</td>
<td>126</td>
<td>Very effective (Ya, &gt;80%)</td>
</tr>
<tr>
<td>2. The changing of letter decision and regulation annually</td>
<td>-</td>
<td>(100%)</td>
<td>126</td>
</tr>
<tr>
<td></td>
<td>50%</td>
<td>50%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: primary data of 2017

Based on the table above, 126 or 100% respondents said that the regulation and letter decision for maternal and child health care center already existed. Its regulation and letter decision is seldom to change which means the existence of maternal and child health care center is accepted already among the society. By this, the management of maternal and child health care center has been effective. It is similar to Cincy’s, et.al research (2017) that the influence of letter decision existence can better the affectivity of maternal and child health care center performances to give better service to people. Alike with Cincy, Noviyanti (2016) also stated that the existence of letter decision also affects the taxpayer responsibility of paying and reporting its tax.

4.3 Budget
The budget here means organization funding to conduct the activities in achieving the goals. It includes the funding from maternal and child health care center itself and outside maternal and child health care center.

### The table of respondents distribution toward the budget of maternal and child health care center management in Sampang

<table>
<thead>
<tr>
<th>Budget</th>
<th>Yes</th>
<th>No</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Budget of maternal and child health care center itself</td>
<td>(100%) 126</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>2. Members’ honorarium</td>
<td>(100%) 126</td>
<td>-</td>
<td>Very effective (Ya, &gt;80%)</td>
</tr>
<tr>
<td>3. Budget report</td>
<td>(100%) 126</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>4. Budget from outside of the organization</td>
<td>(84.13%) 106</td>
<td>(15.87%) 20</td>
<td>96.03% 3.97% 100%</td>
</tr>
</tbody>
</table>

Source: primary data of 2017

Based on the table above, 126 or 100% respondents explained that the maternal and child health care center has fulfilled the budget related to member’s honorarium, activities, and its development. Yet, there are 106 or 84.13% respondents get budget help from other for maternal and child health care center management. Overall, the budget estimation of maternal and child health care center in Sampang has gone 96.03% effective.

#### 4.4 Members’ Performance

Members’ performance includes their active involvement toward structure organizing of maternal and child health care center, their involvement of making plans, conducting activities and making reports of all things related to maternal and child health care center activities.

### The table of respondents’ distribution toward the members’ performance of maternal and child health care center management in Sampang

<table>
<thead>
<tr>
<th>Members’ Performance</th>
<th>Yes</th>
<th>No</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Structure organizing involvement</td>
<td>(100%) 126</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>2. Plans making involvement</td>
<td>(86.51%) 109</td>
<td>(13.49%) 17</td>
<td></td>
</tr>
<tr>
<td>3. Active and creatively involve activities</td>
<td>(100%) 126</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>4. Reports making involvement</td>
<td>(100%) 126</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>5. Appropriation of conducting the activities</td>
<td>(86.51%) 109</td>
<td>(13.49%) 17</td>
<td></td>
</tr>
<tr>
<td>6. Trainings</td>
<td>(27.78%) 35</td>
<td>(72.22%) 91</td>
<td></td>
</tr>
<tr>
<td>7. Corporative characters</td>
<td>(100%) 126</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

Source: primary data of 2017

Based on the table above, 100% respondents explained that almost all members’ or maternal and child health care performance have performed professionally. About 109 respondents have involved in plans making of maternal and child health care center. Then, 35 or 27.78% respondents have got training of concerning their performance which then affects the development of maternal and child health care center management. Overall, the members’ performance has already been effective because about 85.72% respondents actively manage the maternal and child health care center. As Mayamin (2014) stated that workers’ performance affects the service of village chief office of Sako, Palembang so that they can give better service to the society.

### V. CONCLUSIONS

The effectivity of maternal and child health care center management depends on its organization, plans, implementations, monitoring, evaluation, regulation and letter decision, budget and members’ performance. Most maternal and child health care center management in Sampang has gone effective. Only few of them are still less in making plans for its development. About 77.89% maternal and child health care center management has gone effective, 59.52% less managing and 66.84% in trial to increase their affectivity. The budget of maternal and child health care center in sampan has reached 96.03%.
VI. SUGGESTIONS

1. There should be plans prior to managing the maternal and child health care center in order that the activities run well.
2. There should be regular monitoring or control toward its activities.
3. There should be cooperation among related institutions in one place so that children’s essential need can be fulfilled and coordinated very well.

REFERENCES


AIR QUALITY CONCERNS IN AFRICA: A LITERATURE REVIEW

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\textsuperscript{b}State Key Laboratory of Pollution Control and Resource Reuse, College of Environmental Science and Engineering, Tongji University, Shanghai 200092, P.R. China

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Abstract- Air Quality; both indoor and ambient is a worldwide concern. It estimated by The World Health Organisation that Air pollution caused up to 7 million premature deaths every year owing to mainly heart disease, stroke, respiratory diseases and cancers.\textsuperscript{1} Many developed and developing countries such as USA and China are investing heavily in controlling and fighting Air Pollution. However, there seem to be little sign of concern in African countries on Air Quality issues. There is simply strong evidence in study papers that air pollution in Africa has reached worrisome levels and that this problem is growing ignored by authorities in many corners of the continent. Results of Studies carried out all over Africa show unprecedented levels of Pollutants; PM2.5, PM10, NO\textsubscript{x}, SO\textsubscript{2}, CO\textsubscript{2} and many others in the air. The studies also show catastrophic effects of such pollution on health and the socio-economic lives of people. As the countries in Africa are making effort to grow their Economies, the Air Pollution concerns are similarly increasing. This paper summarizes significant finding in literature on the air quality in Africa; including air pollutants, related sources, levels and concertation, mitigation measures and potential health effects. There are also recommendation that may help to change present picture of Air Quality management in Africa.

Index Terms- Air pollutants, Heath Assessment, Mitigation Measures, Africa

I. INTRODUCTION

Air Pollution is currently a worldwide problem. It is regarded as one of the main contributors to morbidity and mortality worldwide.\textsuperscript{2} To date, both outdoor and indoor air pollution, is argued one of the biggest environmental risk to health, it is estimated to be responsible for about one in every nine deaths per year. It is estimated that outdoor air pollution on its own caused around 3 million deaths each year, as a result of non- communicable diseases.\textsuperscript{3} Air pollution is also a cause of many other health problems such as chronic obstructive pulmonary disease (COPD) linked to enhanced ozone (O\textsubscript{3}), and acute lower respiratory illness (ALRI), cerebrovascular disease (CEV), ischaemic heart disease (IHD), COPD and lung cancer (LC) which is linked to PM2.5.\textsuperscript{4} As Air pollution continues to rise at a high rate due to increased human activities, it is in turn affecting economies and people’s quality of life; it is in fact a public health emergency\textsuperscript{3}. While it has been a popular phenomenon in Asia, Europe and America in the past decades, Air Pollution is rapidly becoming a vital concern in Africa. Both indoor and outdoor pollution is presumed to be on the rise; there is increased burning of rubbish and cooking indoors with inefficient solid fuel cook stoves, enormous number of small diesel generators, cars which have had the catalytic converters removed and other petrochemical plants, all emitting pollutants into the continent’s atmosphere. Ambient air pollution from traffic, fuel power generation and industries is increasing at a rapid rate, especially in fast-developing countries such as Egypt, South Africa, Ethiopia and Nigeria. This makes Air pollution a serious and worsening health problem in all the growing cities in Africa\textsuperscript{5}. The deterioration of air quality in Africa is attributed to enhance by rapid population growth and increased vehicle ownership, accelerated use of solid fuels and poor waste management practices. Industrial expansion is also repeatedly mentioned as a major contributor to the worsening air pollution\textsuperscript{6}. Dating back to the time the initial measurements of high concentrations of CO over tropical Asia, Africa, and South America were made available by the MAPS instrument launched in 1981 on the space shuttle Columbia, it became clear that air pollution was a global issue. The images showed not only that industrial air pollution from fossil fuel combustion could affect regional and global air quality, but that emissions from biomass burning were important as well, confirming the hypothesis of Crutzen et al. This meant that communities in less developed regions, as well as residents of industrialized and rapidly developing countries, could suffer from air pollution generated elsewhere.\textsuperscript{7} Studies conducted throughout Africa have shown that air pollution from all the sources adversely affects people’s respiratory health. Despite this realization however, little attention has been paid to the issue and in so doing, the control of this man-made hazard very difficult.\textsuperscript{8} In order to woe foreign investments into their mining sectors, many countries in Africa have been and are willing to overlook instances of mining company non-compliance with environmental standards and regulations. Such acts have lead to high levels of pollution in many mining areas.\textsuperscript{9} This however is causing big problems on both the African people’s health and the continent’s economy. It is estimated by scientific studies that almost 600'000 people in Africa alone each year due to air pollution related sicknesses.\textsuperscript{10} Economically, it was estimated that as at 2013, the African continent incurred costs up to USD 215 billion as a result of outdoor air pollution related premature deaths. While USD 232 billion was the estimated cost of premature deaths from household air pollution.\textsuperscript{11}
Several studies that provide evidence to the fact that Air Quality is of great concern in Africa resulting from the increase in the emission of Pollutants and expansion Pollutant sources, were reviewed. The studies also reveal the extent to which Air pollution is affecting the health of people in Africa as well as their social and economic lives. Despite the overwhelming evidence of increased Air pollution in Africa, there are also revelations in some studies that the problem is being ignored in the continent and only a few countries are implementing Mitigation measures. This is supported by lack of data which make the estimates limited both by the lack of air measurements and the lack of medical studies linking pollution to deaths in Africa.

II. Air Pollutants and Sources in Africa

In developing countries, sources of air pollution range from transportation and industrial pollution, biomass burning and coal fuel use, to suspended soil particles from unpaved roads. These sources are to some extent different from those in many other regions. The literature from different studies show different pollutants from varying sources across the whole continent. Air pollution in Africa appears to be rising with respect to key pollutants. Many studies revealed the main cause of urban air pollution as the use of fossil fuels in almost all industrial and domestic sectors. The pollutant concentrations are presumed high over the industrialized regions (Morocco, North Algeria, Tunisia and Eastern Algeria), where they account for about 60-70% of the total sulphate. Concentrations of NAS are also high over Western Algeria and Eastern Algeria. The burning of fuelwood and agricultural wastes also contributes to high pollution levels. It is estimated by one of the reviewed studies that about 700 million people depend on solid biomass fuel and use simple cook stoves located in poorly ventilated kitchens in Sub Saharan Africa. This results in high concentration indoor air pollutants. The access to less polluting types fuels is very limited for the majority of people in SSA (Rao and Pachauri, 2017) as such people resort to obtaining energy from biomass fuels, such like wood, agricultural wastes and animal dung (Amegah and Agyei-Mensah, 2017; Sulaiman et al., 2017). Scientific studies show that approximately 90% of African households depend on biomass fuels. Another noticeable source of Air pollutants in Africa are the Deserts. Studies reveal that winds transport large amounts of dust from Sahara desert to the Americas, North Africa, and ven Europe. It is estimated by one of the studies that the Sahara and its margins inject between 600 and 900 106 tons of dust into the atmosphere each year (D’Almeida, 1986; Marticorena et al., 1997; Callot et al., 2000). Other studies reviewed have included the use of heavy machinery as another major source of air pollutants in Africa. The use of heavy machinery in extractions and constructions in many countries in Africa, generates a lot of dust which contribute of respiratory disorders (Ayine, 2001; ILO, 2005; Kumah, 2006). However, such damages are not really cared about looked carefully as a hazard. Some practitioners argue that the desire by many African nations to earn foreign exchange weakens their resolve to pass and enforce, mining-related environmental regulations (McMahon, 2011). The high concentrations of dust for long periods of time, and the interaction between dust and other man-made air pollution, raise eyebrows about negative health effects and a need for appropriate interventions by health authorities. Air pollution in Africa thus has many causes; purely anthropogenic factors like industrial, road traffic and biomass fuel use. All these are releasing pollutants into the atmosphere and contributing to the deterioration of the air quality. In addition, dust particles, whether of natural origin or manmade, from bush fires or practices that lead to desertification, affect air quality (O’Hara et al., 2000; Sunnu et al., 2008; Zender et al., 2004). Another study conducted in Africa concluded that Air pollution in urban areas in Africa comes from many and different sources. One of the most important source of the classical pollutants; sulfur dioxide (SO2), nitrogen oxide (NOx), carbon monoxide (CO), volatile organic compounds (VOCs) and particulate matter (PM) is fossil fuels; particularly the burning of fuels. While yet another study went a step further and classified the pollution sources in Africa into three; namely mobile sources, stationary sources, and open burning sources. The sources can further be categorized into groups like motor traffic, industry, power plants, trade and domestic fuel. Southern Africa is globally regarded as a significant source region of atmospheric pollutants, for instance a prominent NO2 hotspot is seen on global maps of NO2 satellite retrievals over the South Africa. Biomass burning is a relatively small source category with a contribution of 5% globally; its areal range is large. It is presumed as the main source of air pollution in Canada, Siberia, Africa, South America and Australia. The annual mean PM2.5 in these countries is below the concentration–response threshold. In the Southern Hemisphere biomass burning is categorized as the leading contributor of PM2.5. In Brazil it is estimated to contribute about 70%, and in some African countries its impact can go as high as 90%. For example in Angola4. Emissions from solid fuel use in households are detrimental to health, especially in households where there is no proper ventilation or improperly designed cook stoves that do not have flues to evacuate the smoke resulting from incomplete combustion. Insufficient burning of fuels produces toxic products such as particulate matter (PM2.5 and PM10), carbon monoxide (CO), oxides of nitrogen (NOx) and sulphur dioxide (SO2). This is the same in crude oil refineries, fertilizer industries and power plants; some of which are located in the Atlantic coast of Morocco, Northern Algeria, Easter Algeria and Tunisia; these greatly contribute to mixing desert dust with particulate pollutants such as nitrate, sulphate and ammonium. Several studies conducted in various countries in Africa revealed different types of pollutants with different levels. For instance a study carried out in Algeria found the annual average concentration of PM1, PM2.5 and PM10 to be 18.24, 32.23 and 60.01 μg m-3 respectively. While PM1, PM2.5 and PM10 concentrations in roadside varied from 13.46 to 25.59 μg m-3, 20.82–49.85 μg m-3 and 45.90–77.23 μg m-3 respectively. In an urban station, the PM1, PM2.5 and PM10 concentrations were found to be varying from 10.45 to 26.24 μg m-3, 18.53–47.58 μg m-3 and 43.8–91.62 μg m-3. The magnitude of air pollution is attributed to the poor combustion of the ever increasing fleet of cars. The fleet of cars to another disadvantage is that it is has a higher proportion of diesel cars which some of them are too old and even poorly maintained. It is also important to note that in the areas under discussion, the use of unleaded gasoline is still very low. In a study conducted in Burkina Faso, large spatial and temporal variations were found that showed a poor air quality situation, with very high levels of PM10, exceeding WHO air quality guidelines. Important sources are

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said to be transported dust and re-suspension of dust from unpaved roads, not forgetting vehicular emissions and biomass burning. While in another study in the same country, Cl, K, Ca, Ti, Mn, Fe, Cu, Zn, Br, Rb, Sr, and Pb were also found in the samples. The particle mass concentration was found to be 27–164 μg/m² while BC varied between 1.3 and 8.2 μg/m³. A study conducted in Kenya, positive matrix factorization analysis identified up to five source factors of PM2.5 in the capital city Nairobi. These are: traffic, mineral dust, industry, combustion and a mixed factor (composed of biomass burning, secondary aerosol and aged sea salt). The study estimated that Mineral dust and traffic factors contribute to about 74% of PM2.5. This is similar to the results of a pilot study conducted in the same country which found that roadway concentrations of PM2.5 were estimated to be about 20-fold higher than those from the urban background site, while black carbon concentrations differed by 10-fold. In Cameroon, the comparison of the roadside concentrations in Douala and the guidelines of the WHO showed a great exceedance of up to approximately 300%, specific to the scenario. In a separate study carried out in Ghana, PM2.5 and PM10 were estimated to be as high as 200 and 400 μg/m³, respectively, in some parts of the path. There is evidence of the contributions from biomass and traffic sources, as well as from geological and marine non-combustion sources to particle pollution. Results of a comprehensive study carried out in Tanzania showed that hourly average sulphur dioxide concentration range from about 127 to about 1385 μg/m³. The measured values of sulphur dioxide were well above the WHO recommended guidelines with an hourly objective value of 350 μg/m³ at 87%. The hourly average suspended particulate matter ranged from about 98 to about 1161 μg/m³, which also exceeded the 230 μg/m³ WHO recommended value at 87% of the sampling sites. In a study done in South Africa, the average annual outdoor concentration of PM10, NO2 and SO2 captured was 48.3 +/- 43.4, 11.50 +/- 11.6 and 18.68 +/- 25.4 μg/m³, respectively, whereas the South African National Outdoor Air Quality recommend 40, 40 and 50 μg/m³ for PM10, NO2 and SO2, respectively. However, some areas in the same country, the levels are much higher as a result of the economic activities taking place, for example in the city of Durban; this is a city with Africa's busiest port and a key hub for crude oil and exported refined petroleum and petrochemical products, as such it experiences a mixture of pollutants that reflects emissions from such sources as traffic, industry and biomass burning. The trend is also the same in several other African countries. In Kenya, the urban concentrations observed by a study raised some concerns as regards public health and policy. Looked at it together with survey data on commuting patterns within Nairobi, the results suggested that many people in Nairobi are exposed to high concentrations of fine particle air pollution on a regular basis. These have the potential of causing serious long-term health implications. This is also the case in Egypt, where PM and lead are presumed the major pollutants. The average PM2.5/PM10 ratio for all paired measurements made during the baseline year and the consecutive three years was 0.51. A comparison study carried out in three countries; Tanzania, Burkina Faso and Botswana on Particulate Matter also revealed similar results; the spatial and temporal variations of PM2.5, PM10 and TSP in these three countries were investigated with portable particle counters. Soil derived dust was found to be the main source of particles in three studied cities of the three counties. PM2.5/PM10 ratios were low (0.1–0.5). Relatively high levels of TSP and PM10 were also observed within the urban areas of Dar es Salaam in Tanzania and Gabon in Botswana. A separate study showed that whether based on daily, monthly, seasonal, or annual PM10 concentrations measured in the four West African stations, the dust concentrations were extremely higher compared to the air quality standards defined by the WHO, the European Union and the United States of America.

It is interesting that most of the reviewed studies tend to agree on the type and levels of pollutants in the atmosphere in the African region. Furthermore the studies are attributing the rise in air pollution to the same or similar causes, the studies suggest that pollution levels may be rising in Africa as a result of the ever increasing car fleet on the continent which is building on already high concentrations of PM in many locations resulting from climatic and geographic conditions. Biomass burning and industrial activities, located in cities, further accelerate the levels of PM in the air. The Pollution from biomass burning however does not only feature in Cities but also in rural areas with the poor masses where it poses the greatest health concern. Unvented burning of biomass for fuel is currently taunted as one of the main killers in the world. In developing countries throughout the world, it is obvious that burning of biomass produces a very hazardous mixture of air pollutants. More than 2,000,000 people, mainly women and children, are estimated to be dying annually from such pollution (Smith, 2003). This is one of the main environmental and health problem of the world, which is vividly not recognized enough by authorities. The use of crop residues, animal dung, crop waste, and other solid wastes for cooking, lighting and heating is an important source of air pollutants in Africa. It is estimated that 82% of people in Africa primarily depend on solid fuels for cooking. The majority of these people live in rural areas where they do not even have access to any of the modern forms of energy such as gas or solar. Inefficient burning of such solid fuels with traditional cook stoves or in a popular African three-stone place in open, generates smoke with significant amounts of toxic air pollutants which include carbon monoxide (CO), particulate matter (PM2.5 and PM10), nitrogen oxide (NOx) and sulphur dioxide (SO2), which a huge health hazard, especially to women and children who spend most of their time in the household where exposure to concentrations of air pollutants from such emissions is considerably high. In addition to household and crop residue burning, anthropogenic savanna fires in sub-Saharan Africa is also presumed to be emitting a lot of smoke that affects cloudiness in the African region. The table below summarizes the Air Pollutant sources in Africa:

<table>
<thead>
<tr>
<th>Air Pollutant Sources</th>
<th>Air Pollutants from the Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industries</td>
<td>NAS, Sulphate, PM10, PM2.5, VOCs</td>
</tr>
<tr>
<td>Biomass Burning</td>
<td>(PM2.5 and PM10), carbon monoxide (CO), oxides of nitrogen (NOx) and sulphur dioxide (SO2), sulfur dioxide (SO2), nitrogen oxide (NO3),</td>
</tr>
</tbody>
</table>

http://dx.doi.org/10.29322/IJSRP.8.5.2018.p7776 www.ijsrp.org
Table 1: Air pollutant and their sources in Africa.

<table>
<thead>
<tr>
<th>Source</th>
<th>Pollutants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil Extraction</td>
<td>sulfur dioxide (SO₂), nitrogen oxide (NO₃), carbon monoxide (CO), volatile organic compounds (VOCs) and particulate matter (PM)</td>
</tr>
<tr>
<td>Transportation (Vehicles)</td>
<td>(NO₃), carbon monoxide (CO), volatile organic compounds (VOCs)</td>
</tr>
<tr>
<td>Construction</td>
<td>Fine dust particles</td>
</tr>
<tr>
<td>Deserts</td>
<td>Fine dust particles</td>
</tr>
<tr>
<td>Power Generation</td>
<td>PM₁, PM₂.₅, PM10, VOCs</td>
</tr>
</tbody>
</table>

### III. Air Pollution and Health Assessment in Africa

Compared to the air pollutant and sources studies above, air quality research related to health assessment is much less in Africa. This is another indication that this field is being ignored somehow. It is vivid from many studies that the greatest health impacts from air pollution worldwide occur among the poorest and most vulnerable populations. The amount of exposure in terms of exposure intensity, the number of people and time spent exposed is said to be far greater in the developing countries (Smith, 1993); it is estimated that 76% of all global particulate matter air pollution occurs indoors in the developing countries.² Indoor air pollution from biomass fuels disproportionately affects children and women and is said to be one of the causes of significant global mortality and morbidity. According to the reviewed literature, this is a neglected area of global disease that affects a large number of people throughout the world.² According to the reviewed studies, the main health effects associated with the exposure to concentrations of air pollutants from emissions are lung cancer, chronic bronchitis, heart disease, stroke, lower respiratory infections, cataracts, premature mortality and low birth weight among many others.²² All over Africa, studies have also shown that air pollution from all the sources negatively affects people’s respiratory health. Air pollution either due to gases (carbon monoxide, sulphur dioxide, nitrogen dioxide, or dust particulates. These, one by one or in combination cause respiratory impairment if inhaled at certain concentrations and over a long enough period of time.³³ Respiratory impairment: in rural as well as urban areas of Africa in which industries are located have been scientifically proven to have a high prevalence of respiratory diseases symptoms and reduced lung functioning. For example, one author demonstrated a high frequency of occurrence of cough alone, cough with sputum, nasal catarrh, morning phlegm, reduced lung function and chest pain among the residents of Bacita, Kwa State in Nigeria owing to their exposure to air pollutants from the sugar factory; and Fatusi et al. also drew similar conclusions from sawmill workers in the same country. In eastern Africa, Mengesha et al. studying the respiratory effects of dust in different sections of yam, cigarette and cement factories found a higher prevalence of chronic cough, bronchial asthma and chronic bronchitis, among the workers than other people. Results of the studies from southern Africa and northern Africa are similar to those mentioned above from West and eastern Africa. Rees et al. found that an uncontrolled dust hazard in all the nine foundries surveyed in South Africa in a nine year period.³³ A study carried out in Sub Saharan Africa concluded that Exposure to ambient air pollution is a major threat to health in SSA with an estimated 176,000 deaths every day in the region attributable to outdoor air pollution exposure.³³ While another study also concluded that Respiratory malfunctioning from the four main sources of air pollution is a major but highly neglected issue in African.³³ A study on the effects of exposure to certain concentration of pollutants revealed that Exposure to an hours concentration of NO₂, SO₂, CO and O₃, an 8-hour concentration of CO and O-3, and a 24-hour concentration of PM10, NO2 and SO2 will less likely lead to adverse effects to sensitive exposed groups. However, children are more likely to be affected than adults. Furthermore, for chronic annual exposure, NO2, SO2 and PM10 posed a health risk to sensitive groups of people, with the severity of risk varying across the exposed groups.³³ In Several other studies in Africa, outdoor air pollution has been associated with adverse respiratory effects, more especially among infants with asthma.³¹ A number of studies dealing with the health effects of Biomass Burning in Africa were also reviewed. The results in one of the studies demonstrated that biomass PM₂.₅ has increased the death rate of under-five infants in Western and Central Africa, each by 2%, and maternal mortality in Central Africa by 19%. While anthropogenic PM₂.₅ increased maternal and under-five deaths in Northern Africa by 10% and 5%, respectively, and maternal deaths by 4% in Eastern Africa. Dust PM₂.₅ increased under-five deaths in Northern, Western, and Central Africa by 3%, 1%, and 10%, respectively. Mixture PM₂.₅ only increased under-five deaths and maternal deaths in Western (incidence rate ratio = 1.01, p < 0.10) and Eastern Africa (incidence rate ratio = 1.06, p < 0.01), respectively.³³ Whereas a study conducted in Malawi (The warm heart of Africa) found that reliance on high-or low-quality fuelwood or crop residue (vs. charcoal) was associated with considerably higher odds of shortness of breath, chest pains, night phlegm, forgetfulness, dizziness, difficulty breathing and dry irritated eyes.¹⁶ Biomass Burning (BB) contributes mainly to indoor pollution in Africa which has been cited by many studies that it contributes to respiratory related illnesses and deaths. A comprehensive study on the health and cost of air pollution in Africa found that the total of annual deaths from outdoor air pollution across the continent increased by 36% from 1990 to 2013, from a then relatively low base of ≈ 180 000 in 1990 to ≈ 250 000 in 2013. Over this period, deaths from indoor air pollution also continued to increase, by 18%, from an already high base of ≈ 400 000 in 1990 to well over 450 000 in 2013.¹¹ It is also important to note that another study highlighted that there is a lot of unreported or unmeasured emissions in the African region. The study concluded that when these underrepresented emissions sources are combined with the current estimates of emissions, ambient particulate matter concentrations from present-day anthropogenic activity...
contribute to approximately 13,210 premature deaths per year, with the largest contributions (about 38%) coming from residential emissions. The studies reviewed also agree that airborne dust particles also affect human health, through their effects on local and regional air qualities (Anuforom et al., 2007; Sassen et al., 2003). From all the studies cited so far, several mention the potential effects of dust particles on human health (e.g. Anuforom et al., 2007; Engelstaetter et al., 2006; Kellogg et al., 2004; Mahowald et al., 2007; Sassen et al., 2003), but very few of them present quantitative results. It is of particular importance to note that only a few studies on Saharan dust have been published, although the Sahara desert is cited as one of the major sources of air pollutants in African; and of major concern is the fact those studies that are available indicate that Saharan dust has a significant impact on human health, further studies could therefore be necessary.41

IV. Mitigation and Control Measures

A far as air pollution is concerned, the worldwide tendency is to reduce the concentrations of pollutants owing to the increasingly strong restrictions which local governments and international organizations unanimously impose. Several guidelines and regulations have been adopted to define air quality levels. The WHO considers the Guideline Values (GD); the EU labels the Limits Values for Air Quality (LVAQ), while the US Environmental Protection Agency defines the National Ambient Air Quality Standards (NAAQS). Guidance on indoor air quality and concentrations of PM2.5 and CO is provided by the World Health Organisation (WHO) (World Health Organization, 2016). To prevent harmful health consequences, the WHO recommends keeping PM2.5 concentrations at less than 25 µg m\(^{-3}\) when averaged over a 24 h period, with the guidance also recommending CO should not exceed 6 ppm over 24 h (World Health Organization, 2016). However, in poor countries like the majority of African countries and those with generally low average incomes, concentrations of air pollutants remain high and the tendency will be to increase their emission levels as they develop, making the problem even worse than it is at the moment. In many African countries, Pollution control falls within the context of competing priorities for basic service provision and economic development. Further challenges include the lack of political will, the limited use of planning tools, and a non-strategic approach to Air Quality Management.42 Developed countries are building up strategies in order to reduce air pollution while most African countries have neither air quality regulations, nor the tools for monitoring the same.43 Despite the health risks this situation presents, air quality programs, particularly in Sub-Saharan Africa, have stalled or completely stopped in recent years. Studies have concluded that minimal attention is given to air quality and air pollution control related programmes. For example one study revealed that out of about 27 countries, only 7 have operational routine monitoring systems: these are Botswana, Ethiopia, Ghana, Madagascar, Tanzania, Zambia, and Zimbabwe.44 While in South Africa air quality management has focused on industrial, domestic coal burning and vehicles as emission sources of air pollutants.45 A few studies have revealed mitigation measures being implemented in Africa. The interesting part is that the few measures that have been implemented in the few areas have revealed very positive and encouraging results. A study in South Africa, for example, showed that household PM2.5 concentrations greatly decreased when households in Kikati areas switched from use of firewood to biogas for cooking.46 It has been suggested by another study that advanced stoves, which burn fuel more efficiently and reduce smoke emissions, could help to reduce indoor air pollution in poor, rural areas.47 The results from other studies also suggest that economic growth and rising incomes may matter in African countries in order to curb pollution, but more stringent policy measures, especially at the industrial level would be required to curb environmental degradation.48 Some countries such as South Africa have already set up targets for mitigation strategies. It is estimated that these targeted potential mitigation strategies can avoid up to about 37% of the estimated annual premature deaths by 2030 with the largest opportunity being a reduction of 10,888 annual deaths from switching half of the energy generation in South Africa to renewable technologies.49 However, another study revealed that South African face several challenges in implementing AQA. as pollution control falls within the context of competing priorities for basic service provision and economic development.50

V. Conclusions and Recommendations

This review summarizes major findings reported in literature on air quality in Africa including air pollutant, related sources, levels and concertation, mitigation measures and potential health effects. In different African countries, research interests and focus varied, which may have led to different reporting and more difficult to compare results across the continent. Data from sub-Sahara Africa is said to be scarce and virtually absent especially among populations residing in informal residential settlement. Again, despite the proximity of the Sahara, very few studies about dust impact on air quality and human health have been conducted in West Africa. The lack of data therefore is one of the major constraints on our understanding of the impacts on human health. Findings also suggest a lack of clear and/or practical policy intervention to restore household air quality, while single policy intervention have been proven inadequate in many studies. In addition, the studies revealed that different countries are at different levels a far as air pollution control and regulation is concerned. For example, as of July 2017, there was no network for the continuous measurement of air quality or data on the levels of air pollution in Algiers (APW, 2017). However, such data is essential for implementing, monitoring and evaluating policies that can help to deal with air pollution while also protecting human health. At present, only some occasional data collected by scientists and researchers are available to give an idea of the air quality in Algiers (Kerbach et al., 2006; Moussaoui et al., 2010; Kerchich and Kerbach, 2013, 2016). These data though are still insufficient and need to be improved further. Another study also concluded that there is a clear lack of urgency from SSA countries in addressing air quality issues. This is clear when we look at the scarcity of reliable data on air pollution levels.6

Our review, just like other reviews on air quality related studies in Africa, reveals that, although few studies have reported annual mean levels of coarse and fine particles, collective evidence from short- and long-term air monitoring studies across Africa demonstrate that pollution levels often exceed WHO and other
Overall, from the reviewed studies we can conclude that the pollution caused by fine particles is of a great concern in Africa because of its high magnitude and its physicochemical characteristics. It is also clear from the studies that air pollution in Africa is on the rise; the number of fatalities from air pollution related illnesses is also tremendously increasing as development efforts are accelerating in almost all African countries. On this basis, this review agrees with many other studies and review in proving recommendations that will help to reduce, control and manage air pollution in Africa. There is need for concentrated efforts on the part of African governments, health administrators and health workers to ensure that necessary attention is given to research on the subject so that meaningful control measures can be formulated, thereby ensuring clean air for the people to breathe and live healthily. Implementation of systematic PM data collection would enable air pollution related health impact assessments, the development of strategies to reduce the air pollution health burden, and facilitate urban planning and transportation policy as it relates to air quality and health. There is need to identify and implement effective and equitable transportation regulations and policies that reduce the impacts of traffic pollution, and technological and policy innovations that can reduce air pollution from biomass fuels without restricting what may be the only energy source available to poor households. Countries EPAs should set higher emission standards for factories and industrial areas and impose strict fines for violation of the standards. Further, they should also consider using air pollution control technologies that are cost-effective, easily adopted, and have minimal impact on the environment. As the concentration of industries in cities increases, so does the air pollution from emissions from factories and industrial areas. Furthermore, using green energy sources such as solar energy can help reduce air pollution. For instance, South Africa’s Renewable Energy Independent Power Producer Procurement Programme (REIPPP) is making a tremendous impact by using renewable energy sources to generate electricity. The focus should be on renewable energy sources that can be adopted by households and industries.

Above all, air quality is a serious concern in Africa and the reviewed studies have proved that it is a killer and a cause of economic losses. Air pollution in Sub Saharan cities appears to be on the rise with respect to many key pollutants. However there I strong indication from some studies that air pollution is being greatly ignored by many of the countries largely due to its conflicts with economic development. Just like one study suggested, if nothing is done to reduce emissions and to better plan for urbanization, this trend can be expected to further exacerbate already serious air quality problems in sub-Saharan African cities as well as the health impacts that accompany them. This sadly applies to the whole African continent a well as other parts of the world.

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Economic Implications of Political Instability in Middle East

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Abstract: Almost all Arab countries have experienced big and rapid changes in their societies and economies in recent years. In the first half of 2008, oil and natural gas prices began to grow very rapidly, leading to huge profits in Arab oil-producing countries. However, at the same time, they had to cope with the rapidly rising prices of food and raw materials that threatened their economy and social stability. The effects of the financial crisis and the expectations of much lower global growth have been caused by the collapse of oil prices. As a result, Arab oil-exporting countries experienced a decline in revenues and a worsening of trade conditions, as well as a fall in their balance of payments surplus. Political turmoil in the Middle East has strong political and financial implications, especially as they increase the risk of stagflation, a combination of slow growth and rapidly rising inflation. If stagflation appears, there is a serious risk of a return to a recession of a global economy that has just recovered from its latest’s crisis. The latest increase in oil prices and the associated increase in prices for other products, especially food, lead to several unfortunate consequences. First, inflationary pressure will grow in already overheated markets of developing economies, where oil and food prices represent 2/3 of consumer basket. Another risk arising from higher oil prices is that all importers of energy and goods will be affected, advanced economies in particular, as soon as they withdraw from the recession and experience anemic recovery. The third risk is that rising oil prices will affect the confidence of investors and increase the risk of aversion, which leads to stock market corrections, which have a downward effect of wealth-spending capital. Business and consumer confidence will probably be affected further by reducing demand.

Keywords: Arab countries, Inflation, Oil prices, Political turmoil, Stagflation

1. INTRODUCTION

Almost all Arab countries have experienced big and rapid changes in their societies and economies in recent years. In the first half of 2008, oil and natural gas prices began to grow very rapidly, leading to huge profits in Arab oil-producing countries. However, at the same time, they had to cope with the rapidly rising prices of food and raw materials that threatened their economy and social stability. The effects of the financial crisis and the expectations of much lower global growth have been caused by the collapse of oil prices. As a result, Arab oil-exporting countries experienced a decline in revenues and a worsening of trade conditions, as well as a fall in their balance of payments surplus (Al-Nasser, 2005). Political turmoil in the Middle East has strong political and financial implications, especially as they increase the risk of stagflation, a combination of slow growth and rapidly rising inflation. If stagflation appears, there is a serious risk of a return to a recession of a global economy that has just recovered from its worst crisis of recent decades. Serious riots in the Middle East have a historically recorded causality of oil price jumps, which in three cases of five, followed the global recession. The Yom Kippur War in 1973 prompted a sharp jump in oil prices, which was a prelude to the world’s stagflation from 1974 to 1975. The Iranian Revolution in 1979 led to a similar situation: the stagflation after the jump in oil prices followed by the recession from 1980 to 1981. The Iraqi invasion of Kuwait in August 1990 led to a jump in oil prices at the same time as the US banking crisis had already pulled the United States into a recession.

2. ENERGY POLICY IN THE ARABIC COUNTRIES

Exploiting oil, without a doubt, is the basis on which Gulf countries base their economic development. Since four decades ago, these countries have decided to take control of the exploitation of this key world energy source, which until then was the largest extent controlled by the Western oil consortiums who had very favorable arrangements with the Gulf States.
Oil price jumps caused by oil shocks will lead to a rise in revenues in OPEC countries, among which are the leading members of the Gulf state (Rivlin, 2009, pp. 25-34). In 2008, a record crude oil price of US $ 147 will be reached, which will enable these countries to strengthen their broadband investments. With 68% of the world's oil reserves, the Middle East and the Persian Gulf play a key role in the conduct of the world's energy policy. In April 2009, oil prices stabilized to around US $ 50 per barrel, despite falling demand and the very bad short-term prospects of the international economy. The main reason for this is that oil became a value for those who lost confidence in the dollar and other currencies. This had a direct impact on the economy of major oil producers. For example, Saudi Arabia went into deficit, 11-12% of GDP for the first time since 2002 (European Commission, 2009). Economic growth slowed down from about 4% in 2008 to about 0% in 2009. In the United Arab Emirates, the large budget surplus recorded in 2008 replaced the deficit in 2009. Today, high government spending meets the costs of reducing the costs of the private sector in the activities of oil production. This is the case, for example, in Kuwait, Libya and Saudi Arabia. With the calculations that oil will be for another 40-50 years, the question is what will the "petroleum states" do when the source of their well-being disappears? Today's wealth is measured by thousands of billions of dollars located beneath the desert sand and the sea. The problem with which the Gulf countries will face in the future is the unchanging of their economies, which are still insufficiently diversified and too dependent on oil and natural gas deals. Some of these countries, such as Bahrain and the Emirates, have made serious efforts in the field of economic transformation, and they have increasingly represented economic sectors such as aluminum industry, petrochemicals, construction, tourism and banking. Arab investors, including national investment agencies such as Kuwait Investment Authority, invested and invested huge capital primarily in the area of Western Europe and the United States. It is estimated that to date around the world has been invested around a billion dollars of "petroleum dollars". About 10% of the sum of money was invested in Arab countries, which is called inter-Arab investment. The growth of investment activities has come in the last ten years, with leading investors Kuwait and Emirates (UAЕ), while the most attractive location for inter-Arab capital is Saudi Arabia, the most powerful member of OPEC (Al Moneef, 2011, pp. 15-21). Saudi Arabia has been a key player in coordinating a successful OPEC campaign in 1999 and other oil-producing countries to raise oil prices to the highest levels of the Gulf War, all thanks to the management of oil production and supplies. What is attracting special attention today is the ever-growing need for strengthening economic links between the Arab countries themselves. The economic advancement of many of them depends precisely on the will and readiness of the "petroleum states" to help develop neighboring fraternal states. Crude oil is the world's most wanted commodity and accounts for 40% of world energy demand. The daily world consumes 76 million barrels of oil, of which America is 20 million barrels / day, China 5.6 million barrels / day and Japan 5.4 million barrels / day. The long-running period of global economic instability has required Arab oil exporting countries to review their long-term oil price expectations and thereby reduce plans for infrastructure spending and investment in production, which were already low. This has had a negative impact on the economy of the entire region because demand for Arab workers working on oil plants of oil rich Arab states has drastically dropped, resulting in a smaller inflow into Arab non-oil exporting countries. Revenues from tourism have also decreased. All this resulted in less investment of richer Arab states in the poor, those that do not have oil revenues. Governments of Arab countries that are not oil-rich have their energy policy largely based on assistance from richer Arab countries. The high price of oil and gas has a dramatic impact on oil importing countries. High prices of goods have already been the reason, earlier, for demonstrations in many Arab countries. The main reason for public protests is the increase in public transport prices by more than 50% as a result of a jump in oil and gas prices. As a result, there is an increase in the cost of living. Dealing with high oil prices, exacerbated by the lack of resources that would allow the stabilization of economic mechanisms and the easing of prices, is one of the biggest challenges facing oil importing countries. Countries that do not have their own sources of oil turn to alternatives in the form of nuclear, solar, wind, biomass and geothermal energy. Oil importing countries are facing a difficult battle for recovery. The reason that the GDP growth rate in 2011 was better than expected is that $ 200 billion is spent on fuel subsidies. This resulted in a hole of some 50 billion dollars in national accounts that would be very difficult to fill in with loans. As long as political transition does not start with its own flows, private investors will be in a state of waiting and observation, and it will take time to go on while returning investments, tourists and capital. Moreover, the international environment remains a problem: the economic appearance of Europe remains challenging, anticipated oil prices are high, and turmoil in Syria could affect many countries in the region.

3. POLITICAL AND OIL PRICES INFLUENCE

Oil prices also played a role in the latest global recession. Until 2008, just before the fall of Lehman - Brothers, oil prices doubled over the previous 12 months, reaching a maximum of $ 148 for bursting "hands of mercy", but weakened by the global economy with shaky financial jumps. It is still not known whether the political "infestation" will spread from the Middle East to other Arab countries. The turmoil can still be contagious and is capable of destroying oil prices to a lower level. But there are great chances for the uprisings to expand and destabilize Bahrain, Algeria, Oman, Jordan, Yemen and possibly Saudi Arabia. Even before the recent Middle Eastern political jumps, oil prices jumped over $ 80-90 per barrel, an increase fueled not only by the energy of thirsty developing economies, but also by non-fundamental factors: assets and goods in emerging market-driven liquidity markets , zero interest rates and quantitative easing in developed economies and limited inelastic oil supplies. The latest increase in oil prices and the associated increase in prices for other products, especially food, lead to several unfortunate consequences. First, inflationary pressure will grow in already overheated markets of developing economies, where oil and food prices represent 2/3 of consumer basket. This
poor demand in slow-growing advanced economies, rising product prices can only lead to a weak first wave of inflation. No developed country will make progress without a jerk. Another risk arising from higher oil prices is that all importers of energy and goods will be affected, advanced economies in particular, as soon as they withdraw from the recession and experience anemic recovery. The third risk is that rising oil prices will affect the confidence of investors and increase the risk of aversion, which leads to stock market corrections, which have a downward effect of wealth-spending capital. Business and consumer confidence will probably be affected further by reducing demand. If oil prices rise further, similar to 2008, advanced economies will rapidly slow down economic growth, and many will likely slip into recession. Even if prices remain at the same level for more than a year, global growth will slow down and inflation will rise. Saudi Arabia as the only OPEC oil producer with excess capacity could increase its production, and the United States could use its strategic oil reserves to increase market supply. Over time, but this may take years; consumers could invest in alternative energy sources and reduce demand for fossil fuels through taxation policies that relate to carbon emissions and new technologies. Since energy and food security are economic issues, as well as social and political stability, a policy that lowers the sensitivity of commodity prices should be of interest to both producers and consumers. But it must act immediately. The transition from autocracy to democracy in the Middle East will probably be perverse and unstable at best. In countries with a downward demand for greater revenue and wealth, democratic enthusiasm could lead to large budget deficits, excessive demands for wages, high inflation, and eventually result in a major economic crisis. Thus, a new brave aid program should be designed for the region, something like the Marshall Plan to help Europe after the Second World War, or as a plan to help Eastern Europe after the fall of the Berlin Wall. The funding should come from the International Monetary Fund, the World Bank, the European Bank for Reconstruction and Development, and bilateral assistance from the US, European Union, China. The goal should be to stabilize the economies of the Middle East countries during their delicate political transition. Unstable political transitions can lead to major social unrest, organized violence, and civil war, fueling new economic and political shocks. Bearing in mind the current risk-sensitive oil price, its impact would not be limited to the Middle East.

4. UNEMPLOYMENT AND POVERTY

The level of unemployment, especially among young people, is one of the main short-term and long-term challenges for many Arab economies. Unemployment among young people is particularly alarming in Algeria, with a youth unemployment rate of 45%. However, figures in other countries, Saudi Arabia or Egypt are also worrying, where this figure is 25%, but like Algeria, they have a higher percentage of people under 15, which could mean an increase in youth unemployment in the future. Therefore, one of the biggest challenges for a large number of Arab countries is unemployment and the need to create jobs for a growing young population. This socioeconomic situation is becoming even more complex in countries that have no income from oil exports and with strong demographic pressures. Very soon, they will have to create jobs for a predominantly young population. Morocco and Egypt are probably the best example of this situation with unemployment and illiteracy, which are serious problems within the poorest part of the population. They together with the Gulf immigrants are most affected by the economic crisis and the decline in employment and remittances. Other exporting countries, such as Algeria and Sudan, with a medium inflow and a large young population will also face similar challenges.

The next challenge, linked to the rise in unemployment, is a possible increase in poverty. According to Arab Human Development Report for 2009, compared to other developed countries with similar income and society development, the Arab countries should get more results in poverty indicators (Arab Human Development, 2009). The economic crisis and public deficit put development and plans into public investment, industrialization processes, social policy and employment at risk. With an increase in unemployment, the economic crisis is turning into a social one, especially in countries with lower income per capita and poorer conditions of human development. In Arab countries with a higher percentage of the population below the poverty line (The Palestinian Territory, Yemen, Algeria, Egypt), the economic stimulus program is not sufficient in itself to create enough new jobs and prevent the rise of poverty in the short run. If economic stagnation continues or economic recovery continues at a slow pace, a large number of households in these countries will be at risk. In order to rid themselves of these economic hardships in such risky households, their governments should implement programs to combat poverty directly. Reinforcement of political reforms and development plans set in the years of economic boom are most needed to reduce the dependence of Arab countries on changes in oil prices and the international market. Greater diversity and industrialization is the key to creating a sustainable economy capable of creating new jobs.

5. CONCLUSION

The global economic crisis that began in the second half of 2008 has affected many Arab countries through several channels of transmission. The impact of foreign investment in the region was reduced, the crude oil market experienced a significant price correction after reaching the record level in 2008; international tourism in destinations in the Middle East has declined; and the global demand for non-oil products has been reduced. Oil exporting countries have suffered a reduction in oil revenues and have had to adapt their ambitious development plans to this situation. However, the Gulf countries managed to maintain their development projects by hitting their major National Investment Funds. They also intervened actively to protect their financial markets that were severely
affected by the fall in the price of oil. No Arab country has escaped the detrimental impact of the economic crisis, the impact on most countries was the only slowdown in economic growth, rather than the economic downturn. From everything that emerged from the crisis, it can be concluded that oil importing countries should as oil exporting countries, build export promotional programs and improve their national capabilities to innovate and adapt existing technologies in order to reduce the reliance on a limited amount of their exporting goods (of mainly natural resources), to separate its economic activities and sources of revenue, to use greater integration into world markets and to change the growth model from extensive to intensive sources, for example from fuel and other primary production to technological progress and productivity. In addition to scarce resources, the Arabs are scared of Tehran's determination to vigorously over its nuclear ambitions-particularly frightened by Egypt, fearing that there will be a disturbance of the balance of power in the Middle East if Iran succeeds in making a nuclear bomb. There is increasing opinion that some of these countries will also engage in military nuclear strategies in the background of civilian nuclear programs.

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ABSTRACT: The general objective of this study was to analyze the effect of financial planning practices on the financial performance of non-profit making health organizations in Kiambu County, Kenya. The specific objectives of the study were: to assess the effect of budgeting practices on financial performance of non-profit making health organizations in Kiambu county, to evaluate the effect of cash planning on financial performance of non-profit making health organizations in Kiambu county, to analyze the effect of inventory planning on financial performance of non-profit making health organizations in Kiambu county and to assess the effect of working capital management on financial performance of non-profit making health organizations in Kiambu county. This study adopted a descriptive survey design. The target population of the study included all the 108 in all the non-profit Making health organizations in Kiambu County, Kenya. Two respondents were selected per organization thereby making the total respondents were 216. The study used Census approach to select all the 216 respondents in all the nonprofit Making health organizations in Kiambu County, Kenya. This study used primary data which was collected through use of a self-administered semi structured questionnaires. Descriptive statistics such as, mean and frequencies was used for the purpose of data analysis. The mean scores was used to rate the factors in order of their importance. After data has been collected through questionnaires, it was prepared in readiness for analysis by editing, handling blank responses, coding, categorizing and keying into statistical package for social sciences (SPSS) computer software for analysis. SPSS version 21 software was used to produce frequencies, descriptive and inferential statistics which was used to derive conclusions and generalizations regarding the population. Analyzed data was presented by aid of frequency tables and charts. The study found that budgeting practices, cash planning, inventory management and working capital management have a positive and significant effect on performance.

Key Words: Budgeting practices, cash planning, inventory planning, working capital management, financial performance

1. INTRODUCTION

Financial performance is the process of measuring the results of a firm's policies and operations in monetary terms. It is used to measure firm's overall financial health over a given period of time and can also be used to compare similar firms across the same industry or to compare industries or sectors in aggregation (Metcalfe & Titard, 2016). Moghimi and Anvari (2014) argued that successful financial performance of a firm requires financial planning. On the other hand, financial planning involves analyzing financial flows of a firm as a whole, forecasting the consequences of various investments, financing and dividend decisions and weighting the effects of various alternatives. Performing financial planning is critical to the success of any organization. It forms the basis of a workable business plan that is measurable and achievable within a period of time. These fuels the need to work towards set targets from a financial perspective. It also helps the CEO to set financial targets for the organization and give targets to his subjects. In enhancing the level of motivation amongst employees’ rewards and recognition are accorded to those who hit the targets as provided by the budget (Moghimi & Anvari, 2014). This leads to financial performance of firms due to motivation and the desire to meet set targets.

According to Ijan (2010), nonprofit organization is an organization that has been formed by a group of people in order "to pursue a common not-for-profit goal, that is, to pursue a stated goal without the intention of distributing excess revenue to members or leaders. A nonprofit organization is often dedicated to furthering a particular social cause or advocating for a particular point of view
(Smith, 2010). In economic terms, a nonprofit organization uses its surplus revenues to further achieve its purpose or mission, rather than distributing its surplus income to the organization's shareholders (or equivalents) as profit or dividends. This is known as the non-distribution constraint. The decision to adopt a nonprofit legal structure is one that will often have taxation implications, particularly where the nonprofit seeks income tax exemption or charitable status. Not for profit health organizations provide medical services (this can also include dental, psychiatric or other specialized health services) as well as educational and preventative care services. They are usually organizations are mission-driven, rather than profit-driven (Carroll & Stater, 2008).

Moghimi and Anvari (2014) evaluated financial performance of Iranian cement companies, it was concluded that financial planning was an important variable in analyzing financial flows of a firm as a whole, forecasting the consequences of various investments, financing and dividend decisions and weighting the effects of various alternatives. According to Sarangarajan, Ananth and Lourthuraj (2012), cement industry performance was good during 1997, 1998 and 2004 while for the rest of the years the industry performed poor.

In a study on 19 Sub-Saharan African countries, USAID (2010) found that only 6.2% of the NPOs in Africa were financially sustainable. The study concluded that local NPOs provided excellent service, but lacked financial sustainability due to overdependence on external donors as the only source of funding. The low financial sustainability of the NPOs in Africa was also attributed to poor performing economies that could not generate donations to the NPOs from local sources like the government, individuals and corporates. Many of the NPOs in Africa were found to be weak and unable to compete with international NPOs for funding.

In South Africa, Not for profit health organizations are expected to invest R362 billion in infrastructures over the medium term, contributing significantly to gross capital formation. In recent years, however, the financial and operational performance of several Not for profit health organizations and development finance institutions has weakened. And although the overall financial position of the social security funds is strong, liabilities continue to mount at the Road Accident Fund (RAF) (Coovadia et al., 2009).

Abdelkarim (2012) noted that it is only organizations capable of building sound financial systems and attracting or generating steady income flows that will be able to continue to 4 exist. To be able to generate a positive balance sheet that allows a NPOs to continue in operation and accord itself flexibility to respond to ever-changing environment and needs, sound financial management practices, management competence, and a diversified funding base are imperative (Leon, 2011).

Okorley and Nkrumah (2012) in their study on the financial sustainability of NPOs found that 26% of the NPOs in Ghana were not sustainable. The study indicated the availability of funds, quality material resources, supportive leadership, development of need-based and demand-driven programmes, and effective management affected the sustainability of local NPOs. Lack of funds was found to be the major factor that affected the sustainability of NPOs as indicated by 82% of the respondents.

The Kenyan health system is impacted by the work of NPOs. According to the NGOs register at the NGOs Co-ordination Board, as at 28 February 2015, there were 16,844 NPOs operating in the 47 counties in Kenya (NGO Board, 2015). Most facilities operated by NPOs are often the best balance of care and cost where they are available. For example at the Lwala Community Health Center, a facility operated by the not for profit group Lwala Community Alliance, the minimal fee of Ksh. 50 (about $0.65 USD) is waived for up to 85% of patients. As a result of the high quality of care and low cost, patients come from a wide area of up to 30 to 40 kilometers to access the facility. In the not for profit health organizations, reliance on donor funding is often the limiting factor that prevents facilities from offering a broader service spectrum, or offering services to more people (Turin, 2010).

1.1.1 Financial Planning Practices

Financial planning is the adaption of the broad objectives, strategies and other plans of an organization into financial terms (Hilton & Gordon, 2008). According to Atieno (2013), financial planning is a continuous process of directing and allocating financial resources to meet strategic goals and objectives. The output from financial planning takes the form of budgets. Understanding past performance and translating that insight into forward looking targets to align business results with the corporate strategy is key to driving shareholder value. A financial plan consists of sets of financial statements that forecast the resource implications of making business decisions. For example, a company that is deciding to expand e.g. by buying and fitting out a new factory will create a financial plan which considers the resources required and the financial performance that will justify their use (Arnold & Chapman, 2014).

There are four financial planning practices which include budgeting, financing planning, inventory planning and working capital management. According to Mutune (2014), a budget is a plan for the accomplishment of programs related to the following; objectives and goals, a definite time period, an estimate of resources required, an estimate of resources available, compared with one or more past periods and showing future requirements. The budgeting process therefore puts an organization’s activities in a coherent manner that results in the general welfare of the organization. Financing planning decisions revolve around how to pay for investments and expenses. Companies can use existing capital, borrow, or sell equity. Once a firm has taken an investment decision and committed itself to the investment, it must decide the best means of financing these commitments. Since, organizations regularly make new investments; there is need for financing and financial decisions. Inventory management involves the recording and monitoring of stock level, forecasting future demand and deciding on when and how to order (Adeyemi & Salami, 2010). Working Capital

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Management is concerned with the problems that arise in attempting to manage the Current Assets, the Current Liabilities and the interrelationship that exists between them (Muthuva, 2010).

1.1.2 Financial Performance

Performance refers to the act of performing; execution, accomplishment, fulfillment, etc. In border sense, performance refers to the accomplishment of a given task measured against preset standards of accuracy, completeness, cost, and speed (Frich, 2009). Financial performance is the extent to which objectives of the firm and in this case financial objectives will be met or have been meet (Yahaya & Lamidi, 2015). Financial performance can also refer to the general well-being of a firm as far as finance is concerned over a certain period of time (Yahaya & Lamidi, 2015).

Financial performance focuses more items that affect the financial statements or reports of a firm directly. The financial performance analysis can deal with items such as dividend growth, sales turnover, capital employed, asset base among others about the firm (Omondi & Muturi, 2013). The financial performance is a crucial indicator or measure of some economic units’ success for example on achievement of set goals and objectives (Xu & Wanrapee, 2014). Firms stakeholders are mostly interested in the firm’s performance as far as finance is concerned (Nyamita, 2014).

Financial performance of a firm has several major characteristics, potentials of the business, defines competitiveness, economic intents of the company's leadership and reliability of present or future contractors (Dufera, 2010). Financial performance is more 5 often than not expressed with regards to increase in sales or price of stocks (Maghanga & Kalio, 2012).

1.1.3 Non-profit Making Health Organizations in Kiambu County, Kenya

The development of healthcare systems in Kenya dates back to the pre-colonial era. With the establishment of mission stations in Kenya in the 1890 and the arrival of the 5 Imperial British East Africa Company (IBEA) in 1888, western medicine entered the country. The Church Missionary Society (CMS), the Church of Scotland Mission (CSM) and the Catholic Missionary Holy Ghost Fathers began their activities in East Africa between 1898 and 1903. Simultaneously, the Church of Scotland set up a station in Kikuyu in 1898, which gave medical help. After independence, the government continued to expand health facilities in the country as its main social concern at the time of independence was elimination of poverty, illiteracy and disease (Government of Kenya, 1965). Today, alongside government services, missionaries and NGO’s provide health services at delivery points that range from dispensaries, Sub-County Hospitals (SCH) to County Referral Hospitals (CRH (Government of Kenya, 2012).

Kiambu County in Kenya is home to about 108 local NPOs (NPOs Coordination Board, 2015). Some of these NPOs are headquartered there while others have simply set up their branch offices in Kiambu to enable them to maintain proximity to Nairobi. With declining donor funding, local NGOs in the area are facing closure due to the financial sustainability issues (NGO Council, 2015). The NPOs with headquarters in Kiambu face challenges in sourcing income from the area.

1.2 Problem Statement

Favorable financial planning practices are important essential for high performance records in the case of Non Profit Organizations (Karanja, 2014). For NPOs to be continually funded there is need for accountability to the donor agencies and individuals who support their activities. Financial planning leads to good financial performance. According to a survey carried out by Mutua (2010) in Kenya, financial management practices of NPOs conforms to the laid down procedures of International Financial Reporting Standards. Mogaka (2016) attributes NPOs’ failure to poor financial planning practices. Financial planning practices can help NPOs to properly and successfully manage their current and future status of their units.

However, the performance of most Non Profit Organizations (NPOs) in Kenya has been poor. In Kiambu county most residents have filled dozen complaints of dissatisfaction with the services offered by nonprofit health organizations in Kiambu health centers (Dinga, Mwangi & Abong, 2013). Patients in Kiambu nonprofit health organizations have been reported to experience delayed access to services with some returning home without access to treatment due to shortage of health staff (Dinga et al., 2013). According to Abdelkarim (2012), most nonprofit health organizations in Kiambu County lack enough money to pay their staff due to lack of financial planning, poor budgeting and misplaced prioritization. In addition other nonprofit making organizations like vision fund Kenya have been performing poorly. In the year 2015 the return on Asset of vision fund Kenya declined by 18% from that of the year 2014. The poor performance is as a result of most organizations not able to effectively adopt the use of accepted financial planning practices despite the benefits of the practices in long-term decision making and planning.

Mutune (2014) determined the relationship between financial planning and financial performance of cement manufacturing firms in Kenya. Mwaura (2013) researched on the effect of financial planning on the financial performance of automobile firms in Kenya. Atieno (2013) investigated the relationship between financial planning and financial performance of small and medium enterprises in Nairobi City Centre Kenya. These studies and many more have not been able to clear the current gap on the effect of financial planning on the financial performance of nonprofit making health organizations in Kiambu County, Kenya. This study aimed to fill this gap by determining the effect of financial planning on the financial performance of nonprofit making health organizations in Kiambu County, Kenya. 1.3 Research Objectives
1.3.1 General Objective
The general objective of the study was to determine the effect of financial planning practices on the financial performance of nonprofit making health organizations in Kiambu County, Kenya.

1.3.2 Specific Objectives
i. To assess the effect of budgeting practices on the financial performance of nonprofit making health organizations in Kiambu County, Kenya
ii. To evaluate the effect of cash planning practices on the financial performance of nonprofit making health organizations in Kiambu County, Kenya
iii. To analyze the effect of inventory planning practices on the financial performance of nonprofit making health organizations in Kiambu County, Kenya
iv. To assess the effect of working capital management practices on the financial performance of nonprofit making health organizations in Kiambu County, Kenya

1.4 Research Questions
i. How does budgeting practices affect financial performance of nonprofit making health organizations in Kiambu County, Kenya?
ii. In which ways does cash planning practices affect financial performance of nonprofit making health organizations in Kiambu County, Kenya?
iii. How do inventory planning practices affect financial performance of nonprofit making health organizations in Kiambu County, Kenya?
iv. What is the effect of working capital management practices on financial performance of nonprofit making health organizations in Kiambu County, Kenya?

1.5 Significance of the Study
This study will be of great benefit to the management of hospitals. The findings will show how financial planning practices influence financial performance. The study will also provide insights to other types of businesses on how financial performance may be improved through sound financial planning practices for sound decision making by financial managers.

Financial manager of nonprofit making organizations can use this study in making appropriate decisions concerning financial planning of the hospitals to improve financial performance of their hospitals. Financial planning can also be used as a blue print of a firm’s future financial plans in terms of cash flow management, investments and expansion plans.

The study will be useful to academicians and other researchers. The study will serve as a reference for other researchers and academicians in the field of business administration by providing them with relevant recommendations for further studies and empirical data to feed researchers’ literature in this line of academia.

1.6 Scope of the Study
The study sought to analyze the effects of financial planning practices on the financial performance of not for profit health organization’s in Kiambu county, Kenya. Specifically the study focused on the effect of budgeting practices, cash planning, inventory management and working capital management on the financial performance of not for profit health organization’s in Kiambu county, Kenya. The study focused on not for profit health organizations in Kiambu County. The study therefore targeted 108 not for profit health organizations in Kiambu County. Data collection and report writing was done between May and June 2018.

2. LITERATURE REVIEW
2.1 Introduction
This chapter discussed theories relevant to the study. Literature related to the study was also reviewed with the aim of identifying literature gaps. The literature review guided the relevance of the study findings.

2.2 Theoretical Framework
A theoretical framework is a collection of interrelated concepts, like a theory but not necessarily so well worked-out. Theoretical frameworks provide a particular perspective, or lens, through which to examine a topic. The theoretical foundation for this study was informed by the following theories.

2.2.1 Agency Theory
The agency theory postulates that the day to day running of a business enterprise is carried out by managers as agents who have been engaged by the owners of the business as principals who are also known as shareholders. The theory is on the notion of the principle
of 'two-sided transactions' which holds that any financial transactions involve two parties, both acting in their own best interests, but with different expectations (Ang, Cole & Lin, 2000).

This theory has been observed to identify a few shortcomings in that: it shows information asymmetry where agents have information on the financial circumstances and prospects of the enterprise that is not known to principals; moral hazard where agents deliberately take advantage of information asymmetry to redistribute wealth to themselves in an unseen manner which is ultimately to the detriment of principals; and adverse selection where agents misrepresent the skills or abilities they bring to an enterprise (Ang, Cole & Lin 2000). This theory provides useful knowledge in financial decisions concerning the hospitals; it also brings out considerable arguments on how a financial manager of hospitals should relate with the owners of the business to serve the interests of all stakeholders in a firm (Matthews & Scott, 2008). This theory informed the independent variable which was financial planning.

2.2.2 Complexity Theory

Complexity theory was proposed by Kiel and Elliott in 1996. The theory states that state is neither a legal abstraction nor reducible to the individuals who purportedly comprise it. Complexity theory, which is the study of nonlinear dynamic systems promises to be a useful conceptual framework that reconciles the essential unpredictability of industries with the emergence of distinctive patterns. Despite the fact that the theory was originally developed in the context of physical and biological sciences, today it has found applications in social, ecological and economic systems which also tend to be characterized by nonlinear relationships and complex interactions that evolve dynamically over time (Kiel & Elliott, 1996).

During the 1990s, there was an explosion of interest in complexity as it relates to organizations and strategy. The theory suggests that simple deterministic functions can give rise to highly complex and often unpredictable behavior. Thus, applying this theory in financial planning pre-supposes flexibility on the part of an organization. Any financial planning should be done in such a manner that it accommodates the “unexpected” ensuring financial sustainability. Thus non-profit health organizations would not only depend on others but device alternative strategies to counter the unexpected. This theory was deemed relevant to this study since it captured the independent variable which was financial planning. Financial planning should provide for unexpected occurrences in an organization.

2.2.3 Theory of Budgeting

Theory of budgeting was proposed by Lewis in 1952. The theory argues that analysts should focus on increments of public expenditure, at the margin, since ‘this is the point of balance at which an additional expenditure or any purpose would yield the same return. Lewis (1952) argues that the relative value of these increments can then be assessed in terms of their relative effectiveness in achieving a common objective. It is the task of financial planners to determine this common objective and assess the relative effectiveness of alternative applications of expenditure in achieving this goal. Budgeters can assist decision makers by presenting alternative proposals at varying levels of expenditure for each programme. In this way the trade-offs between alternative applications of additional funding can be revealed.

Lewis (1952) argues that the concept of ‘relative effectiveness’ with regard to a common objective effectively circumvents the problem presented by the lack of a common measure of utility. This theory was deemed relevant to this study as it informed one of the independent variables which is budgeting. A budget allows an organization to create a spending plan for their funds. It ensures that organizations have enough money for the things they need and the things that are important.

2.3 Conceptual Framework

A conceptual framework is a set of broad ideas and principles taken from relevant fields of enquiry and used to structure a subsequent presentation. Mugenda and Mugenda (2003) and Smith (2004), define a conceptual framework a hypothesized model identifying the model under study and the relationship between the dependent and independent variables. Kothari (2004) defines an independent variable also known as the explanatory variable as the presumed cause of the changes of the dependent variable, while a dependent variable refers to the variable which the researcher wishes to explain. The goal of a conceptual framework is to categorize and describe concepts relevant to the study and map relationships among them. Such a framework would help researchers define the concept, map the research terrain or conceptual scope, systematize relations among concepts, and identify gaps in literature (Creswell, 2003).

Budgeting practices

- Budget planning
- Budget coordination & evaluation
2.3.1 Budgeting Practices

A budget is a detailed estimate (forecasted) of future transactions which are expressed in terms of physical quantities, money or both. The essence of a budget is that it is a target set for management to keep within, achieve or surpass it. The foundation for Budgeted Financial Statements is Detail Budgets. Detail Budgets include sales forecasts, production forecasts, and other estimates in support of the Financial Plan. Hilton and Gordon (2008) define financial planning as the adaptation of the broad objectives, strategies and other plans of an organization into financial terms.

In addition, the best practices for planning and executing projects is a budget and then employ it as a benchmark for improving project from other industries (Tonnquist, 2010). Budget involves financial planning and shows the required cash flow for each time period (Zwikael & Saleh, 2006). Regular budget plan review should focus more on the role level rather than the activity level. This approach is said to increase the planning of a project which will lead to better completion results. The Gantt chart is the commonly used planning tool on projects. However, budgeting allows a public administrator to plan, make proper choices, and decide on the mission and direction of an organization (Rosilyn, 2007)

2.3.2 Cash Planning

Households, firms, financial intermediaries, and government all play a role in the financial system of every developed economy. Financial intermediaries are institutions such as banks that collect savings of individuals and corporations and funnel them to firms that use money to finance their investments in plant, equipment, research and development. Firms can raise investment capital from variety of financial instruments. The firm’s financial policy describes the mix of financial instruments to finance the firm, this could take the form of; internal capital, external capital: debt vs. equity (Grinblatt & Titman, 2012).

Cash planning management can translate into high performance which reflects management effectiveness and efficiency in making use of company’s resources and this in turn contributes to the country’s economy at large (Abioro, 2013). Therefore efficient cash management prepares organization for problems, as well as breaks.
This can be attributed to an increase in sales volume normally through speeding collection on sales made on credit thus eliminating the possibility of bad debt, increase in employee’s turnover due to availability of finances to meet their wage requirements from increased cash inflow generated from short term investments, controlling payments normally geared towards ensuring that limited amount of cash exit the business, cash shortage financing from credit institutions among others, and finally increase in asset levels due to readily available cash for acquisition generated from short term investment, credit sales collections thus all impacting positively on production output of an enterprise (Ondiek, Deya, & Busaka, 2013). Organization have different cash management policies due to entity size, geographical location, number of customers, and size of employees and the nature of its operations.

2.3.3 Inventory Management Planning

Inventory management may be defined as the system used by a firm to control its investment in inventory (Stevenson, 2010). It involves the recording and monitoring of stock level, forecasting future demand and deciding on when and how to order (Adeyemi & Salami, 2010). The primary goal of inventory management, therefore, is to have adequate quantities of high quality items available to serve customer needs, while also minimized the costs of carrying inventory (Brigham & Ehrhard, 2015). According to Miller (2010), inventory management involves all activities put in place to ensure that customers have the needed product or service. It coordinates the purchasing, manufacturing and distribution functions to meet the marketing needs and organizational needs of availing the product to the customers. Inventory management is primarily involved with specifying the size and placement of stocked goods. Inventory management is required at different locations within a facility or within multiple locations of a supply network to protect the regular and planned course of production against the random disturbance of running out of materials (Ketchen & Hult, 2007).

Bachetti et al. (2010) argue that inventory management need to be organized in a logical way to facilitate the organization knowledge of when to order and quantity to order. Economic order quantity enables organizations plan their inventory replenishment on a timely basis such as monthly, quarterly, half yearly or yearly basis. The management of inventories has an important bearing on the financial strength and competitiveness of organizations due to the reason that it directly affects the working capital, production and customer services (Vergin, 2012). Many practices are available for effectively managing inventories. There are traditional IM practices such as order quantity purchase, Always Better Control (ABC) practice and modern IM practices such as computerized inventory accounting Just-in time (JIT) and Vendor Managed Inventory (VMI).

2.3.4 Working Capital Management

According to Brigham and Houston (2007), is a financial metric which represents operating liquidity available to a business, organization, or other entity, including governmental entity. Working capital management, a managerial accounting strategy focuses on maintaining efficient levels of components of working capital, current assets and current liabilities, in respect to each other. Efficient management of working capital ensures a company has sufficient cash flow to meet its short-term debt obligations and operating expenses.

Working capital management involves the planning and controlling of current assets and liabilities in a manner that eliminates the risk of inability to meet short-term obligations and avoid excessive investments in these assets (Lamberson, 2015). This management of short-term assets is as important as the management of long-term financial assets, since it directly contributes to the maximization of a business’s profitability, liquidity and total performance. Consequently, businesses can minimize risk and improve the overall performance by understanding the role and drivers of working capital (Lamberson, 2015). It is important that a firm preserves its liquidity to enable it meet its short term obligations when due. Increasing profits at the cost of liquidity exposes a company to serious problems like insolvency and bankruptcy. Inadequate working capital leads the company to bankruptcy. On the other hand, too much working capital results in wasting cash and ultimately the decrease in profitability (Chakraborty, 2008).

2.3.5 Financial Performance

Financial Performance in a firm is mainly measured by financial statements. A financial statement is an organized collection of data according to logical and consistent accounting procedures. Its purpose is to convey an understanding of some financial aspects of a business firm. It may show a position at a moment of time as in the case of a Balance Sheet, or may reveal a series of activities over a given period of time, as in the case of an Income Statement. Financial analysts often assess firm's production and productivity performance, profitability performance, liquidity performance, working capital performance, fixed assets performance, fund flow performance and social performance. However in the present study financial health of a firm is measured from the following perspectives; Working capital Analysis, Financial structure Analysis, Activity Analysis and Profitability Analysis (Lundberg, 1982).

Financial performance of not for profit organizations can also be defined in terms of financial accountability. Financial performance has been one of the key elements in measuring overall performance and evaluating effectiveness of non-profits (Speckbacher, 2003; Ritchie & Kolodinsky, 2003; Sowa, Selden and Sandfort, 2004; Mc Cathy, 2007). As far as donors and community stakeholders are concerned, financial accountability focuses primarily on a non-profits reputation for fiscal transparency and honesty (Keating & Frumin, 2003). More often than not accountability is represented by the data on these the use of external independent auditors, operating standards, audit committees and boards’ expertise (Whitaker et al., 2004; Greenlee et al., 2008).
2.4 Empirical Review

2.4.1 Budgeting Practices

Onduso (2013) conducted a study on the effect of budgets on financial performance of manufacturing companies in Nairobi County. The used cross-sectional research design with primary data being collected by use of questionnaires and secondary data was obtained from the companies records. The findings of the study concluded that the magnitude of coefficients of the independent variables denoted the strength of the influence that they have on the dependent variable (Financial performance as measured by ROA). The results indicated that financial performance as measured by ROA is strongly influenced by using of budget and managerial performance.

Silva (2012) conducted a study to evaluate the impact of budgetary process on the performance of apparel industry in Sri Lanka. The budgetary process of apparel industry was assessed by using variables such as planning, coordination, control, communication and evaluation. The performance of apparel industry in Sri Lanka was examined by using Return on Assets. Based on the data extracted from apparel industry’s financial statements, correlation coefficients and regression analysis showed that budgetary process have significant associations with the financial performance of apparel industry in Sri Lanka. From the findings, apparel companies maintain a sound budgetary process which contributes to higher levels of financial performance hence a positive relationship.

Mwaura (2010) conducted a study on the participatory budget setting and budget commitment as a factor that affects performance of the NSE listed companies. This study used a causal research design to identify cause-and-effect relationship. The population in this study comprised 55 companies listed where it considered only 53 still operating ones. Data for this study was both quantitative and qualitative hence both descriptive and content analysis techniques were employed. The descriptive statistical tools helped the researcher to describe the data and determine the extent used. In addition, to quantify the strength of the relationship between the variables, the researcher used a multiple regression. The study concluded that budgetary participation affects return on capital employed and return on assets to a great extent. It was further found that budgetary participation affects return on investment and budget commitment to moderate extents. This implied that budgeting as a financial planning technique is positively related to financial performance of the NSE companies.

2.4.2 Cash Planning Practices

Tarus and Juma (2017) conducted a study on role of cash planning technique on financial performance in public hospitals in Kajiado North Sub-County. The study adopted a descriptive survey design. The study sought to find out how cash planning affects financial performance, the study did confirm that cash planning affects financial performance. The study established that majority of the respondents agreed that indeed cash flow was well managed at these public hospitals. The overall mean obtained on financial performance was 3.95 indicating a strong mean that is leaning towards agree in a five point likert scale. The combined effect model that was computed explained the variation in financial performance of public hospitals in Kajiado north Sub County. The study recommended that the there is need to strengthen cash collection avenues by encouraging payment in other forms and move from cash payments, with the advent of M-pesa and cash payments to banks where this can be audited for proper payment systems.

Mwaura (2013) determined the effect of financial planning on the financial performance of automobile firms in Kenya. The design of the study was descriptive research method. The aim of this study was to find out whether financial planning has an impact on the financial performance of the firms in the automobile industry in Kenya. The results of the study indicated that the financial planning measures such as earnings before interest and tax and the capital employed which comprises of fixed assets and working capital had an impact on the financial performance of the firm measured by return on capital employed (ROCE). This implies that a percentage change in the financial planning measures will have an effect on the financial performance of a firm. This study showed that there is strong relationship between financial planning and financial performance of a firm. The success of any business depends on the manner the financial plans are formulated. Therefore, it can be concluded that financial planning has an effect on the financial performance of automobile companies in Kenya.

Kemboi (2010) carried out an investigation on how listed firms in Kenya financed their investment in capital market. The objective of the study was establishing sources of funds for the firm and find out whether cash flows and debt influence the firm’s investment decisions. Tests were based on fundamentals investment equations in which cash flow and debt were added as explanatory variables. All these variables were normalized by beginning capital stock .The study showed a significant positive relationship between debt and investment levels in the firm. It was concluded that corporate investments in firms did not respond to market fundamentals and liquidity position. The findings support corporate life cycle hypothesis whereas firms become mature, past investments generate higher cash flows, making present investment rates to slow down and become less attractive, hence the negative empirical relationship between investment and cash flow.

Mohamad (2016) investigated the impact of corporate financing decision on corporate performance in the absence of taxes: panel data from Kuwait stock market. This study examined the relationship between financing decisions such as capital structure, capital budgeting techniques and dividend policy along with the firm’s attributes. The study examined the impact of industrial sectors and financial performance using the panel data of 80 listed companies in Kuwait. The results of this study suggest that, contrary to the Trade-off Theory of capital structure, there is a negative association between the level of debt and financial performance. This can be
attributed to the high cost of borrowing and the underdeveloped nature of the debt market in Kuwait. Given the unique tax environment in Kuwait, using debt does not seem to be sufficient to outweigh the costs of using debt, including the high interest cost.

2.4.3 Inventory Management Planning Practices

Shardeo (2015) conducted a study on impact of inventory management on the financial performance of the firm. The study used secondary data. The study found that there is some relationship between the inventory turnover ratio and financial condition of the firm. The study concluded that inventory is the most important part of any business especially for manufacturing companies. It is hidden costs which are to be controlled for sustaining in present competitive market. Apart of costs, customer satisfaction is also the most important factors for the businesses. Inventory management also improves the level of customer satisfaction because customer wants product at least time as possible. So, a manufacturing firm must install the optimal inventory control techniques or improve their asset turnover as much as possible. Also, by different analysis it is concluded that inventory turnover ratio is correlated with the net profit of the companies.

Onyango (2012) conducted a study on impact of inventory management on profitability and liquidity: a case of large supermarkets in Nairobi. The research methodology involved collection of data through questionnaire and standard face-to-face interview questions, which were developed by reviewing the effects of inventory management on profitability and liquidity. Procedures employed by different supermarkets were found to range from informal mechanisms without written manuals and non-computerized systems to computerized inventory management systems capable of tracking the movement of stocks and re-order levels. Overstocking was very frequently experienced in the supermarkets with suppliers connected to the extranet and occasionally more than one supplier could supply goods for the same automated order.

Onyoni (2015) conducted a study on effect of inventory management practices on operational performance in non-governmental organizations in Kenya. Data was analyzed using descriptive statistics with the use of Statistical Package for Social Sciences (SPSS). This study established that a unit increase in ABC Analysis would lead to increase in operational performance of NGOs by a factor of 0.683, a unit increase in Economic order quantity would lead to increase in operational performance of NGOs by a factor of 0.702, unit increase in Vendor managed inventory would lead to increase in operational performance of NGOs by a factor of 0.793, a unit increase in Demand focus inventory would lead to increase in operational performance of NGOs by a factor of 0.699 and a unit increase in Automatic replenishment would lead to increase in operational performance of NGOs by a factor of 0.612. Vendor managed inventory was found to have more effect on operational performance of NGOs in Kenya compared to other inventory management practices studied. The study concluded that Effective inventory control management is recognized as one of the areas management of any organization should acquire capability.

2.4.4 Working Capital Management Practices

Apuoyo (2010) carried out a study on the relationship between the policies that companies used and their effect on profitability. The study was based on fifty-five companies quoted at the Nairobi Stock Exchange (NSE) in Kenya as at 31st December, 2009. The companies were classified based on the NSE sector categorization proportionate random stratified sampling was used. Relevant data was collected from the sampled companies’ audited financial reports for the five years since 2005 to 2009. The data was analyzed to find out the annual working capital policy for each firm that were then classified into aggressive, conservative and moderate policies. The relationship between the working capital policies and return on total assets (ROTA), which was the measure of profitability, were determined using simple regression. The study found out that the firm’s profitability increases with the firm’s gross working capital efficiency. Contrary to conventional theory that a conservative working capital policy sacrifices profits at the expense of liquidity, the study revealed a positive relationship between conservative working capital policy and firms profitability.

Nyabwanga (2011) conducted a study to assess the effect of working capital management practices on the financial performance of Small Scale Enterprises (SSEs) in Kisii South District. The study adopted a cross- sectional survey research design which allowed the collection of primary quantitative data through structured questionnaires. The target population was 159 managers of 101 trading and 58 manufacturing SSEs. Stratified random sampling technique was used to obtain a sample of 113 SSEs comprising 72 trading and 41 manufacturing enterprises. The data were analyzed using both descriptive and inferential statistics. The study found that working capital management practices were low amongst SSEs as majority had not adopted formal working capital management routines and their financial performance on average remained low. The study also revealed that SSE financial performance is positively related to efficiency of cash management (ECM), efficiency of receivables management (ERM) and efficiency of inventory management (EIM) at a 0.01 level of significance.

Nyakundi (2016) investigated on the influence of Working Capital Management Practices on Financial Performance of Small and Medium Enterprises in Machakos Sub-County, Kenya. The study adopted a cross-sectional survey research design. Collection of primary data was done through structured questionnaires and interviews. The target population was 159 Owners/ Managers of SMEs trading in Machakos Sub-County. Random sampling technique was used to obtain a sample of 22 SMEs trading in Machakos Sub-County. The data was analyzed using both descriptive and inferential statistics. The coefficient of determination ($R^2$) indicated that 0.507 or 50.7% of the variations in financial performance could be explained by the changes ECM, ERM and EIM. This study concluded that WCMPs have an influence on the financial performance of SMEs.

http://dx.doi.org/10.29322/IJSRP.8.5.2018.p7778
Mathuva (2009) studied the influence of working capital management components upon corporate profitability by using a sample of 30 companies listed on the Nairobi Stock Exchange (NSE) from 1993 to 2008. The findings of his study indicated that there is a highly significant negative relationship between accounts collection period and profitability. In regard to the relationship between profitability and the inventory 17 conversion period or the average payment period, the results were positive and significant.

2.5 Critique of the Literature

Nyabwanga (2011) conducted a study to assess the effect of working capital management practices on the financial performance of Small Scale Enterprises (SSEs) in Kisii South District. The study found that working capital management practices were low amongst SSEs as majority had not adopted formal working capital management routines and their financial performance on average remained low. A similar study was conducted by Nyakundi (2016) on the influence of working capital management practices on financial performance of Small and Medium Enterprises in Machakos Sub-County, Kenya. However this study found that most SMEs had adopted the working capital management practices in their firms.

Onduso (2013) conducted a study on the effect of budgets on financial performance of manufacturing companies in Nairobi County. The study used ROA to measure performance. A similar study was conducted by Mwaura (2010) on the participatory budget setting and budget commitment as a factor that affects performance of the NSE listed companies but used profitability to measure performance.

Shardeo (2015) conducted a study on impact of inventory management on the financial performance of the firm. The study used secondary data. A similar study was conducted by Onyango (2012) conducted a study on impact of inventory management on profitability and liquidity: a case of large supermarkets in Nairobi but used primary data.

2.5 Research Gaps

Onduso (2013) conducted a study on the effect of budgets on financial performance of manufacturing companies in Nairobi County. This study focused on manufacturing companies in Nairobi County thus presenting a scope gap. It was conducted in Nairobi County presenting a geographical gap. The current study focused on not for profit health organizations. It was conducted in in Kiambu County. Silva and Jayamaha (2012) conducted a study to evaluate the impact of budgetary process on the performance of apparel industry in Sri Lanka. The study focused on budgets as the only financial planning technique that influenced performance of the industry in general thus presenting a contextual gap. The current study focused on analyzing how budgeting affects financial performance. Mohamad (2016) conducted a study on the impact of corporate financing decision on corporate performance in the absence of taxes: panel data from Kuwait stock market. This study examined the relationship between financing decisions such as capital structure, capital budgeting techniques and dividend policy along with the firm’s attributes. The study was conducted in Kuwait thus presenting a geographical gap. The current study was conducted in Kiambu County, Kenya. Nyabwanga (2011) conducted a study to assess the effect of working capital management practices on the financial performance of Small Scale Enterprises (SSEs) in Kisii South District. The study focused Small Scale Enterprises (SSEs) therefore presenting a scope gap. The current study focused on not for profit health organizations.

2.6 Summary of the Literature Reviewed

The above chapter reviewed the various theories that explain the independent and dependent variables. The reviewed theories are then critiqued for relevance to specific variables. The chapter also explored the conceptualization of the independent and the dependent variables by analyzing the relationships between the two set of variables. In addition, an empirical review was conducted where past studies both global and Local is reviewed in line with the following criteria, title, scope, methodology resulting into a critique. It is from these critiques that the research gap was identified.

3. RESEARCH METHODOLOGY

3.1 Introduction

The purpose of this study was to analyze the effect of financial planning practices on the financial performance of not for profit organizations in Kiambu county, Kenya. This chapter presented a review of the research methodology. Specifically, the chapter discussed the research design, the population of the study, the sample size, the data collection procedure and the data analysis.

3.2 Research Design

According to Kothari (2004), a research design can be defined as the plan for obtaining answers to the questions being studied and for handling some of the difficulties encountered during the research process. It is therefore the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure.

This study adopted a descriptive survey design. According to Upagade and Shende (2013), a descriptive survey is mainly concerned with description of facts only. It is a self-report that requires the collection of equitable information from sample (Orodho, 2005). Descriptive survey was appropriate for this study whose intention was to present a situation, what people currently believe in, what people are doing at the moment and so forth with no control of the variables under investigation which is a limitation.

http://dx.doi.org/10.29322/IJSRP.8.5.2018.p7778 www.ijsrp.org
3.3 Target Population

According to Kombo and Tromp (2006), population is a group of individuals, objects or items from which samples were taken for measurement or it is an entire group of persons, or elements that have at least one thing in common. There are 108 nonprofit health organizations in Kiambu County. The target population of the study was all the 108 nonprofit health organizations in Kiambu County (Kiambu County Report, 2016). The study respondents were two respondents from the finance department in all the 108 nonprofit health organizations in Kiambu County. The study picked two respondents per organization who comprised of the finance manager and one of the senior managers thereby making the total accessible population to be 216 respondents. The finance managers and senior managers were used since they had the information about the financial planning practices of the entities they manage.

Since the population was small the study used the census approach and thus the entire 216 respondents from nonprofit health organizations in Kiambu County were studied. Charman, Petersen, Piper, Liedemanv and Legg (2017) argued that in census method there would be higher degree of accuracy in data. No other method is accurate like census method when the population is small. In addition census method gives opportunity to the investigator to have an intensive study about a problem and thus it is the most appropriate for this study.

3.5 Research Instrument

This study used both primary and secondary data. Primary data was collected through use of a questionnaire. A questionnaire is a pre-formulated written set of questions to which the respondents record the answers usually within rather closely delineated alternatives. For this study a questionnaire was decided upon as the data collection instrument because; a high response rate is expected as the questionnaires was distributed to respondents to complete and collected personally by the respective researchers, they was less time and energy consuming to the participants. Questionnaires also offered the required anonymity because Participants’ names were not required on the completed questionnaires. The questionnaire contained short and precise questions to avoid ambiguity and save time. The questionnaire also comprised of both open and closed ended questions. Ample time and assistance was given to respondents to fill them. One of the main advantages of using questionnaires is that respondents can fill them in at their own convenient time, thereby encouraging a higher response rate. Secondary data was collected from the hospitals financial statements. Secondary data was collected from the financial statements of these organizations.

3.6 Pilot Study

Prior to using a questionnaire to collect data it was pilot tested. The purpose of the pilot test was to refine the questionnaire so that respondents had no problems in answering the questions and there were no problems in recording the data. In addition, it enabled one to obtain some assessment of the question’s validity and the likely reliability of the data that was collected. Preliminary analysis using the pilot test data was undertaken to ensure that the data collected enabled the investigative questions to be answered (Saunders, Lewis & Thornhill, 2012).

Therefore, in order to check the validity and reliability of the questionnaires in gathering the data required for purposes of the study, a pilot study was carried out. The purpose of pilot testing was to establish the accuracy and appropriateness of the research design and instrumentation (Saunders, Lewis & Thornhill, 2009).

Newing (2011) states that the importance of pilot testing cannot be overemphasized; you will almost always find that there are questions that people fail to understand or interpret in different ways, places in the questionnaire where they are not sure where to go next, and questions that turn out simply not to elicit useful information. Cooper and Schindler (2006) concur that the purpose of pilot test is to detect weaknesses in design and implementation and to provide proxy for data collection of a probability sample. Sekaran (2006) reinforces that pilot test is necessary for testing the reliability of instruments and the validity of a study. Once the questionnaire was pilot tested and amended and the sample selected, the questionnaire was then used to collect data.

3.6.1 Validity

Validity refers to whether a questionnaire is measuring what it purports to measure (Bryman & Cramer, 1997). It describes validity as the degree of congruence between the explanations of the phenomena and the realities of the world. While absolute validity is difficult to establish, demonstrating the validity of a developing measure is very important in research (Bowling, 1997). This study used both construct validity and content validity. For construct validity, the questionnaire is divided into several sections to ensure that each section assessed information for a specific objective, and also ensured that the same closely ties to the conceptual framework for this study. To ensure content validity, the questionnaire was subjected to thorough examination by 22 randomly selected managers. They were asked to evaluate the statements in the questionnaire for relevance. On the basis of the evaluation, the instrument was adjusted appropriately before subjecting it to the final data collection exercise. Their review comments were used to ensure that content validity is enhanced.

3.6.2 Reliability

Reliability refers to the repeatability, stability or internal consistency of a questionnaire (Jack & Clarke, 1998). Cronbach’s alpha was used to test the reliability of the measures in the questionnaire (Cronbach, 1995). According to Cooper and Schindler (2003),
Cronbach’s alpha has the most utility for multi-item scales at the interval level of measurement, requires only a single administration and provides a unique, quantitative estimate of the internal consistency of a scale. Baker, Veit and Powell (2001) states that the size of a sample to be used for piloting testing varies depending on time, costs and practicality, but the same would tend to be 5-10 per cent of the main survey. According to Cooper and Schindler (2006) the respondents in a pilot test do not have to be statistically selected when testing the validity and reliability of the instruments.

In this study, data collection instrument which is a questionnaire was tested on 10% of the sample of the questionnaires to ensure that it is relevant and effective. Reliability was tested using questionnaire duly completed by eight (8) randomly selected respondents. These respondents were not included in the final study sample in order to control for response biasness. The questionnaire responses were input into statistical package for social sciences (SPSS) and Cronbach’s alpha coefficient generated to assess reliability. The closer Cronbach’s alpha coefficient is to 1, the higher the internal consistency reliability (Sekaran, 2006). A coefficient of 0.7 is recommended for a newly developed questionnaire.

### 3.7 Data Collection Procedure

Data collection refers to the process of gathering raw and unprocessed information that can be processed into meaningful information, following the scientific process of data analysis (Gall, Gall & Borg, 2007). The questionnaires were self-administered with the help of research assistants. To enhance the response rate, the study put into consideration the research ethical issues. The researcher explained to the respondent the importance of the study. The study assured the respondents of the confidentiality and anonymity of their identities, the respondents were debriefed in case of challenging questions, voluntary participation by respondents were enhanced, the data collection method was freed from emotional harm to respondents and that only respondents competent enough to address the objective were considered.

### 3.8 Data Analysis and Presentation

Data analysis is a practice in which raw data is ordered and organized so that useful information can be extracted from it (Gall, Gall & Borg, 2007). Descriptive statistics such as, mean and frequencies were used to perform data analysis. The mean scores was used to rate the factors in order of their importance. After data has been collected through questionnaires, it was prepared in readiness for analysis by editing, handling blank responses, coding, categorizing and keying into statistical package for social sciences (SPSS) version 21 computer software for analysis. SPSS was used to produce frequencies, descriptive and inferential statistics which were used to derive conclusions and generalizations regarding the population. The particular descriptive statistics were frequencies, mean scores and standard deviation. The particular inferential statistic was regression analysis.

The analysis of variance (ANOVA) was checked to reveal the overall model significance. In particular, the calculated f statistic was compared with the tabulated f statistic. A critical p value of 0.05 was also used to determine whether the overall model was significant or not. A multivariate regression model was used to link the independent variables to the dependent variable as follows:

\[
Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \mu
\]

Where;

- \(Y\) = Financial Performance
- \(X_1\) = Budgeting Practices
- \(X_2\) = Cash planning
- \(X_3\) = Inventory Management
- \(X_4\) = Working Capital Management

In the model, \(\beta_0\) = the constant term while the coefficient \(\beta_i\) = 1…4 was used to measure the sensitivity of the dependent variable (Y) to unit change in the predictor variables \(X_1, X_2, X_3\) and \(X_4\). \(\mu\) is the error term.

Analyzed data was presented by aid of statistical tables, graphs and charts with inferences therein made. Demographic characteristics were presented in charts; descriptive was presented in tables and graphs while inferential was also presented in tables. This was done in line with the objectives of the study.

### 4. RESULTS AND DISCUSSIONS

#### 4.1 Introduction

This chapter comprises of data analysis, findings and interpretation. Results are presented in tables and diagrams. The analyzed data was arranged under themes that reflect the research objectives
4.2 Response Rate

Table 4.1: Response Rate

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Returned</td>
<td>157</td>
<td>72.7%</td>
</tr>
<tr>
<td>Unreturned</td>
<td>59</td>
<td>27.3%</td>
</tr>
<tr>
<td>Total</td>
<td>216</td>
<td>100%</td>
</tr>
</tbody>
</table>

The number of questionnaires that were administered to nonprofit health organizations in Kiambu County was 216. A total of 157 were properly filled and returned. This represented an overall successful response rate of 72.7% as shown on Table 4.1. This agrees with Babbie (2004) who asserted that return rates of 50% are acceptable to analyze and publish, 60% is good and 70% is very good. Based on these assertion 72.7% response rate is adequate for the study.

4.3 Demographic Characteristics

4.3.1 Findings on the Age of Respondent

The respondents were asked to indicate their age. The results are indicated in figure 4.1.

![Figure 4.1: Age of the Respondents](image)

The result revealed that majority of the respondent (55%) indicated that they were between the ages of 26-35yrs, (25%) of the respondents indicated that they were between the age of 18-25 years, while the remainder (20%) indicated to be between 36-45years.

4.3.2 Findings on Academic qualification of Respondent

The respondents were asked to indicate their academic qualification. The results are indicated in figure 4.2.

![Figure 4.2: Respondents’ Academic Qualification](image)

The result revealed that majority of the respondents (55%) indicated that they were undergraduates, 24% indicated that they had a diploma, 11% indicated that they were post graduates while the remaining 10% indicated they had a certificate. This implies that most managers of nonprofit making firms are educated and thus have the capacity to improve performance of the organization.
4.3.3 Findings on Respondents’ Years of Experience in the Organization

The respondents were asked to indicate duration the organization been in operation. The results are indicated in figure 4.3.

![Years of organization](image)

**Figure 4.3: Years of Experience in the Organization**

The result revealed that majority of the respondent (40%) indicated that their organization has been operating for 6-10 years, (35%) indicated that their organization has been operating for 3-5 years, while (17%) indicated that their organization has been operating for more than 10 years, 8% of the remainder indicated that their organization has been operating for less than 2 years.

4.3.4: Findings on the Respondents’ Years of Experience

The respondents were asked to indicate years they have worked the organization. The results are indicated in figure 4.4.

![Years worked](image)

**Figure 4.4: Respondents’ Years of Experience**

The result revealed that majority of the respondent (57%) indicated that they have worked for the organization for 6-10 years, 35% indicated that have worked for the organization for 4-5 years, while 8% indicated that have worked for the organization for less than 3 yrs. This implies that majority of the manages of the health organization had worked for the institution for a long period and thus had enough experience to improve performance of the hospitals.

4.4 Descriptive Statistics

4.4.1 Findings on Budgeting Practices and Performance

The respondents were asked to indicate type of budget used in their organization. The results are indicated in figure 4.2.

Table 4.2: Type of Budget Used in Respondents’ Organization

<table>
<thead>
<tr>
<th>Statement</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed</td>
<td>130</td>
<td>82.8</td>
</tr>
<tr>
<td>Flexible</td>
<td>27</td>
<td>17.2</td>
</tr>
</tbody>
</table>
The result revealed that majority of the respondent (83%) indicated that they have had a fixed budget in the organization while 17% of the respondent indicated they had a flexible budget in their organization. The respondents were further asked to respond to statements on budget practices. The responses were rated on a five likert scale as presented in Table 4.3:

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly agree</th>
<th>Mean</th>
<th>Std.Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>All departments prepare budget plans prior to the budget year</td>
<td>6.40%</td>
<td>7.60%</td>
<td>8.30%</td>
<td>42.70%</td>
<td>35.00%</td>
<td>4.00</td>
<td>1.0</td>
</tr>
<tr>
<td>control of the budget activities is done by the head of departments</td>
<td>3.80%</td>
<td>8.30%</td>
<td>8.90%</td>
<td>44.60%</td>
<td>34.40%</td>
<td>3.97</td>
<td>1.06</td>
</tr>
<tr>
<td>there is a regular follow up on budget plans by the budget</td>
<td>5.70%</td>
<td>8.90%</td>
<td>8.30%</td>
<td>43.90%</td>
<td>33.10%</td>
<td>3.90</td>
<td>1.13</td>
</tr>
<tr>
<td>committee/Departmental heads</td>
<td>5.70%</td>
<td>6.40%</td>
<td>8.90%</td>
<td>40.10%</td>
<td>38.90%</td>
<td>4.00</td>
<td>1.12</td>
</tr>
<tr>
<td>Budget performance evaluation reports are prepared regularly</td>
<td>8.30%</td>
<td>5.70%</td>
<td>6.40%</td>
<td>44.60%</td>
<td>35.00%</td>
<td>3.92</td>
<td>1.18</td>
</tr>
<tr>
<td>he deviations from the budget targets are frequently reported to the</td>
<td>5.70%</td>
<td>6.40%</td>
<td>7.60%</td>
<td>46.50%</td>
<td>33.80%</td>
<td>3.96</td>
<td>1.09</td>
</tr>
<tr>
<td>budget committee/executive</td>
<td>8.30%</td>
<td>6.40%</td>
<td>7.60%</td>
<td>46.50%</td>
<td>33.80%</td>
<td>3.96</td>
<td>1.09</td>
</tr>
<tr>
<td>The organization has budget policies to check on spending</td>
<td>5.70%</td>
<td>6.40%</td>
<td>7.60%</td>
<td>46.50%</td>
<td>33.80%</td>
<td>3.96</td>
<td>1.09</td>
</tr>
<tr>
<td>Average</td>
<td>3.95</td>
<td>1.09</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Majority of the respondent 77.7% (42.7% + 35.00%) agreed with the statement that all departments prepare budget plans prior to the budget year. The result also revealed that 79% of the respondents agreed that control of the budget activities is done by the head of departments. The result further revealed that 77% of the respondents agreed with the statement that there is a regular follow up on budget plans by the budget committee/Departmental heads. The result further revealed that 79.6% of the respondents agreed with the deviations from the budget targets are frequently reported to the budget committee/executives. Finally the result revealed that (80.3)% of the respondents agreed with the statement that the organization has budget policies to check on spending.

On a five point scale, the average mean of the responses was 3.95 which means that majority of the respondents were agreeing with most of the statements; however the answers were varied as shown by a standard deviation of 1.09.

4.4.2 Findings on Cash Planning and Performance

The respondents were asked to indicate the main source of operation finance in their organization. The results are indicated in table 4.4.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government</td>
<td>11</td>
<td>7.0%</td>
</tr>
<tr>
<td>Ploughing back profit</td>
<td>13</td>
<td>8.3%</td>
</tr>
<tr>
<td>Donors</td>
<td>133</td>
<td>84.7%</td>
</tr>
<tr>
<td>Total</td>
<td>157</td>
<td>100%</td>
</tr>
</tbody>
</table>
profit, while 7% of the remainder indicated that the main source of operation finance in their organization was the government. The respondents were asked to respond to statements on cash planning practices. The responses were rated on a five likert scale as presented in Table 4.5.

Table 4.5: Cash Planning Practices and Performance

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly agree</th>
<th>Mean</th>
<th>Std.De</th>
<th>v</th>
</tr>
</thead>
<tbody>
<tr>
<td>financial manager always plans an optimum capital structure for the organization</td>
<td>3.80%</td>
<td>8.30%</td>
<td>10.80%</td>
<td>46.50%</td>
<td>30.60%</td>
<td>3.92</td>
<td>1.04</td>
<td></td>
</tr>
<tr>
<td>A strong control is one with tight budgetary control over cash received, cash banked, cash paid, and cash brought down. The organization uses externally generated funds to finance its operations. Strict accounting principles and accountability practices is used. Cash budget is the most significant device used to plan for and control cash receipts and payments.</td>
<td>5.10%</td>
<td>5.10%</td>
<td>8.90%</td>
<td>47.10%</td>
<td>33.80%</td>
<td>3.99</td>
<td>1.05</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>3.96</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>1.07</strong></td>
<td></td>
</tr>
</tbody>
</table>

Majority of the respondent (77.1%) agreed with the statement that financial manager always plans an optimum capital structure for the organization. The result also revealed that majority (80.9%) of the respondents agreed with the statement that a strong control is one with tight budgetary control over cash received, cash banked, cash paid, and cash brought down. The result further revealed that (80.2%) of the respondents agreed with the statement that the organization uses externally generated funds to finance its operations. The result also showed that 77% of the respondents agreed with the statement strict accounting principles and accountability practices are used. Finally the result revealed that 77.7% of the respondents agreed with the statement that the cash budget is the most significant device used to plan for and control cash receipts and payments.

On a five point scale, the average mean of the responses was 3.96 which means that majority of the respondents were agreeing with most of the statements; however the answers were varied as shown by a standard deviation of 1.07.

4.4.3 Inventory Management Planning and Performance

The respondents were asked to respond to statements on budget practices. The responses were rated on a five likert scale as presented in Table 4.6.

Table 4.6: Inventory Management Planning and Performance

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly agree</th>
<th>Mean</th>
<th>Std.De</th>
<th>ev</th>
</tr>
</thead>
<tbody>
<tr>
<td>financial manager always plans an optimum capital structure for the organization</td>
<td>3.80%</td>
<td>8.30%</td>
<td>10.80%</td>
<td>46.50%</td>
<td>30.60%</td>
<td>3.92</td>
<td>1.04</td>
<td></td>
</tr>
<tr>
<td>A strong control is one with tight budgetary control over cash received, cash banked, cash paid, and cash brought down.</td>
<td>5.10%</td>
<td>5.10%</td>
<td>8.90%</td>
<td>47.10%</td>
<td>33.80%</td>
<td>3.99</td>
<td>1.05</td>
<td></td>
</tr>
</tbody>
</table>

http://dx.doi.org/10.29322/IJSRP.8.5.2018.p7778  www.ijsrp.org
The organization uses externally generated funds to finance its operations.

<table>
<thead>
<tr>
<th>Statement</th>
<th>4.50%</th>
<th>5.10%</th>
<th>10.20%</th>
<th>43.90%</th>
<th>36.30%</th>
<th>4.03</th>
<th>1.04</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strict accounting principles and accountability practices is used</td>
<td>5.10%</td>
<td>7.00%</td>
<td>10.80%</td>
<td>43.90%</td>
<td>33.10%</td>
<td>3.93</td>
<td>1.09</td>
</tr>
<tr>
<td>Cash budget is the most significant device used to plan for and control cash receipts and payments</td>
<td>6.40%</td>
<td>5.70%</td>
<td>10.20%</td>
<td>44.60%</td>
<td>33.10%</td>
<td>3.92</td>
<td>1.11</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3.96</td>
<td>1.07</td>
</tr>
</tbody>
</table>

Majority of the respondent 84.7% (44.6% +40.1%) agreed with the statement that we have systems in our organization to review usage on inventories. The result also revealed that 80.3% of the respondents agreed with the statement that that inventory planning reduces the delivery lead time. The result revealed that 82.1% of the respondents agreed with the statement that the organization have clearly set inventory policies. The result also showed that (80.2%) of the respondents agreed with the statement their systems are able to prevent shortages and stock out costs. Finally the result revealed that 82.1% of the respondents agreed with the statement that inventory control affects the performance of the organization.

On a five point scale, the average mean of the responses was 3.96 which means that majority of the respondents were agreeing with most of the statements; however the answers were varied as shown by a standard deviation of 1.07.

### 4.4.4 Working Capital Management and Performance

The fourth objective was to establish the effect of working capital practices on the financial performance of nonprofit making health organizations in Kiambu County, Kenya. The respondents were asked to respond to statements on budget practices. The responses were rated on a five likert scale as presented in Table 4.7.

#### Table 4.7: Working capital Practices and Performance

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly agree</th>
<th>Mean</th>
<th>Std.Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounts receivables are collected on time</td>
<td>7.60%</td>
<td>6.40%</td>
<td>7.00%</td>
<td>43.90%</td>
<td>35.00%</td>
<td>3.92</td>
<td>1.17</td>
</tr>
<tr>
<td>Accounts payable are paid out on time</td>
<td>4.50%</td>
<td>6.40%</td>
<td>7.00%</td>
<td>47.10%</td>
<td>35.00%</td>
<td>4.02</td>
<td>1.04</td>
</tr>
<tr>
<td>Inventory holding period is short</td>
<td>4.50%</td>
<td>5.70%</td>
<td>10.80%</td>
<td>47.80%</td>
<td>31.20%</td>
<td>3.96</td>
<td>1.03</td>
</tr>
<tr>
<td>Working capital management leads to achievement of goals/objectives</td>
<td>5.10%</td>
<td>7.00%</td>
<td>8.90%</td>
<td>44.60%</td>
<td>34.40%</td>
<td>3.96</td>
<td>1.09</td>
</tr>
<tr>
<td>Too much working capital results in wasting cash</td>
<td>6.40%</td>
<td>5.10%</td>
<td>9.60%</td>
<td>49.00%</td>
<td>29.90%</td>
<td>3.91</td>
<td>1.08</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3.95</td>
<td>1.08</td>
</tr>
</tbody>
</table>

Majority of the respondent 78.9% (43.9 % +35.0%) agreed with the statement that accounts receivables are collected on time. The result also revealed that 83.1% of the respondents agreed that accounts payable are paid out on time. The result revealed that 79% of the respondents agreed with the statement that inventory holding period is short. The result also showed that (79%) of the respondents agreed with the statement that working capital management leads to achievement of goals/objectives. Finally the result revealed that 78.9% of the respondents agreed with the statement that too much working capital results in wasting cash.

On a five point scale, the average mean of the responses was 3.95 which means that majority of the respondents were agreeing with most of the statements; however the answers were varied as shown by a standard deviation of 1.08.

In addition the respondents were asked to indicate if working capital management influence financial performance in their organization.
Figure 4.5: Working capital management and performance

The result revealed that majority (95%) of the respondent indicated that working capital management influence financial performance in their organization while (5%) of the respondent indicated that working capital management does not influence financial performance in their organization.
4.4.5 Financial Performance

4.4.5.1 Donor Retention Rate Trend Analysis

![Donor retention rate trend analysis graph](image)

Trend results in Figure 4.6 revealed that there was a consistent increase in mean of donor retention rate across the 5 years of study. Mean of donor retention in year 2012 was 51.48. It decreased to 46.65 in year 2013 but steadily improved to 50.34. In the year 2014 the mean increased to 69.772 in year 2015 and then increased to 82.962 in the year 2016. The linear plot yielded an r square of 0.767 implying that 76.7% of changes in donor retention rate can be explained by time and this further revealed a consistent trend.

4.4.5.2 Trend Analysis for Fundraising Return on Investment

![Fundraising return on investment trend analysis graph](image)

Trend results in Figure 4.7 revealed that there was a consistent increase in fundraising return on investment across the 5 years of study. The fundraising return on investment in year 2012 was 54. It slightly declined to 48.24 in year 2013 but the increased to 50.32 in year 2014. It then constantly increased to 69.96 in year 2015 and further increased to 85.114 in the year 2016. The linear plot yielded an r square of 0.7145 implying that 71.45% of changes in fundraising return on investment can be explained by time and this further revealed a consistent trend.
4.5 Inferential Statistics

4.5.1 Correlation Analysis

Table 4.8 below presents the results of the correlation analysis.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Performance</th>
<th>Budgeting Practices</th>
<th>cash planning</th>
<th>Inventory planning</th>
<th>Working capital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Correlation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Budgeting Practices</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>.193*</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>cash planning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>.158*</td>
<td>.089</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inventory planning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>.287**</td>
<td>.05</td>
<td>-0.098</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Working Capital</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>.570**</td>
<td>211*</td>
<td>410*</td>
<td>-0.02</td>
<td>1</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
<td>0.09</td>
<td>0.07</td>
<td>0.805</td>
<td></td>
</tr>
</tbody>
</table>

The results revealed that budgeting practices and performance are positively and significantly associated (r=0.193, p=0.015). These findings agree with that of Onduso (2013) who conducted a study on the effect of budgets on financial performance of manufacturing companies in Nairobi County. The results indicated that financial performance as measured by ROA is strongly influenced by using of budget and managerial performance. The results further indicated that information cash planning and performance are positively and significantly associated (r=0.158, p=0.049).

These findings agree with that of Tarus and Juma (2017) who found that cash management have a positive effect on performance. It was further established that inventory planning and performance are positively and significantly associated (r=0.287, p=0.000). These findings agree with that of Shardeo (2015) who conducted a study on impact of inventory management on the financial performance of the firm. The study found that there is some relationship between the inventory turnover ratio and financial condition of the firm. Finally, results showed that working capital and performance are positively and significantly associated (r=0.570, p=0.000). These findings agree with that of Mathuva (2009) who indicated that there is a highly significant negative relationship between accounts collection period and profitability inventory turnover ratio and financial condition of the firm.

4.5.2 Regression Analysis

The results presented in table 4.9 present the fitness of the regression model in explaining the study phenomena.

<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>.751</td>
<td>0.564</td>
<td>0.554</td>
<td>0.42942</td>
</tr>
</tbody>
</table>

Budget practices, cash planning, inventory planning and working capital were found to be satisfactory variables in explaining pharmaceutical suppliers’ performance. This is supported by coefficient of determination also known as the R square of 56.4%. This means that budget practices, cash planning, inventory planning and working capital explain 56.4% of the variations in the dependent variable which is performance. This results further means that the model applied to link the relationship between the variables was satisfactory.

Table 4.10: Analysis of Variance

<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>1 Regression</td>
<td>9.881</td>
<td>4</td>
<td>2.47</td>
<td>13.396</td>
<td>0.000</td>
</tr>
</tbody>
</table>
Regression of coefficients results in table 4.12 shows that budgeting practices and performance are positively and significantly related (β = 0.179, p = 0.004). These findings agree with that of Onduso (2013) who found that financial performance as measured by ROA is strongly influenced by using of budget and managerial performance. The table further indicates that cash planning and performance are positively and significantly related (β = 0.177, p = 0.009). These findings agree with that of Tarus and Juma (2017) who found that cash management have a positive effect on performance. It was further established that inventory management planning and performance are positively and significantly related (β = 0.255, p = 0.000).

These findings agree with that of Shardeo (2015) who conducted a study on impact of inventory management on the financial performance of the firm. The study found that there is some relationship between the inventory turnover ratio and financial condition of the firm. Finally, working capital management practices and performance were found to be positively and significantly related (β = 0.340, p = 0.000). These findings agree with that of Mathuva (2009) who indicated that there is a highly significant negative relationship between accounts collection period and profitability inventory turnover ratio and financial condition of the firm.

5. SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter deals with the summary of the findings, the conclusion and recommendations. This was done in line with the objectives of the study. Areas of further research were also suggested.

5.2 Summary of Findings

The first objective was to establish the effect of budgeting practices on the financial performance of nonprofit making health organizations in Kiambu County, Kenya. Majority of the respondent noted that all departments prepare budget plans prior to the budget year. Control of the budget activities is done by the head of departments. There is a regular follow up on budget plans by the departmental heads and that budget performance evaluation reports are prepared regularly. The correlation results indicated that budgeting practices and performance are positively and significantly associated. The regression results showed that there is a positive and significant relationship between budgeting practices and performance as supported by a p value of 0.004 and a beta coefficient of 0.179. This implies that a unit increase in budget practices results to an improvement in performance by 0.179 units.

The second objective was to establish the effect of cash planning practices on the financial performance of nonprofit making health organizations in Kiambu County, Kenya. Majority of the respondent noted that financial manager always plans an optimum capital structure for the organization. A strong control is one with tight budgetary control over cash received, cash banked, cash paid, and cash brought down. Organization uses externally generated funds to finance its operations. The results also revealed that majority also noted that strict accounting principles and accountability practices is used. The correlation results indicated that cash planning and performance are positively and significantly associated. The regression results showed that there is a positive and significant relationship between cash planning and performance as supported by a p value of 0.009 and a beta coefficient of 0.177. This implies that a unit increase in cash planning practices results to an improvement in performance by 0.177 units. The findings were also supported by the statements in the questionnaire which majority of the respondents agreed with the statements.

The third objective was to establish the effect of inventory planning practices on the financial performance of nonprofit making health organizations in Kiambu County, Kenya. Majority of the respondent noted that they had systems in their organization to review usage on inventories. Inventory planning reduces the delivery lead time. Organizations have clearly set inventory policies. The systems are
able to prevent shortages and stock out costs and that inventory control affects the performance of the organization. The correlation results indicated that inventory planning and performance are positively and significantly associated. The regression results showed that there is a positive and significant relationship between inventory planning and performance as supported by a p value of 0.000 and a beta coefficient of 0.255. This implies that a unit increase in inventory planning practices results to an improvement in performance by 0.255 units. The findings were also supported by the statements in the questionnaire which majority of the respondents agreed with the statements.

The fourth objective was to establish the effect of working capital practices on the financial performance of nonprofit making health organizations in Kiambu County, Kenya. Majority of the respondent noted that accounts receivables are collected on time in most health institutions in Kiambu. Accounts payable are paid out on time. Inventory holding period is short. Working capital management leads to achievement of goals/objectives and that too much working capital results in wasting cash. The correlation results indicated that inventory planning and performance are positively and significantly associated. The regression results showed that there is a positive and significant relationship between inventory planning and performance as supported by a p value of 0.000 and a beta coefficient of 0.340. This implies that a unit increase in working capital practices results to an improvement in performance by 0.340 units. The findings were also supported by the statements in the questionnaire which majority of the respondents agreed.

5.3 Conclusion

From the study findings, the study concluded that there is a positive and significant association between budget planning and financial performance of nonprofit making health organizations. In addition organizations that prepare their budgets prior to budget year are sustainable. The study also found that most not for profit making organizations have a regular follow up on budget plans by the budget committee and that budget performance evaluation reports are prepared regularly.

From the findings, the study concluded that there is a positive and significant association between cash planning and financial performance of nonprofit making health organizations. In addition, a strong control is one with tight budgetary control over cash received, cash banked, cash paid, and cash brought down. Most organization uses externally generated funds to finance its operations.

In addition the study concluded that there is a positive and significant association between inventory planning and financial performance of nonprofit making health organizations. It was also noted most organizations had systems to review usage on inventories. The systems are able to prevent shortages and stock out costs and that inventory control affects the performance of the organization.

The study concluded that there is a positive and significant association between working capital and financial performance of nonprofit making health organizations. It was also noted that accounts receivables are collected on time in most health institutions in Kiambu. Accounts payable are also paid out on time. In addition, working capital management leads to achievement of goals/objectives and that too much working capital results in wasting cash.

5.4 Recommendations

Based on the findings the study recommends that all departments should prepare budget plans prior to the budget year. Control of the budget activities should be done by the head of departments. Follow up on budget plans by the departmental heads and that preparation of regularly budget performance evaluation reports should also be done. This will increase the planning of a project which will lead to better completion results. Also budgeting allows a public administrator to plan, make proper choices, and decide on the mission and direction of an organization.

The study also recommends that that financial manager should always plans an optimum capital structure for the organization. There should also be a strong control that has tight budgetary control over cash received, cash banked, cash paid, and cash brought down. Organization should uses externally generated funds to finance its operations. This was found to be of importance since the success of any business depends on the manner the financial plans are formulated.

Penultimate, the findings the study recommends that those organizations should have clearly set inventory policies and systems that are able to prevent shortages and stock out costs. Having effective inventory control management is recognized as one of the areas management of any organization should acquire capability. Therefore effective inventory control management will help organizations to gain a lot benefit which include optimal use of resources, cost reduction, improved profitability, improved sales effectiveness, reduction of waste, transparency and accountability, easy storage and retrieval of stock, high inventory utilization amongst others.

Finally, the findings the study recommends that there should be working capital management both short term and long term assets as it leads to achievement of goals/objectives. This management of short-term assets is as important as the management of long-term financial assets, since it directly contributes to the maximization of a business’s profitability, liquidity and total performance. Similarly the study recommended that that a firm preserves its liquidity to enable it meet its short term obligations when due this is because increasing profits at the cost of liquidity exposes a company to serious problems like insolvency and bankruptcy.
5.5 Areas of further research

The study recommends that a similar study should be conducted in other counties for comparison purposes. The study also recommends that a study seeking to establish other financial planning practices affecting financial performance of nonprofit making health organizations should be conducted.

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Effect of Financial Inclusion on Financial Performance of Banks Listed At the Nairobi Securities Exchange in Kenya

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ABSTRACT: This study sought to determine the effect of financial literacy programs, usage of agents and representatives, increased proliferation of ATMs and Mobile banking services on the financial performance of listed banks in Kenya and to determine the effect of bank branch spread on performance of listed banks in Kenya. The main theories reviewed in this study were the Grameen Model of Banking, Bank Led Theory, Financial intermediation theory and Contemporary Banking Theory. The study adopted a descriptive research design, and the study population included management and operational level employees of the 11 banks listed on the Nairobi Securities Exchange. A census study was conducted with primary data being collected using questionnaires. The NIC Bank provided data for pilot testing to determine the reliability and validity of the research instruments. The analysis of data based on SPSS software (version 2.3) and regression analysis presented using charts and tables. The results of the studied determined that financial inclusion elements have a positive and strong impact on the financial performance of banks in terms of return on equity. The study determined that financial literacy programs have positive but weak impact on financial performance of banks. The use of agents and representatives had positive and strong effect on performance of banks. The proliferation of ATMs and Mobile banking services had positive but weak effect on financial performance of banks. Bank branch spread had positive but weak effect on financial performance of banks. The study recommends that policy makers in the financial institutions such as banks should make use of financial inclusion elements to improve financial performance of banks. The study recommends further research using moderating and intervening variables such as size and ownership of business entity.

Key Words: Financial literacy programs, usage of agents and representatives, increased proliferation of ATMs, Mobile banking services, financial performance

1. Introduction

The business of banks involves taking deposits and using the same deposits to make loans (Fuhrmann, 2017). It could be complicated, but this is the basic model used in banking. In the past Kenyan banks have been accused of not reaching out to areas where the transaction or deposit size is very low. In places with low deposits, the volumes are usually low, and the costs of serving are high. The banks did not see any sense to open up branches in areas with low volumes and the high cost of operation.

The above situation has changed though, and most firms have embraced the concept of financial inclusion where they strive to open up to the new areas by biometric devices and mobile money. This practice has opened up access to financial services even in the remotest areas of the country. The policy changes by the government permitted banks to use agents to deliver financial services through (Finance Act, 2009). Most of the financial institutions have been encouraged to use this model due to the cost advantages to the financial institution, the agents, and the customers. For the client, the advantages include the lower cost of the transaction, the shorter lines, longer operational hours and easy access by the illiterate part of the population who feel intimidated by the set up in branches.

The relationship between financial inclusion and banks profitability forms two ideological perspectives. It is a multiple of low costs, multiple locations and small deposits that amounts to huge deposits and high levels of profitability (Okun, 2012). The low costs incurred by banks mean that the population in the rural and semi-urban settings can gain access to loans. In a typical sense, the loans are given collateral free, meaning that they are charged at very high-interest rates. The financial institutions gain from such strategy.
because the repayment rate is around 90% since most people from the rural setup fear to default on their loan obligations (Develtere & Huybrechts, 2002). The second perspective of profits is determined as a multiple of small loans, good interest rate and high repayment leading to higher profitability.

Financial inclusion is a process that cannot take place in isolation without the support and effort from the government (Fuhrmann, 2017). Research has shown that there is a relationship between financial exclusion and poverty. The finding has pushed the Central Bank to create a policy with the intention of ensuring financial inclusion (Oruo, 2013). The government understands the fact that financial inclusion cannot happen on its own, hence the need to have policies that guide the process in the economy.

The government has to be involved regarding the creation of policies because financial services are unavailable in some regions and that financial services are only accessible and used by a certain section of the population. As much as the majority of people demand the services, their provision has not been effective until recent days. The regions excluded are poor, rural areas and people living in areas with harsh climatic conditions. The excluded population relies upon services from the informal sector for the availability of finances; such services offered at high-interest rates (Lusardi & Mitchellelli, 2012).

The reliance on the informal sector has led to a vicious cycle within the population (Waihenya, 2012). The high costs mean that the individuals in the rural setting must earn an average income higher compared to those with access to finance at a lower cost. The second effect is that a huge portion of the income pays back the moneylenders within the informal sector hence the people remain in poverty. The second reason as to why there has been a financial exclusion in the past is the high costs incurred in financial services. The poor people living in the living in urban and rural areas have failed to utilize important financial services since they believe that they are unaffordable and costly. Even though the financial services could be available, they remain unutilized due to the costs associated with them.

From a global perspective, according to CGAP (2018) estimates show that 2 billion working age adults, which is more than half the total adult population, do not have formal accounts with financial institutions. Financial inclusion efforts seek to ensure that all the businesses and households gain access and utilize financial services regardless of their levels of income. Digital payment terminals are important elements of financial inclusion around the world. In Russia there are over 70 million individuals using terminals once every month (CGAP, 2018). In Azerbaijan, there is about 10 bank branches for every 100,000 adults hence the use of payment terminals seven times more than Russia. The use of payment terminals in other countries such as Brazil, Colombia, India and the USA works as per expectations (CGAP, 2018).

In Philippines and Bangladesh, it takes up to one month for an individual to get access to a small loan. In Denmark banking, services such as loan processing are instant (Narain, 2012). The requirement that account holders maintain a minimum balance in the past deterred most individuals from opening bank accounts. One unique case that cited is in Cameroon where for one to open an account they must maintain a minimum of $700 (Mutua, 2013). In South Africa, no minimum requirement applies for the account holders. The cost of managing an account has deterred several people in the past, and a good example is in Sierra Leone where the checking account annual fee is at 25 percent of the per capita. When small businesses are in a position to gain access to quick loan, financial inclusion is at its best. Kenya is trying to adopt the practice in Denmark where such services are instant.

Other issues that have inhibited financial inclusion are not on price barriers. When an individual is seeking to access formal financing services, they need several documents of proof. Majority of the poor people do not have such formal documentation, which has limited their access to formal financial services (Narain, 2012). They may subscribe to the services, but face difficulties in gaining access to the banks due to the distance from the institution and poor infrastructural development.

The other element that has limited financial inclusion in the past is behavior. Research conducted in the field of behavioral economics has indicated that majority of people have certain reservations when it comes to using of financial services (Agrawal, 2013). They cite various reasons such as language barrier and several documentations that are required before getting services. The Kenyan government over the past few years has been among the leading African countries that have created policies to enhance financial inclusion. The National Financial Access Survey conducted in 2009 indicates that Kenya is second to South Africa regarding access to financial services (Mwega, 2014).

The element of financial inclusion has developed widely with more than eight banks offering agency-banking services. The most common banks that offer such services include NIC Bank, Eco Bank, Kenya Commercial Bank, Co-Operative Bank, Family Bank, Post Bank, Equity Bank and Diamond Trust Bank. The Central Bank intended to improve financial inclusion in Kenya and created an environment for agency banking in May 2010 when it created the guideline on agent banking after a study that indicated the advantages it had for countries that had engaged in it (Otieno, 2016). The regulatory framework that had created by the Central Bank led several banks to adopt the practice that has improved financial inclusion.

Financial Inclusion through an agency and mobile banking offer banks opportunities to improve their revenue generation. Past researches done on the branchless form of banking show the importance of mobile phones and agents play in certain models.
The outcome of the researchers is consistent with the idea that electronic money brings about increased efficiency and reduction in transaction costs. From a theoretical point of view, the use of mobile and agency banking in the electronic form promises to raise the levels of efficiency and reduce the costs of the transaction (Mwangi, 2014). It translates to better financial performance since better financial inclusion results in more profits for banks through commission and interest income and reduction in overhead expenses such as marketing and administration costs.

On an international context, Chauvet and Jacolin (2017) studied financial inclusion, bank concentration, and firm performance in 79 countries, which forms the basis of understanding the international context. It was determined that distribution of financial services across firms had positive impact on the growth of the firm. The study established that in the United States the impact becomes greater when the markets of the banks are less concentrated. Furthermore, the study established that banks which are highly competitive favour growth at high levels of inclusion and bank concentration is only favourable at the state-owned firms. The international elements highlighted above are critical in advising the nature of this paper.

In Kenya, researches that have looked at financial inclusion’s impact on performance by breaking it into its two main elements, which are agency banking and mobile banking. Mwaniki (2014) found that mobile banking has transformed the business of money transfer and created various innovations that have cut on the transaction costs for the banks and the customers that have resulted to high financial performance in the sector.

Mutua (2010) researched mobile banking and financial performance of banks and determined that there is a weak positive relationship between financial performance and mobile banking. Ondieki (2015) researched the effect of Agency Banking on the financial performance of commercial banks and determined that the number of agents operated by commercial banks does not have a direct correlation with the financial performance measured on the return on equity.

According to FSD Kenya (2018), financial inclusion is growing at a fast rate. The adults in Kenya excluded from any form of financial services went down from above 40% to 17% between the years 2006 and 2016. Access to different forms of formal financial services increased from 27% to above 75% (FSD Kenya, 2018). The growth is continuing as the number of Kenyans not using formal financial services went down from 25% in 2013 to 17.4% in 2016 (FSD Kenya, 2018).


Dichotomy exists among researchers. It is not clear whether financial inclusion influences performance positively or negatively. While some researchers find financial inclusion affecting performance positively (Mwaniki, 2014); others find financial inclusion to be affecting performance negatively (Ondieki, 2015; Oruo, 2013) while some find financial inclusion to be affecting performance under a weak positive relationship (Mutua, 2010).

Researchers such as Nthambi (2015) researched financial inclusion, bank stability, bank ownership and financial performance of commercial banks in Kenya and argued that financial inclusion has an impact on the performance of banks. Others such as Simboley (2017) studied the effects of Agency Banking on the financial Performance of commercial banks in Kenya. Cherungong (2015) conducted a study on the effects of financial literacy programs on the performance of small and medium scale enterprises in Trans Nzoia County. KipNgetich (2013) studied agency banking and financial inclusion in Kisumu. Kithaka (2014) studied the effects of mobile banking on the financial performance of commercial banks in Kenya. Despite all these studies and many others, this area still remains grey and with minimal studies and no published study on financial inclusion and how that influences performance of listed banks in Kenya and hence the need to fill this gap by conducting this study.

The general objective of this study was to determine the effect of financial inclusion on the financial performance of banks listed in the Nairobi Securities Exchange in Kenya. The specific objectives were: to determine the effect of financial literacy programs on financial performance of banks listed in Kenya, to investigate the effect of usage of agents and representatives on financial performance of banks listed in Kenya, to evaluate the effect of increased proliferation of ATMs and Mobile banking services on financial performance of banks listed in Kenya and to assess the effect of bank branches spread on financial performance of banks listed in Kenya.

2. Literature Review

2.1 Theoretical Framework

This section analyzes theories advanced to explain the relationship that exists between financial inclusion and financial performance of banks. The main theories explored in this area include the Financial Intermediation Theory, Grameen Model of Banking, Contemporary Banking Theory and Bank Led Theories. The main theory in this study was the financial intermediation theory.
2.1.1 Financial Intermediation Theory

The work of Raymond Goldsmith (1969) is the basis of the financial intermediation theory. In work, Goldsmith gave wide-ranging facts related to the financial structure and the economic development. It was determined that in the course of economic development of a nation, the financial system develops faster than the wealth of the nation. Determining of the size of the financial system in a country is the division of the role of saving and investment among the various units in the economy (Goldsmith, 1969). The observation made in the 1960s is still relevant to the modern-day format of financial intermediation. The contemporary society has continued to appreciate the role played by financial intermediation in development of the economy (Scholtens & Van Wensveen, 2003). Theoretical and empirical researchers have shown that financial intermediation plays an important role in the growth of the economy.

The study establishes that one of the reasons for financial exclusion is low income and assets among some people in the society. With financial intermediation, there is an efficient allocation of capital within the economy with the aim of ensuring that economic growth. Another factor mentioned to contribute to financial exclusion is limited information related to certain financial aspects. Financial intermediation provides information to the owners of capital and the borrowers of capital. The financial intermediation process brings together the deficit and surplus units in an environment not known to them (Mandell, 2008).

The banks through financial intermediation ensure that there is financial inclusion. In the process of ensuring that there is access to information, financial literacy and efficient allocation of the resources in the country, there is a risk that the banks take on behalf of the different players in the economy (Scholtens & Wensveen, 2003). The risk taken during the financial intermediation process has to cover the financial institution through the charging of the interest rate. This part of financial intermediation is critical to the study in this paper since it highlights the fact that financial institutions can earn through their role of financial intermediation hence improving their financial performance. The elements of financial intermediation have proven critical in ensuring financial inclusion, meaning that research of this nature would want to determine whether the financial inclusion results to profits for the financial institutions that offer intermediation services.

2.1.2 Grameen Theory

The Grameen Bank through its creation of the Grameen Bank Model developed the Grameen theory. The bank created a program aimed at elevating poverty among the poor Bangladeshis from which the now famous Grameen theory was developed (Develtere & Huybrechts, 2012). The Grameen theory looks at the income expected by the financial institution from entrepreneurial borrowing. It states that poor members of the society are better borrowers since they value the relationship that they have with the bank.

The study in Grameen case looked at the dynamics of banks operating under monopoly conditions granting loans and taking deposits from future generations of entrepreneurs with varied levels of expected returns (Develtere & Huybrechts, 2012). The evidence shows that Grameen would focus on individuals with lower expected income, and did not give out the dividends until it attained the level of potential borrowers. The theory does not fit well into financial inclusion research because it ignores the effect of the model on high-income earners in the society.

In a study of the effect of financial inclusion on the financial performance of banks, the concern is whether the various elements of financial inclusion lead to better returns for the financial institutions. The Grameen theory provides empirical evidence of the positive returns where the study covered the household survey in Bangladesh (Develtere & Huybrechts, 2012). The empirical results of the theory indicated that various measures of the income expected by the bank are positive and significantly related to the default probabilities. The Grameen theory should encourage banks to view the low-income borrowers as the best form of business since they have the low rate of default and they are charged high-interest rate over a short period. This means that policies structuring is in a way that low income and financially excluded groups form the targeted by the banks to gain from their good payment record.

2.1.3 Bank Led Theory

The bank led theory arose under various efforts by banks to come up with new models of reaching their clients through agents. Various researchers have studied the theory (Kiburi, 2016; Kendall, 2012). Under the model, a financial institution licensed to operate in a country, in most cases a bank, uses retail agents to deliver financial services. The banks create the financial products and services and then distributed them to the retail agents who handle all the interactions with the customers. The ultimate providers of the financial services are the banks, and the customers have to maintain an account with the primary bank.

Under this arrangement, the retail agent maintains a face-to-face contact with the customer in the same manner as a teller at a branch. They handle cash functions through taking deposits and processing of withdrawals. In other countries, the use of retail agents is at an advanced level where they open accounts, identify customers and service them with loans (Kiburi, 2016). The outlets that provide cash services are close to the customers and at the same time perform as retail agents. The retail agent has a direct electronic communication with the bank that they serve.
The bank led theory is critical in this research as it forms the basis of agency banking which is an important element of financial inclusion. While looking at the use of agents and proliferation of ATMs and mobile banking services, what comes to mind is the bank led theory (Kendell, 2016). The analysis of the theory explains why banks have continued to use the elements prescribed under the variables as modes of enhancing financial inclusion. Even though the theory forms the backbone of the element of agency banking, it has not established the outcome of the practice regarding the returns to the banks and the customers. In a simple form, it has highlighted the manner in which the process of agency banking occurs within business environment.

2.1.4 Contemporary Banking Theory

Bhattacharya and Thakor advanced the Contemporary Banking Theory in 1993 and it is an extension of financial intermediation theory. The theory states that commercial banks together with other financial intermediaries are important when it comes to proper distribution of capital resources in the economy. The financial intermediaries play an important role in the economy through reduction of the transaction costs for the services.

In review of the contemporary theory of financial intermediation, the main areas of focus include the contribution it has had over the past decade, and the advancement of the understanding of the existence of the financial intermediaries. Even though the theory has helped in understanding the elements of financial intermediation, it includes the financial intermediation theory elements. The second aspect is that it has complicated regulation of financial intermediaries due to its expansion of scope of financial intermediation (Bhattacharya & Thakor, 1993).

The contemporary banking theory is relevant to this study in relations to bank branch spread variable. Commercial banks can operate in a single branch, but due to competition and the need for financial inclusion, they operate a network of branches. The operation of a network of branches is one of the roles of the contemporary banks that seek to narrow the distance between the customer and the services rendered.
2.2 Conceptual Framework

### 2.2.1 Financial Literacy Programs

Financial Inclusion includes double aspects that include the demand and the supply side. The financial literacy programs make up the demand side and it is inclusive of elements such as financial literacy credit counselling, knowledge of the products and the credit absorption capacity. The elements are satisfied through the supply side (Joshi, 2011).

The strategies that are used by the banks to meet the demands include refining the existing credit delivery mechanisms, strengthening the credit absorption capacities and development of new models for effective reach (Joshi, 2011). The strategies used to ensure that they attain the desires of the sub variables of financial inclusion, which include personal financial management, information on different financial management services and products and the operational knowledge.

When financial inclusion is successful in meeting the sub variables highlighted above, the financial performance of banks is better (Joshi, 2011). The main aspects of performance of the banks include establishing proper business delivery models; ensure access to the financial services and targeting all the sectors of the economy.

### 2.2.2 Use of Agents and Representatives

Agent banking is one of the innovative models of delivering banking services to the population. The strategy has brought trained financial service providers within the reach of millions of people in Kenya. However, there is little knowledge regarding the effect of agents and representatives on financial inclusion and performance of banks (Sanford, 2014). The agents and representatives have managed to ensure person-to-person payments and ensuring that there is delivery of credit, savings and other financial products to the poor.
In Kenya, household heads in most cases tend to visit banking agents regularly. The agents perform customer’s services (deposits and drawings), account openings, and customer care services (Sanford, 2014). The use of the agents has however not opened up to accessing new financial services other than the ones above. The extent to which such services have influenced the financial performance of banks must be determined through analysis of the different sub variables.

The agents have ensured that there is increase in financial inclusion through serving the part of the population that was underserved (Sanford, 2014). The individuals that make use of agents and representatives include the poor, less educated and female members of the society. The impact of agents and representatives on financial inclusion in Kenya is not clear. This study has highlighted three critical areas that are customer care services, deposits and drawings and opening of accounts as the main elements of inclusion.

2.2.3 Proliferation of ATMs and Mobile Services
Through mobile banking, millions of people gain financial access as long as they have a cell phone. The use of mobile banking has made basic financial services access easy. It reduces the time and distances to the neared bank branches. In any case, an individual customer does get to the branch; the ATMs make it easy for them to access deposit and withdrawal services rather than queuing at the teller. According to CGAP (2018), the use of ATMs and Mobile banking services reduces the bank’s overhead and transaction related costs. The use of mobile banking is an opportunity for institutions to extend the banking services to the new customers hence opening up their market.

The main areas of mobile banking services and use of ATM that are of interest to this research include the mobile banking services and products, the effect they have on the volume and the cost of transactions for the banks and the customers. According to Constable (2017), E-Banking relies on the need to reduce the operating cost and maximizing the revenues.

It is evident that in developed markets the use of online banking and ATMs has an impact in terms of reduced costs hence the increase in terms of revenues. This study seeks to determine whether Kenyan banks gain from the multiple of cost reduction and increase in volume due to ATM and online banking services.

2.2.4 Bank Branches Spread
In the past, most Kenyan banks had limited the spread of their branches to established urban centers. During that period of financial exclusion, few banks had shown interest in the rural areas of the country. According to Mandell (2008), some banks recorded reduction in financial performance during that period hence they were discouraged from establishing such branches. However, with the growth in financial inclusion, banks have to opening up branches in different parts of the country. The biggest concern is whether the spread of the branches have an effect on financial inclusion and whether it amounts to better financial performance.

As banks open up branches to rural areas, the biggest concern is whether the number of branches amount to higher volumes of transactions. The opening up of branches is aimed at ensuring that the customers gain access to new services, which cannot be provided using agents, representatives, or mobile banking (Musyoka, 2011). In the past, banks were reluctant to open up branches due to the element of cost. It is important to study whether proper spread of branches across different geographical location can have an impact on the financial performance of banks.

The main areas of concern for this study under the fourth variable include the number of branches and their spread across the country, the effect in terms of changes in volume of transaction, and the cost incurred in the operations.

2.2.5 Financial Performance
Financial performance is a subjective process through which an analysis of how the business can utilize its primary assets (Mutua, 2013). It is as a measure of the financial health of a firm, and it is a means of comparison of the performance of various firms that operate in the industry. Several measures apply in analysis of financial performance, but the most important thing is that financial measures are in aggregate. The measures can use line items such as operating income or cash flows, revenues from annual operations and the total sales units.

Net Interest Margin of a bank is the difference between interest income generated by a banking financial institution and the interest paid out to the lenders about the assets of the company. Financial institutions earn percentage income from the loans within a given period and the other assets less the interest paid by the firm on the borrowed funds (Mwangi, 2014). The return on investment is what the shareholders look forward to gaining from the organization at the end of the financial period. It shows the profit that earned about the total equity that held by the shareholders.

Financial inclusion using mobile and agency banking can have a huge contribution to the performance of banks. Improved performance leads to better customer satisfaction, increased customer share, and expanded the range of productivity (Mwangi, 2014). Mobile banking and agency banking are important tools that enhance acquisition and retention of customers. A strategy leads to increased profitability of the organization if properly implemented.
2.3 Empirical Review

This section reviewed the past studies conducted on the variables of this research. They entail financial literacy programs, financial performance of banks, use of agents and representatives, financial performance of banks and proliferation of ATMs and mobile services, and financial performance of banks.

2.3.1 Financial Literacy Programs

Hung et al. (2009) studied the role of financial literacy in solving the problem of low financial security among the Americans. The researchers analyzed the secondary data of the empirical research done on role of financial inclusion. The primary data was collected using internet-based survey. It was determined that the three knowledge tests have a strong degree of correlation and that all the correlations are statistically significant. Even though there was degree of stability in the measurement strategy. The study concluded that there is no systematic method applicable in determination of the impact of financial literacy programs. The lack of systematic method creates an opportunity for this research to determine a model to determine the effect of financial literacy on performance.

Onyango (2014) sought to determine whether financial literacy had an impact on the financial management practice among the employees of commercial banks. The study adopted the survey method and conducted purposive sampling. The sampling selected the major banks in Nairobi, and random sampling used to select the 100 respondents from five commercial banks. The study established that financial literacy has a positive influence on personal financial practices, but the same time the research determines that employees of the Kenya Commercial Bank have financial literacy yet they are not good managers of their finances. The study recommended that individuals should adopt comprehensive saving methods and prudent expenditure. Based on the recommendation above, there is a gap regarding determining whether increased savings translates to the better financial performance of listed banks.

After establishing that financial literacy has some impact on the financial activities of individuals, the next question is to determine whether the effect trickles down to financial advantage to the banks. Mwaniki (2014) studied the impact of financial literacy training on financial performance of women self-help groups. The study adopted a survey method, and collected both qualitative and quantitative data. The data was analyzed using inferential and descriptive statistics. The main finding stated that majority of the members were keeping a budget since training, they were borrowing for investment and the training on loan management positively influenced their loan graduation. The study concluded that the knowledge gained meant that the self-help groups would find new means or alternative-banking channels as members had new desire to access financial services. It meant that financial literacy training had opened up more business avenues for the self-help group. The studies indicated that financial literacy programs affect how individuals invest and manage their expenditure. But it is not clear as to whether such elements of financial literacy translate to better financial performance of banks.

2.3.2 Use of Agents and Representatives

Belita (2013) sought to establish the effect of Agency Banking on the financial performance of commercial banks in Kenya. The research used a descriptive survey study that covered 16 banks. The research finding showed that there exists a positive relationship between the volume of deposits, cash deposits and volume of withdrawals and the financial performance of banks. The numbers of agents were important part of the assets of the banks, meaning that the increase in the size of the bank asset had a positive impact on financial performance of banks. The study concluded that there is a positive relationship between the increase in the number of banking agents and the financial performance of banks.

Monica (2015) sought to determine the impact of Agency Banking on the financial performance of commercial banks in Kenya. The study adopted descriptive survey methodology and studied 17 commercial banks. It was determined that there is a strong positive relationship between return on assets of banks and the volume of transactions as well as the size of the bank and financial performance of the banks. The study concluded that an increase in the number of agents of commercial banks leads to an increased financial performance, meaning that there is a positive correlation between the agent outlets and financial performance of banks.

Ndirangu (2011) also sought to determine the effect of Agency Banking on the financial performance of commercial banks, but he used census method to study a population of all the banks licensed to operate in the country. The study covered ten banks and determined that the number of agents of a commercial bank and the volume of transactions did not have a positive correlation with the financial performance of banks as measured using the return on equity of the banks. The study looked at the number of agents and deposits, loan repayment transactions and withdrawals undertaken through the agents. It was determined that other factors apart from those highlighted could contribute to the financial performance of banks that conduct agency banking.

2.3.3 Proliferation of ATMs and Mobile Services

Asia (2015) conducted a study to determine the contribution of E-Banking on the performance of banking financial institutions in Rwanda. The research adopted a descriptive research methodology using qualitative and quantitative approach. The findings indicated that there is a positive relationship between electronic banking and performance of banks in Kigali. The significance level was 0.01. The research concluded that electronic banking methods such as Pay Direct, electronic check conversion, e-transact, use of ATM and
mobile banking have a great impact on the performance of the banks regarding reduction in the cost of operations, increase in assets of the bank and efficiency and the increase in the level of profitability.

Jegede (2014) investigated the effect of ATMs on the performance of banks in Nigeria. The study used descriptive survey methodology where questionnaires applied in collection of data from a sample of 125 employees of five selected banks in the Lagos state. The study determined that there was less than benefit in use of ATMs to offer financial services since the use of ATM terminals has been average regarding the improvement of performance of banks in Nigeria. This is a contradiction to Asia (2015). The latter stated that, there is a relationship between use of ATMs and improved financial performance of banks. The disparity in outcome occurred out of the difference in the research environments provided in Rwanda and Nigeria. It is prudent to conduct similar research in Kenya and establish the relationship between the variables.

The Kenyan context has also seen several types of researches conducted to determine the relationship between use of ATMs and Mobile Banking and financial performance of banks. Munyoki (2013) used a descriptive study to determine the impact of online banking on the financial performance of Kenyan commercial banks. The study concluded that generally, the element of online banking has a weak and positive relationship on the financial performance of commercial banks in Kenya. The effect attributed to the fact that use of online banking cut costs, reduces the staffing levels, and makes banking convenient to customers.

Vekya (2017) sought to establish the impact of electronic banking on the profitability of Kenyan commercial banks. Using descriptive study applied in conducting a survey of all the banks in Kenya. The multiple regression results of the study indicated that there was a significant positive relationship between the profitability of the banks. The study also indicated that there was a positive significant relationship between the profitability of the bank and the point of sale transaction. The study established that ATM transactions had a positive trend over time, which reflected in the profitability of the banks.

2.3.4 Bank Branches Spread

Musyoka (2011) conducted a study that sought to establish the relationship between branch network spread and the financial performance of banks in Kenya. The study was through descriptive research design in an attempt to collect qualitative and quantitative data. The population included all the banks licensed and operating in Kenya under the Banking Act. The study also collected secondary data through a review of bank financial statements between the year 2000 and 2010. It was determined that there is a positive relationship between branch network and financial performance of banks. As much as the study was conducted using some of the best research models, the fact that it was conducted between 2000 and 2010 means that other dynamics might have changed between 2010 and now prompting a new research in the same area.

Chelangat and Muturi (2016) sought to establish effect of branch network on financial performance in private colleges in Kenya. Even though the study was in an industry that is not banking, it contained elements that are important in this research. The specific objectives of the study included to impact of spread of branches on financial performance, the relationship between number of branches and financial performance and relationship between sizes of branches to financial performance. All the three variables are important part of this study. The study also adopted a descriptive approach used in this study. It was determined that number of branches and their geographical spread had an impact on the revenues and cost. It was also determined that as organizations grew the revenues and costs increased significantly.

Under the American context, Hirtle (2017) sought to establish the impact of network size on bank branch performance. The study used descriptive technique to analyze the branch networks held by large banks. The study sought to determine network elements and their effect on the performance of banks. The findings suggested that banks that operate through midsized branch networks face competitive disadvantages in branching activities. The study established that there is no relationship between size of the network and the overall profit of the bank. The above research is relevant to this study as it helps as a guide to the question of whether banks optimize banks size as part of the overall strategy involving the branch based and non-branch-based activities.

2.3.5 Financial Performance

Islam (2014) analyzed the financial performance of National Bank Limited using financial ratio. The study adopted both qualitative and quantitative methodology in determining the financial performance of the bank. The study determined that financial analysis is a structural and logical manner of assessing the overall financial performance of financial institutions. The most commonly applied method in the financial analysis of business entities with stakeholder interests is ratio analysis. In the analysis of financial performance of financial institutions, few categories of financial ratios are identical. The stakeholders tend to concentrate on the business regarding profitability, asset management, solvency, and liquidity ratio analysis.

Okinyi (2012) studied the performance and financial ratios of commercial banks in Kenya from 2006 up to 2010. The study sought to determine the factors that shape bank’s performance through the measure of return on assets and return on equity. The study adopted quantitative survey method and covered all 49 commercial banks in Kenya. The findings showed that capital adequacy, liquidity and the size of the bank explained the variations in performance of the banks over time. The study showed that larger banks earn superior
returns compared to the smaller banks. The study concluded that certain banks in Kenya seem to be earning higher returns in comparison to their competitors even though they operate under the same micro-economic environment. The research recommends that there is need to move forward and study the variations in the Return on Assets and Return on Equity.

Awuor (2011) studied the use of financial ratios for credit evaluation by commercial banks in Kenya. The study adopted a descriptive research method, and it involved 28 banks. The finding showed that all the banks had teams for management of credit risk and that all the banks relied on ratios on the evaluation of the corporate customers and most credit evaluations based on liquidity and profitability ratios. The study recommended further research on the use of financial ratio to determine the financial performance of banks.

2.4 Critique of Literature

Nthambi (2015) sought to determine the effect of financial inclusion on the performance of banks using the moderating and intervening variables of bank stability and bank ownership respectively. The research concluded that the joint effect of financial inclusion, NPL and Z score was greater than the effect of financial inclusion on the financial performance of commercial banks in Kenya. The researcher failed short of determining how the moderating and intervening variables would influence the data if they had not been included as part of the research.

Chemungong (2015) studied the impact of financial literacy on small and medium scale enterprises while Mwaniki (2015) studied the impact of financial literacy training on women self-help groups. The dynamics in the two industries are not the same as in the banking industry. Hence, performance could be different under the same element of financial literacy. The study by Jayantilal (2017) has determined the impact of financial literacy among the employees of Bank of Baroda, yet such a group of people is not an important part of efforts to ensure financial inclusion in the banking sector.

A study by Muema (2013) sought to determine the impact of financial inclusion strategies on the financial performance of banks but in the variables did not include financial literacy as one the variables that were to be tested. The study determined that financial inclusion strategies had an impact on the performance of commercial banks in Kenya since there was greater variation in performance of banks due to changes in agency banking, micro banking, Islamic banking and Micro banking. It did not capture the element of financial literacy as one of the strategies of financial inclusion.

The research on the effect of Agency Banking on the financial performance of banks in Kenya has partly indicated that there is a positive relationship between agency banking and financial performance (Belita, 2013; Monica, 2015). At the same time, another research indicates that there is no relationship between agency banking factors and financial performance of banks (Ndirangu, 2011). The contradiction creates a gap in the study that needs filling through further research of agency banking and financial performance of banks.

2.5 Research Gaps

The studies discussed above sought to determine the relationship between various elements of financial inclusion and profitability. Nthambi (2013) failed to determine the effect of financial inclusion on profitability without the intervening and moderating variables. Other studies on financial inclusion such as Chemungong (2015) and Mwaniki (2015) studied financial institutions other than banks. When banks were part of the study, some of them such as Jayantilal (2017) studied the individual customers rather than the banks. The elements highlighted above provide avenues through which this study can make this area of research better than the initial researches.

The studies have not successfully established whether there is a relationship between financial inclusion and financial performance of listed banks in Kenya. The researchers have not established the direction of the relationship between financial inclusion and the financial performance of banks. Most researchers have looked at financial inclusion elements as the focus of their research, and have not managed to look at the contribution of financial inclusion as a whole in the financial performance of banks. This research aimed at dealing with the lack of clarity regarding general effect of financial inclusion and not a single element such as agency banking. The study hinged on the importance of financial inclusion and the amount of time and resources invested by policy makers in ensuring that it is a success. The Central Banks and listed banks are concerned about the prospects of the element of financial inclusion in future and will be keen on research that seeks to identify its significant in the present day.

3. Methodology

The study used descriptive survey design. Under descriptive survey research design, the aim is to define the subject matter using the collected data, tabulated based on frequencies on the variables (Schindler & Cooper, 2003). The descriptive research design was suitable for this study as it allows the analysis of the relationship between the variables under study. The descriptive study design was appropriate in the sense that the study is concerned with elements that are already in existence and no variable was altered extensively.
According to Sireci (2008), several behavioral scientists argue that the assessment of social indicators must be content-valid. Content validation is an experimental demonstration that the test measures the claim (Brown, 2000). In this study, the experiment took the form of differential group study and the performance divided into two: one had the construct and another one did not (Brown, 2000).

The study used judgmental sampling technique and simple random sampling to pick five respondents from the senior management and five employees from operational level staff for each of the 11 listed banks in Kenya. The senior management used in the study was the heads of departments. The study used census method since it was not possible to sample the 11 listed companies. Hundred and ten respondents were part of the sample size for this study.

The research used both qualitative and quantitative data. The research used questionnaire as the main research instrument. According to Mugenda & Mugenda (2003), the elements in the questionnaire had to address the specific objective of the study and the research questions. The questionnaire made use of the structured (closed-ended) questions. Primary data was collected using questionnaires; on the other hand, secondary data was collected using publications from scholars and institutionalized reports such as financial statements of the listed banks.

The questionnaires are easy to administer and are low cost (Mugenda & Mugenda, 2003). The respondent has time to read the questions, think and then provide the answers. According to Kothari (2008), the questionnaires allow for assessment of a large number of respondents, meaning that the outcome will be highly reliable. The scores by the respondents in the questionnaire were determined using the Likert Scale. The responses were assigned numbers ranging from 1 up to 5 where Strongly Agree is represented by 1, and neither agree nor disagree represented by 5.

The data collected included primary and secondary data. The primary data was collected using questionnaires. The collection of the primary data was through the administering of self-administered questionnaires. The researcher visited the institutions under study with the intention to gain permission to distribute the questionnaires. According to Kothari (2008), questionnaires are more objective and can gather information in a structured way compared to interviews. The questionnaires were favored because they are easy to administer and they can collect a wide range of information. The secondary data was collected using information from Central Bank of Kenya (CBK), Nairobi Securities Exchange (NSE), Kenya National Bureau of Statistics (KNBS), and Annual Financial Statements and Reports of the banks. According to Ember and Ember (2009), secondary data is the data collected by other researchers and accessed by other researchers through histories, censuses, and ethnographies. The data from the published reports and materials made up the secondary data for this study.

Before conducting the actual study, it was important for the researcher to determine whether there are any limitations or weaknesses in the data collection methods and instruments. The pilot study applied (Adams et al., 2007). Traditionally the rule of thumb applied in which the pilot study of 1% of the total sample was selected (Mugenda & Mugenda, 2003). According to Polit and Beck (2003), the aim of the pilot test is not to test and prove the hypothesis under study but to test the data collection instruments, the strategies of creating the samples, and other aspects of the study in readiness for the actual study. The aim of the pilot test is to determine the validity and the reliability of the instruments of the research. Pilot testing based on validity and reliability testing.

According to Mugenda and Mugenda (2003), validity refers to the accuracy and the meaning of the findings made based on the results of the research. The expectation is that validity will provide the degree with which the results obtained will represent the phenomenon and variables under study.

According to Sireci (2008), several behavioral scientists argue that the assessment of social indicators must be content-valid. Content validity, in this case, looked at whether the subject under study is well covered. Experts in the area of finance reviewed the questionnaires to determine whether they consistent and could cover the variables in the research. The second test of validity that was construct validity, which is an experimental demonstration that the test measures the claim (Brown, 2000). In this study, the experiment took the form of differential group study and the performance divided into two: one had the construct and another one did not (Brown, 2000).
According to Saunders et al. (2009), the term reliability refers to the extent to which the procedures for data collection and analysis yield findings that are free from bias and consistent. It is concerned with the determination of whether different researchers made similar observations, transparency and whether similar inferences appear from the same data.

The study made use of Cronbach (Alpha – \( \alpha \)) model in the determination of the reliability of the data. The Cronbach reliability coefficient is expected to range between 0 and 1 in which zero represents no consistent variance and one if all variance is consistent. According to Brown (2002), the closer to 1 the coefficient is, the higher the internal consistency of the items put to the scale. When there is an alpha score of 0.70 or above, the study is reliable (Gliem & Gliem, 2003).

The data analysis based on the descriptive model and it included the use of the standard deviations, percentages and the relative frequencies. The descriptive statistic applied in the analysis of the qualitative data while the Statistical Package for Social Sciences (SPSS version 2.3) applied in the analysis of quantitative data (Mugenda & Mugenda, 2003).

Kothari (2008) defines analysis as computation of measures together with searching for relationships within the groups of data. Analysis involves operations conducted with intention of summary of the data collected and organizing it in a manner that answers the questions in the research. In the study, the data was edited, coded, classified and tabulated using SPSS. The SPSS analysis based on the multiple regression equation below:

\[
Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \epsilon
\]

Whereby:

- \( Y \) = Financial Performance of Listed Banks
- \( X_1 \) = Financial literacy programs
- \( X_2 \) = Use of agents and representatives
- \( X_3 \) = Increased proliferation of ATMs and Mobile Services respectively
- \( \beta_0 \) = Constant and
- \( \epsilon \) is the error term.

\( \beta_1, \beta_2, \beta_3 \) = Coefficients of variables in the regression model

The study used multiple regressions because it provides for analysis of a research hypothesis that is highly sophisticated than when a single correlation is used. The study was exploratory in nature since it seeks to gather new insights into an existing phenomenon, ask questions about the phenomena and assess the phenomena in a new way (Saunders et al., 2009).

The data was classified and tabulated based on the objectives of the study. The tabulated and classified data analyzed both quantitatively and qualitatively. The quantitative data in the tables was useful in the sense that it provided information that is quantifiable and easy to understand. The qualitative data presented through techniques such as tables, pie charts and bar charts.

### 4. Findings and Discussion

#### 4.1 Results for Response Rate

Table 4.1 is a summary of the response rate that stands at 84.54%. The data refers to the fact that out of 110 expected responses, there were only 93% actual responses. According to Mugenda and Mugenda (2013), response rate above 60% is good and above 70% is perfect. The response 84.54% is both good and perfect hence it can be conclude that the representation was excellent.

<table>
<thead>
<tr>
<th>Population</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filled and Returned</td>
<td>93</td>
<td>84.54%</td>
</tr>
<tr>
<td>Not Returned</td>
<td>17</td>
<td>15.46%</td>
</tr>
<tr>
<td>Total</td>
<td>110</td>
<td>100%</td>
</tr>
</tbody>
</table>
4.2 Results for Experience of the Respondents

Information from the Table 4.2 indicates that majority of the respondents have experience of 1-5 Years at 60% of the respondents. 36.7% of the respondents have experience ranging between 6-10 years and only 3.3% of the respondents have experience of over ten years. The information is a critical indicator that all the respondents used in the study had experience in the banking sector. The experience of the respondent is important to the study because the responses will be factual only if people who have an understanding of the area provide them.

Table 4.2 Results on Level of Experience

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-5 Years</td>
<td>55</td>
<td>60.0</td>
<td>60.0</td>
<td>60.0</td>
</tr>
<tr>
<td>5-10 Years</td>
<td>34</td>
<td>36.7</td>
<td>36.7</td>
<td>96.7</td>
</tr>
<tr>
<td>10-20 Years</td>
<td>4</td>
<td>3.3</td>
<td>3.3</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>93</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

4.3 Result for the Department of Respondent

The Figure 4.1 is a graphical representation of the departments of the respondents. The figure indicates that majority of the respondents were drawn from the finance department, followed by the administration department, sales and marketing and IT departments. The data is critical in terms of making sure that every department in the organization took part in the study. This information implies that majority of respondents had served in their current department for a long time, therefore, were well abreast with their departmental requirements and operations and thus their experience would provide a good sense of information relevant for this study.

Figure 4.1: Departments of the Respondents

4.4 Results for Duration of Stay in Current Organization

The duration of time spent by the respondents in the current organization based on information in figure 4.2. The data indicates that majority of the respondents had stayed in the organization for more than 3 years. Only 6% of the respondents had stayed in the organization for a period of one year. The information is critical since it is an indication that the respondents are vast in the issues related to the organization due to their experience in the organization.
4.5 Results for Duration in Current Position
The table 4.3 is a representation of the information about the number of years an individual has taken in the current position. Forty percent of the respondents have been in the current position for 3 years followed by 33% of the respondents who have been in the organization for more than 5 years. The longevity in a given position within the organization means that the individual is a proper source of information due to knowledge gathered while working in the same position.

Table 4.3: Duration in Current Position

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>9</td>
<td>10.0</td>
<td>10.0</td>
</tr>
<tr>
<td>2</td>
<td>16</td>
<td>16.7</td>
<td>26.7</td>
</tr>
<tr>
<td>3</td>
<td>37</td>
<td>40.0</td>
<td>66.7</td>
</tr>
<tr>
<td>Above 5 Years</td>
<td>31</td>
<td>33.3</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>93</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

4.6 Results of Diagnostic Test

4.6.1 Test for Normality
When testing for normality, the Shapiro-Wilk model applied because the respondents were less than 100. In the case of the study the respondents were 93 hence the Shapiro-Wilk test of normality applied. In examining the normality of the variables, Skewness and Kurtosis applied. Based on the information provided below, the study rejected the null hypothesis and accepted the alternate hypothesis because the sig. value was less than 0.05. The data was not normally distributed as per the outcome of table hence it was important to normalize it using logarithm method.

Table 4.4: Result for Test of Normality

<table>
<thead>
<tr>
<th>Kolmogorov-Smirnov(a)</th>
<th>Shapiro-Wilk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statistic</td>
<td>Df</td>
</tr>
<tr>
<td>ROA</td>
<td>.273</td>
</tr>
<tr>
<td>NIM</td>
<td>.474</td>
</tr>
<tr>
<td>ROE</td>
<td>.251</td>
</tr>
</tbody>
</table>

Figure 4.3: Results of Financial Data Distribution
The K density histogram indicates that the financial data is not evenly distributed which is in line with the findings of the Shapiro-Wilk test above.
4.6.2 Test for Reliability

To determine the reliability level of the study, Cronbach’s alpha test applied. The Table 4.5 below is an indication of the outcome of the Cronbach’s test on the questionnaires used in the collection of the data.

Table 4.5: Cronbach’s Alpha Test

<table>
<thead>
<tr>
<th>Variables</th>
<th>Cronbach’s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial Literacy Programs</td>
<td>0.721</td>
</tr>
<tr>
<td>Use of Agents and Representatives</td>
<td>0.76</td>
</tr>
<tr>
<td>Proliferation of ATMs and Mobile Banking</td>
<td>0.78</td>
</tr>
<tr>
<td>Bank Branch Spread</td>
<td>0.756</td>
</tr>
</tbody>
</table>

The average value from the Cronbach’s test is 0.75425, which indicates that the data collection instrument was reliable as the value is above the rule of thumb value of 0.7 (Cronbach, 1951).

4.7 Results of Substantive Test

4.7.1 Regression Analysis Tests

The research sought to determine the relationships that existed among the variables. Simple and multiple regression were used to help in understanding how the values of the dependent variable (Financial Performance) changes when one of the variables that are independent are altered while the other remain fixed.

4.7.2 Regression Results on Net Interest Margin

Table 4.6: Regression Results on Net Interest Margin

<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>.429a</td>
<td>.184</td>
<td>.029</td>
<td>.179625273283709</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Number of Customers, Number of Agents, Number of ATMs, Number of Bank Branches

From the Table to determine strength and direction of the relationship between the dependent and independent variables the study used regression analysis. The relationship between the net interest margin and the number of customers, agents, ATMs and branches is positive and weak. The finding contradicted Hung et al (2009) and agreed with Onyango (2014) and Mwaniki (2014). According to Hung et al. (2009), there was no systematic model of determining the effect of financial inclusion on performance.

The finding of this study means that number of customers, number of agents, number of ATMs and number of branches explains 18.4% of Net Interest Margin. Additional variables to the study are a possibility since the outcome of the model is less than 50%. The ANOVA sig value of .337 means that the value is above 0.05 hence it is proper to accept the null hypothesis and state that the number of customers, branches, ATMs and Agents influences the Net Interest Margin.

The meaning of the finding above is that the variables of the study positively influence the Net Interest Margin, even though the influence is weak. It means that positive changes in any of the variable will have positive effect on the net interest margin even if the change is minimal.

The model that was developed for the independent and dependent variables above can be represented based on \( NIM = \alpha_0 + \alpha_1 + \alpha_2 + \alpha_3 + \alpha_4 + \epsilon \). The model appears together with the data elements collected from the ANOVA test. The model is as shown below with extracts from Table 4.6

\[ NIM = .215 + .002 \text{ Number of Banks} + .06 \text{ Agents} + .01 \text{ATMs} + .09 \text{ Customers} \]

Table 4.7: Coefficients of Results of Net Interest Margin

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>T</th>
<th>Sig.</th>
</tr>
</thead>
</table>

http://dx.doi.org/10.29322/IJSRP.8.5.2018.p7779

www.ijsrp.org
4.7.3 Regression Results on Return on Asset

Table 4.8: Regression Results on Return on Asset

<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>.432*</td>
<td>.187</td>
<td>.032</td>
<td>.03926747431978</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Number of Customers, Number of Agents, Number of ATMs, Number of Bank Branches

From the table above it is evident that there is a weak but positive relationship between ROA and the number of customers, the number of agents, number of ATMs and Number of bank branches. R square of 18.7% means that the remaining 81.3% of ROA refers to other variables that are not part of the study. Using the ANOVA the sig. 0.338 is above the rule of thumb value of 0.05 meaning that the null hypothesis is accepted. The number of customers, agents, ATMs and bank branches has significant impact on ROA.

The finding above is in line with Belita (2013) who established that number of agents is an important part of the assets of the banks, meaning that the increase in the size of the bank asset had a positive impact on financial performance of banks. Monica (2015) agreed that increase in bank agents and ATMS leads to positive performance of the assets of the company. The study contradicted Ndirangu (2014) which stated that it was not clear as to whether increase in number of agents, bank branches, and mobile banking transactions had positive impact on performance of banks.

The model used in the analysis of ROA is given as ROA= α0+ α1 +α2+α3+ α4+ £. Based on the model and the outcome of the regression analysis the value of the model is: ROA=.034+.001 Number of Banks+.006 Agents+.000ATMs+.01 Customers.

Table 4.9: Coefficients of Return on Asset

| Model | Unstandardized Coefficients | Standardized Coefficients | t     | Sig.  
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></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>.034</td>
<td>.020</td>
<td></td>
<td>1.670</td>
</tr>
<tr>
<td>Number of Bank Branches</td>
<td>-.001</td>
<td>.000</td>
<td>-.953</td>
<td>-1.601</td>
</tr>
<tr>
<td>Number of Agents</td>
<td>4.733E-006</td>
<td>.000</td>
<td>.184</td>
<td>.576</td>
</tr>
<tr>
<td>Number of ATMs</td>
<td>.001</td>
<td>.001</td>
<td>.416</td>
<td>.707</td>
</tr>
<tr>
<td>Number of Customers</td>
<td>1.879E-009</td>
<td>.000</td>
<td>.063</td>
<td>.169</td>
</tr>
</tbody>
</table>

a. Dependent Variable: NIM

4.7.4 Regression Results on Return on Equity

Table 4.10: Regression Results on Return on Equity

<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>.934*</td>
<td>.873</td>
<td>.849</td>
<td>.15073245198807</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Number of Customers, Number of Agents, Number of ATMs, Number of Bank Branches

The results from the summary above shows that 87.3% of Return on Equity is explained by the number of customers, number of agents, number of ATMs and number of Bank Branches. It is an indication that the elements are good predictors of Return on Assets and that no other variable should be included. The ANOVA sig. 0.000 is below 0.05 that is an indication that we reject the null
hypothesis and accept the alternative hypothesis. The number of customers, agents, ATMS and Bank Branches has no significance on the ROE.

The finding above is in line with the findings in Asia (2015) which stated that ATMs, e-transactions, and mobile banking services had positive effect on the net interest margin of banks. The reason for contradiction is the significance level where Asia (2015) had significance level of 0.01 that is higher than significance level of this study. The study was in contradiction with Jegede (2014) which stated that the number of banking agents, the number of branches and the number of online transactions the banks engaged in positively influences the net interest margin.

The model used to determine the relationship between the variables and ROE is given as $\text{ROE} = \alpha_0 + \alpha_1 + \alpha_2 + \alpha_3 + \alpha_4 + \epsilon$. The statistical representation of the variables is as shown below. $\text{ROA} = .0034 + -.33 \times \text{Number of Banks} + -.006 \times \text{Agents} + .000 \times \text{ATMs} + .01 \times \text{Customers}$

### 4.7.5 Results for Test for Correlation

Correlation is the measure of association between the independent variables. It is used in the same manner as regression to determine the direction and strength of relationship between the dependent and independent variables.

<table>
<thead>
<tr>
<th>Table 4.11: Results for Test for Correlation</th>
<th>Number of Agents</th>
<th>Number of Customers</th>
<th>Number of Bank Branches</th>
<th>Number of ATMs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Agents</td>
<td>Pearson Correlation</td>
<td>1</td>
<td>.746**</td>
<td>.765**</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>N</td>
<td>93</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>Number of Customers</td>
<td>Pearson Correlation</td>
<td>.746**</td>
<td>.000</td>
<td>.833**</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>N</td>
<td>93</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>Number of Bank Branches</td>
<td>Pearson Correlation</td>
<td>.765**</td>
<td>.000</td>
<td>.943**</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>N</td>
<td>93</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Number of ATMs</td>
<td>Pearson Correlation</td>
<td>.744**</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>N</td>
<td>93</td>
<td>.000</td>
<td></td>
</tr>
</tbody>
</table>

The rule of thumb dictates that rejection of null hypothesis occurs if the significant value is below 0.05 and the alternative hypothesis adopted. The study rejected null hypothesis based on the information in the table above, and the alternate hypothesis adopted that there is no correlation between the variables of the study.

The result above is an indication that the variables of financial inclusion are not related and they affect the dependent variable in different ways. It is an indication that each variable will lead to a different outcome if analyzed from a standalone point of view.

### 4.8 Results of Financial Inclusion on Financial Performance of Banks

This section is a review of the effects of financial literacy programs, use of agents and representatives, proliferation of ATMs and Bank Branch spread on financial performance of banks.

#### 4.8.1 Results of Financial Literacy Programs

This section is a review of the financial literacy programs on the performance of banks. The section looks at the financial literacy levels, customer understanding of risk aversion, level of savings of the customers, and the changes in number of people seeking formal banking services.

From the table 4.12 it is evident that majority of the respondents agreed and strongly agreed that financial Literacy levels have improved over the past five years at 66.7% and 33.3% respectively. Majority of the respondents (56.7%) agreed that customer understanding of risk aversion has led to more savings while 30% neither agreed nor disagreed with the statement. Only 6.7% disagreed with the statement above. It is an indication that more customers tend to save more because they have become financially rational.

The study contradicted the findings of Onyango (2014) which could not establish whether savings and prudent expenditure had an impact in the financial performance of banks. Mwaniki (2014) established that financial literacy programs had positive impact on financial performance of self-help groups. The finding was in line with the finding of this study.
The study determined that 66.6% of the respondents believe that customers are saving more due to better knowledge of financial choices while 10% of the respondent disagreed with the statement. The data indicates that majority believe that financial literacy levels have improved hence the better choices made by customers.

The study found that 63.3% of the respondents agree that increase in literacy levels has increased the number of people seeking formal banking services. Furthermore, 36.7% of the respondents strongly believe that increase in literacy has led to growth in the formal banking. It is an indication that knowledge of financial choices and existence of formal financial institution has led to an increase in number of people seeking the services. The above factors are indicators of the fact that financial literacy programs elements have an effect in the nature of operation of banks.

### Table 4.12: Results of Effects of Financial Literacy Programs

<table>
<thead>
<tr>
<th>Effects of Financial Literacy programs on Financial Performance</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial Literacy levels have improved over the past five years</td>
<td>Strongly Agree 33.3%</td>
</tr>
<tr>
<td>Customer understanding of risk aversion has led to more savings</td>
<td>6.7%</td>
</tr>
<tr>
<td>Customers are saving more due to better knowledge of financial choices</td>
<td>20%</td>
</tr>
<tr>
<td>Increase in literacy levels has increased the number of people seeking formal banking services</td>
<td>36.7%</td>
</tr>
</tbody>
</table>

### 4.8.2 Results of Use of Agents and Representatives

The data above collected from the respondents sought to determine the effect of agents and representatives on the financial performance of banks. The data showed that 53.3% of the respondents agreed that increased number of account holders have led to increased revenue for the bank. Up to 40% of the respondents neither agreed nor disagreed with the statement maybe because they could not categorically state the effect of increased number of account holders.

The finding above determined that 83.3% of the respondents agree that account-opening representatives have increased the number of customers for the bank. It is an indication that opening of new accounts has an impact on increase in the number of customers. The study posed the question of whether customer service agents have led to reduction in customer service costs, 50% strongly agreed, and 33.3% agreed with the statement. Further, five percent of the respondents neither agreed nor disagreed. It is an indication that agents have made it easy for the banks to cut on costs in terms of time and money.

The research sought to determine whether customer service agents have increased the number of customers served annually. The data above indicates that 50% strongly agreed that agents had increased the number of customers served each year. The same percentage agreed with the statement. The increase in the number of customers served annually has an impact on the performance of the bank.

The findings above are in line with the outcome of Belita (2013) which stated that there is positive relationship between the increase in the number of banking agents and the financial performance of banks. The study was also in line with Monica (2015) who established that increase in the number of agents of commercial banks leads to an increased financial performance, meaning that there is a positive correlation between the agent outlets and financial performance of banks.

### Table 4.13: Agents and Representatives

<table>
<thead>
<tr>
<th>Effects of Use of Agents and Representatives on Financial Performance of Banks</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Agree</td>
<td>Agree</td>
</tr>
<tr>
<td>Customer service agents</td>
<td>50%</td>
</tr>
</tbody>
</table>
have increased the number of customers served annually. Customer service agents have led to reduction in customer service costs  

| Percentage | 50% | 33.3% | 0% | 0% | 5% |

Account Opening Representatives have increased the number of customers for the bank  

| Percentage | 6.7% | 83.3% | 0% | 3.3% | 6.7% |

Increased number of account holders have led to increased revenue for the bank  

| Percentage | 3.3% | 53.3% | 0% | 3.3% | 40% |

### 4.8.3 Results of Proliferation of ATMs and Mobile Services

The paper sought to determine the effect of increased proliferation of Mobile Banking Services and ATMs on financial performance of banks. The respondents gave their views on whether mobile banking services have led to better financial penetration and 56.7% agreed with the statement while 40% of strongly agreed with the statement. 3.3% of the respondents gave a contrary opinion. It means that banks have gained better financial penetration due to the use of ATMs and mobile banking services.

An interesting aspect of the study was whether the cost of banking reduced through mobile banking services. The above data indicates that 30% of the respondents believe that the cost has not reduced due to use of ATMs and mobile banking services. However, 56.7% of the respondents believe that cost reduced due to use of ATMs and mobile banking services.

Further, 63.6% of the respondents indicated that financial performances of banks have improved due to increased mobile banking services. Only 16.7% of the respondents disagreed with the statement and believed otherwise. The financial performance of the banks in relation to the use of mobile banking and ATMs appears to be an important part of banks. However, the research showed that the aspect of mobile banking has led to reduction in the use of ATMs with 80% of the respondents stating that ATMs are losing to mobile banking in terms of popularity.

This study was in line with the findings of Asia (2015) who established that electronic banking methods such as Pay Direct, electronic check conversion, e-transact, use of ATM and mobile banking had positive impact on the performance of banks. The study contradicted Jegede (2014) and agreed with Munyoki (2013) who established that mobile banking and ATMs have a positive effect on the performance of banks.
Table 4.14: Proliferation of ATMs and Mobile Services

<table>
<thead>
<tr>
<th>Effect of Increased Proliferation of ATMs and Mobile Banking Services</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly Agree</td>
</tr>
<tr>
<td>Mobile banking services have led to better financial penetration</td>
<td>40%</td>
</tr>
<tr>
<td>The Cost of Banking has been reduced through mobile banking services</td>
<td>3.3%</td>
</tr>
<tr>
<td>Financial performance of banks have improved due to increased mobile banking services</td>
<td>0%</td>
</tr>
<tr>
<td>Mobile banking services have reduced the need for ATMs in most places</td>
<td>16.7%</td>
</tr>
</tbody>
</table>

4.8.4 Results of Bank Branch Spread

The study sought to determine the effect of bank branch spread on financial performance of banks. The study posed questions to the respondents and their responses summarized above. From the data, 77.3% agree that the number of banks branches positively influences financial performance of the bank. 3.3% of the respondents had contrary opinion.

The assumption that volume of transactions in the bank changes with the changes in the number of branches was set as a statement and the response indicated that 63.3% agree with the statement while 26.7% neither agree nor disagree. The outcome above is an indicator that changes in branch may not necessarily influence the volume of transactions. The explanation for the outcome is that the study did not find any significant correlation between the two variables.

Compared to the number of people who disagreed that mobile banking has reduced cost of service provision, 4.6% of the respondents disagree that the cost associated with management of branches are influenced by the spread of branch across the country. Significantly, only 46.7% agree and 3.3% strongly agreed with the statement.

The study also sought to determine whether the number of customers served has increased due to bank branch spread and 96.7% of the respondents agreed with the statement. It means that bank branch spread has a significant impact on the number of customers served by the banks, as it has been determined in the correlation of variables above.

The study was in agreement with the outcome of Musyoka (2011) who established that there is a positive relationship between branch network and financial performance of banks. Chelangat and Muturi (2016) had findings similar to this study where they established that the number of branches and their geographical spread had an impact on the revenues and cost. The contradiction arises when it comes to the findings of Hirtle (2007) where it was established that there is no relationship between size of the network and the overall profit of the bank.

Table 4.15: Bank Branch Spread

<table>
<thead>
<tr>
<th>Effect of Bank Branch Spread on Financial Performance</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly Agree</td>
</tr>
<tr>
<td>The number of banks branches positively influences financial performance of the bank</td>
<td>23.3%</td>
</tr>
<tr>
<td>The volume of transactions in the bank changes with the changes in the number of branches</td>
<td>3.3%</td>
</tr>
</tbody>
</table>

http://dx.doi.org/10.29322/IJSRP.8.5.2018.p7779
5. **Summary, Conclusions and Recommendations**

5.1 **Summary of the Study**

This section provides the summary of the findings of the study. The summary of the findings follows the objectives of the study, which includes financial literacy programs, the use of agents and representatives, the proliferation of ATMs and Mobile Banking Services, and bank branch spread.

5.1.1 **Financial Literacy Programs**

Majority of the respondents are of the opinion that financial literacy programs elements such as customer knowledge of risk aversion, customer savings, and the increased literacy levels have a positive impact on the financial performance of banks. The respondents argued that the growth in financial literacy programs has enhanced the financial knowledge of the customers’ hence positive performance of the banks.

The results above is in line with Kumunduu *et al.* (2016) who concluded that high level of financial literacy within the population leads to greater financial performance of medium scale enterprises. The results of the study indicated a strong and positive relationship between financial performance and financial literacy levels. Many of the respondents indicated that financial literacy levels have improved over the past five years, which has subsequently increased the number of people seeking formal financial services. Subsequently it leads to better financial performance of the banks.

5.1.2 **Use of Agents and Representatives**

In the study majority of the respondents, believe that customer service agents have increased the number of customers served annually with 50% agreeing and another 50% strongly agreeing. The study determined that number of agents explains 87.3% of Return on Equity. The finding is in line with Waihenya (2012) who revealed that agency banking has a significant and positive effect on the ROE of Kenyan Banks.

It was also evident from the study that costs of services have reduced due to agency banking as 50% of the respondents strongly agreed with the statement while 33.3% agreed over the same. It is in line with the findings of Monica (2015) who indicated that elements of agency banking have cut on the cost of services for the customers and the banks as well. The other elements studied include the effect of account opening agents on the financial performance of banks. It was determined that 53% of the respondents agree that accounts opening agents have improved the performance of banks (Supported by Monica, 2015).

5.1.3 **Proliferation of ATMs and Mobile Banking Services**

The study sought to determine the effect of proliferation of ATMs and Mobile on the financial performance of banks. Majority of the respondents believe that mobile banking services have led to better financial penetration whereby 56.7% agreed and 40% strongly agreed with the statement. The outcome is in line with Monyoncho (2015) in her study where it revealed that companies have changed the ATMs from cash dispensers into relationship management control and has helped to enhance loyalty among customers.

The study also revealed that cost of banking reduced extensively through adoption of mobile banking and ATMs services. Monyoncho (2010) stated that mobile banking is likely to have a big impact on the profitability of commercial banks as the operations become smoother and mobile internet banking becomes part of the conducting business. In this study, the 63.3% of the respondents agree that financial performance of banks have improved due to increased mobile banking services.

5.1.4 **Bank Branches Spread**

The study determined that there is no significant relationship between bank branch spread and financial performance of banks. However, it is contrary to the outcome of Nyatika (2017) that established a positive and significant relationship between bank spread...
and financial performance. This study established that bank branch has no significant effect on the return on asset of the company, which is in line with the findings of Nyatika (2017) that return on asset is not subject to bank branch spread.

The respondent believe that the number of bank branches have a positive impact on the financial performance of bank, with the numbers standing at 77.3% of the total respondents. It is in line with the findings of Musyoka (2011) who determined that there is positive relationship between bank branch network and financial performance. The study also determined that 46.7% of the respondents believe that the spread of branches across the country influences the cost associated with the management of the branch.

5.2 Conclusion of the Study
This section of the paper provides the conclusions drawn from the study. The conclusion of the study focuses on the objectives of the study, which include financial literacy programs, use of agents and representatives, proliferation of mobile banking services and ATMs and bank branches spread.

5.2.1 Financial Literacy Programs
Financial literacy programs significantly influence the performance of banks listed in the Nairobi’s security exchange. Most of the respondents agreed with the fact that financial literacy programs have led to better financial knowledge that has led to better financial outcome for the banks.

Some of the most important factors under the financial literacy programs included improvement of the financial literacy levels, better understanding of risk aversion by the customers, and better saving by the customers due to better financial knowledge. In conclusion, the respondents provided that better financial inclusion has led to more people seeking formal banking services.

5.2.2 Use of Agents and Representatives
The use of agents and representatives was determined to have a strong positive impact on the returns on equity of the banks. It means that the more the agents, the better the performance of the bank in terms of returns on equity. It was determined that the customer agents have increased the number of customers served each year. At the same time, the study established that customer service agents have led to reduction of the costs associated with services offered to the customers. The impact of the account-opening representative was also determined whereby it was determined that they have an impact on the number of customers served by the banks. The increase in the number of accounts holders mean better financial outcome for the banks.

5.2.3 Proliferation of ATMs and Mobile Banking Services
The study sought to determine the impact of ATMs and mobile banking services on financial performance of banks. It was determined that mobile banking services have increased the level of financial penetration by banks. At the same time majority of the respondents determined that, the cost of banking services have reduced due to mobile banking services and the use of ATMs. The respondents also observed that financial performance of banks have improved due to increased mobile banking services. Interestingly, the study determined that the growth in mobile banking services has reduced the importance of ATMs within the banking environment.

5.2.4 Bank Branches Spread
The study was concerned with the effect of bank branches spread on financial performance. It was determined that bank branch spread has a significant effect on the ROE. It means that bank branch spread is a determinant of the financial performance of banks with regard to the returns on equity. The areas of concern included the number of bank branches and the positive impact it has on the financial performance. The study also determined that the volume of transaction of the bank changes with the number of branches held by the bank. Generally, the study found out that the number of customers served annually has increased due to bank branch spread.

5.3 Recommendations for Banks and Government Policy Makers
5.3.1 Policy Makers in Banking Institutions
The study established that to some extent, financial literacy programs have a positive impact on the financial performance of banks. The study recommended that policy makers of the banking financial institutions should continue to invest in financial literacy programs through arrangement of workshops and seminars in which potential customers learn different aspects of financial management. It has been determined that the use of agents and representatives have an impact on the financial performance of banks. It means that financial institutions of the same nature as banks should also be encouraged to come up with policies that aim towards increasing the number of agents. Such policies open up the banks to new clients and new sources of revenues. The use of ATMs has gone down due to increase in the number of customers using the element of mobile banking. Banking policy makers should emphasize on the creation of more internet and mobile-based platforms while cutting down on the number of ATMs around the
country. Even though ATMs have a positive effect on financial inclusion, they tend to play almost the same role as the mobile banking element.

5.3.2 Government Policy Makers
The government of Kenya in the year 2010 allowed banks to use creative methods to gain access to customers in marginalized areas in terms of financial access. Over the past seven years, the debate has been on whether the financial inclusion measures established by banks have been effective in opening up most parts of the country to financial services. This research established that financial inclusion elements are critical in making access to financial services better. Therefore, government policy makers, especially at the Central Bank should encourage banks to continue using aspects of financial inclusion in expanding their businesses across the country due to its effectiveness.

5.4 Areas for Further Research
Research on effects of financial inclusion on the financial performance of banks is at its developmental stage. Most of the studies have concentrated on single variables such as agency banking, ATMs and Mobile banking. This study has sought to fill the gap through studying financial inclusion as a whole, combining all the elements that are associated with it. Yet certain gaps still exist especially in terms of methodologies used to conduct similar study.

Based on the above factors, this study recommends further study of the same area in future with attention on different sub variable elements. This study has shown that the variables used explain a small part of financial performance; hence, more variables are applicable especially under Return on Assets and Net Interest Margin.

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Determinants of Procurement Performance in Public Entities in Kenya: A Case of Kenya School of Law

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ABSTRACT: The purpose of the study was to establish the determinants of performance of procurement in Kenya’s public entities. The objectives of the study were: to find out how inventory management influence performance of procurement in the public entities in Kenya; to investigate how supply chain forecasting influence performance procurement in the public entities in Kenya; to establish how Information Communication Technology (ICT) integration influence performance procurement in the public entities in Kenya and to examine how resources influence performance procurement in the public entities in Kenya. The study was conducted at Kenya School of Law which is public organization responsible for training Lawyers into advocated and the 86 respondents were used to provide necessary information concerning the research problem. The study adopted a descriptive research design. Questionnaires were the major instrument for collecting data. Both qualitative as well as quantitative data was collected and used in the analysis process in this study. The collected quantitative data was further analyzed for both descriptive and inferential statistics using SPSS. The findings of the study were presented using frequency tables as well as pie charts and even bar graphs. As shown by the R value of 0.890, the study found out that there is a strong and positive relationship existing between the independent variables and dependent variable. The determination coefficient (R²) which gives an explanation on the extent to which changes that can take place in the dependent variable can also be explained as a result of changes in the independent variables. In this case it was found to be 79.20% meaning that change in the four independent variables explains 79.20% of the procurement performance.

Key Words: Inventory management, supply chain forecasting, Information Communication Technology integration, resources, procurement performance

1. INTRODUCTION

Public procurement is increasingly becoming prominent across the globe as a key profession when it comes to public resources’ proper management. Many countries are aware of the vulnerability of this to corruption and mismanagement and thus they have come up with measures and policies that can integrate procurement into the government’s strategic efforts. Many countries have decided to employ plans of procurement as their way of solving problems as an effort of adopting a long-run strategic view of the needs of procurement and management. Public procurement is in charge of a wide range of activities, which include the fiduciary obligation of delivering goods and services to the public (Uyarra, 2009). Additionally, the public procurement has been critical in helping the governments to achieve socio-economic objectives like the stimulation of the economic activities, shielding the local industry from international competition, advancing the competency of some sectors in the industry and helping in the removal of the national disparities (Bolton, 2006).

Procurement is the means of getting goods, services and labor through a process of purchase, renting, hire purchase, franchise, license tenancy or by singing of a contract that involves any kind of work, services, asset or even goods that include the livestock or any other combination (PPDA, 2005). It is a vital section of the management of an organization, which ensures that goods and services necessary for the running of the organization are readily provided at the right time and in right quantities and at a reasonable price for the best quality available (WHO, 2007).

Public procurement (PP) as a government function includes the making of decisions concerning the kind of services that will be made available to the local authorities and to communities served (Hughes, 2005). Additionally, the function helps in the implementation of the national policies and in achieving of the social objectives of the government (Thai, 2004). Both national and international instruments give focus towards the creation of an effective and efficient system of procurement. In light of this concern, some procurement procedures like the implementation of the secondary policies, the reviewing of mechanisms that are used to address
complaints, electronic procurement and rules that govern projects that are financed privately have been accorded an in-depth evaluation (De Castro, 2006).

The reformation of the public procurement in Kenya was jointly initiated in the year 1997 by the World Bank and the Kenyan Government. The government made a decision of reviewing the existing system of procurement with the aim of advancing its efficiency, accountabilty, economy and transparency. The review led to the formation of the 2005 Act, PPDA (Public Procurement Disposal Act) (PPDA, 2005). The PPDA 2005 creates the procedures that ensure an effective and efficient process of public procurement and in the disposal of the obsolete and unserviceable, assets, stores and equipment by the public institutions. Section 29 of the Act gives specifications of open tendering in every procurement process as stated in sections 51, 52, 53, 54 and 55. This is done in an effort to establish a transparent and accountable system of procurement. The use of different procedures in the process of procurement is permittable under part V of the act.

Further, section 34(1) of the procurement Act notes “that the entity that is procuring shall come up with specific requirements in regard to the goods, services or works to be procured that are clear, giving a correct as well as complete description of what is supposed to be procured and which provides room for open and fair competition to those who wish to be part of the proceedings of procurement.” From this section, it can be determined that the act is meant to enhance fairness and a fair competition in the procurement system (PPDA, 2005).

Section 52(2) of the Act gives a recommendation, which states that the tender papers should have all the necessary information to warrant a fair competition among the interested parties that are bidding for the tender. Section 54(1) of the Act supports transparency in the system of procuring by requiring the advertisement of the tenders as a way of inviting the attention of all interested parties and any person or institution that may wish to submit a tender bid. The flexibility in the valuing of the consulting services is demonstrated in Section 81(c) where the proposal requests are required to include the financial proposals. Further, Section 82(3) and Section 84(1) gives a clear support to the idea of price flexibility. Therefore, the PPDA 2005 is meant to guide the public procurement system and help establish transparency, fairness and accountability, which are essential towards ensuring the value of money is gained by the public institutions. Further, the Act specifies possible offences in case of a contravention of the provided procedures and policies for corruption purposes or create a favor to a certain individual (PPDA, 2005). The Act has been made as a guide to most procurement system in the country with most public institutions having a challenge in the process of procurement. Many public Universities have been necessitated by the Act to establish a workable and efficient procurement system that is in line with the Kenyan Procurement Act of 2005. This Act requires all the purchase made by the public institutions to undergo an elaborate procurement procedure, which needs a minimum of three quotations from three different suppliers (PPOA, 2005).

Cap 446 of the State Corporation Act is a parliament Act that creates room for the establishment of public Entities. In the Act, State Corporation is defined as a body that is established under the parliament Act. The president may or by order establish a state corporation and each of them shall have power necessary for performance of functions (State Corporation Act Cap 446). The government of Kenya forms corporations under the state management so as to work towards the realization of the country’s commercial as well as social goals. These corporations play the essential role in regard to correcting failure in the market, exploitation of both social and even political objectives, education provision, health, income redistribution and ensuring that there is development in marginalized areas (Njiru, 2011).

For many developing countries, public sector still remains to be a necessary and an ongoing policy objective. This is done in Kenya in a way so as to overhaul the administrative systems so as to serve better the needs of the government as well as citizens using improved delivery of services of the public services and in the long run improve lives, reduce poverty, and providing sustainable good governance (Kempe, 2012). The government of Kenya committed to transform public service from process oriented, unnecessary bureaucratic practices, empowering speedy delivery of services by risk management and reviewing procurement management systems (Public Sector Reform and Institutional Capacity Building, 2005).

State corporations of Kenya are divided into eight broad categories using their mandate and functions as the basis of categorization. They consist of Commercial and Manufacturing Corporations, Financial Corporations, Regulatory Corporations, Training and Research Corporations, Public Universities, Service Corporations, Tertiary Education and Training Corporations as well as Regional Development Authorities (SCAC, 2004). The Kenya School of Law is the top most Legal Training institution in Kenya. It was founded in the year 1963 with 11 students being pioneers of the school that year. The school was located at Valley Road next to the University of Nairobi Dental School, on a 4-acre piece of land. It was using then the buildings meant to be for a maternity wing of the Nairobi Hospital. The institution was a part of the Attorney General’s Office up to 2001, after which it was accorded a semi-autonomous status to become a government agency. The government later purchased an ultramodern training facility at Karen to help make better the learning activities in the school. A commission of enquiry has been set up by both the pre and post-colonial governments to help address educational issues and to come up with proper policies to guide the sector. The policies that were formulated include the Denning Committee 1962, the Akiwimi
Committee 1995 to focus on the status and Management of the Kenya School of Law, Kwach Committee 1998, which was meant to look into the administration of justice in Kenya. The Akiwimi Report made recommendations that led to the establishment of the Council of Legal Education Act CAP 16A of the Kenya Laws.

The public institution in Kenya face a challenge posed by the procurement Act of Kenya, which requires that, all materials in public offices to be subjected to a procurement procedure that should have a minimum of three quotations for every item raised by different suppliers (PPOA, 2005). The procurement Act of 2005 is meant to optimize economy and efficiency in the tendering process as it also promotes competition and a fair and equal treatment of the competitors. These measures ensure transparency and accountability in the procurement process as well as promoting the local industry. Despite the goal of the Act being to make the procurement process efficient and ensure equality among competitors, it is a tedious process that takes much to complete. This delays the process and makes it unsuitable for emergency cases (RoK, 2012).

Well procurement is a vital process in ensuring an efficient performance of the organization. The establishment of the 2015 procurement Act as well as its implementation and even the subsequent guidelines has encountered challenges in the public organization in Kenya because of lack of goodwill in the implementation processes (Mongare, 2012). Mburu & Jeru (2014) note that most of the procurement activities are subject to neglect, lack of good will, improper coordination by the management, bureaucracy and a lack of open tendering. From the information found at the Kenya School of Law (KSL) concerning the tendering process, 75% to 85% of the procurement process does not meet the standards and procedures set by the public procurement and disposal act. Statistics shows that the crisis that is related to management of stores brings hindrance to effective management of the public tendering that ends up in misusing the government tax payee’s money. This shows that inefficiency poor performance of staff in procurement, lack of good skills in advertising tenders, inefficiency, competition, integrity, lack of transparent, public confidence and conclusive investment environment for the staffs in procurement department has led to the mismanagement of the government taxpayers.

Local studies have been conducted on the same. Some of them include studies like Otieno (2004) that focused on procurement of public institutions and Akech (2005) that focused on governance of public procurement and the development partners in Kenya. Others include Ombaka (2009) did a research on the management of the procurement of medicine in the countries that are developing and Kiawa (2012) that carried out a study on the accountability of the procurement process in the public sector in accordance to the state Law Office. The aim of this study therefore, is to establish the existing factors that affect the efficiency of the procurement performance in the institution; Kenya School of Law.

The study’s purpose was to establish the determinants of performance of procurement in the public entities in Kenya. Specific objectives that guided the study were: to find out how inventory management influence performance of procurement in the public entities in Kenya; to investigate how supply chain forecasting influence performance procurement in the public entities in Kenya; to establish how Information Communication Technology (ICT) integration influence performance procurement in the public entities in Kenya and to examine how resources influence performance procurement in the public entities in Kenya.

2. LITERATURE REVIEW

2.1 Empirical Literature

Onkundi and Bichanaga (2016) sought to establish factors that influence management of inventory management in Kisii County but focusing on health hospitals of the public. The study’s objectives were: to find out how performance of inventory management in the public health sector is influenced by stock replenishment; to establish how the public health sector’s effective inventory management performance is influenced by sharing of information; to find out how the public health sector’s inventory management performance is influenced by costs of inventor as well as establishing how the public health sector’s inventory management performance is influenced by variability in demand. The outcome of the study was that the inventory under stocking and overstocking in Kisii County’s public health sector was as a result of insufficient staff, inadequate requirements for forecasting, receiving scheduled time, deliveries scheduled time, issuing and storage facilities that were unorganized and demand variability. These affected effective management of the inventory.

This study therefore has sought to examine the influence of inventory management on the energy sector performance in Kenya with a special focus on Kenya Power Limited. The study also intended to establish the influence of process auditing on the performance of Kenya Power Limited. It was found out that inventory control influences Kenya Power performance especially the lack of process auditing. The recommendation of the study is that organization should enhance process auditing in the inventory control to enhance efficiency in service delivery. Another study by Onchoke and Wanyoike (2016) to establish the Influence of inventory control practices on procurement performance in Nakuru Central Sub County but the focus being on distributors of Agrochemicals. It was found out that auditing of the inventory and Computerized Inventory Control systems have a positive and significant influence on the performance of procurement.
Other findings were presented by Boyle et al. (2008) from the electronics industry. In this study original equipment manufacturers were not able to make predictions on demand of a period exceeding 4 weeks. Moon et al. (2000) also presented the forecasting of demand from Lucent and this demonstrated an improvement in accuracy of about 60% to 80-85% in forecasting. Datta (2008) also gave related observations that resulted in the markdowns of inventory. According to Zhao et al. (2002) as well as Bayraktar et al. (2008) and Wright & Yuan (2008), there is an improvement in the performance of supply chain if advanced tools of forecasting are used as evidenced by the past and recent research provided that some other factors are kept constant and optimized such as inventory collaboration and ordering policies. It has been discovered that in inventory forecast of macroeconomic nature, autoregressive models are effective (Albertson & Ayle, 2003). More emphases is also given by Zhao et al. (2002) and Bayraktar et al. (2008). In these studies it is emphasized that the primary role of supply chain forecasting is to show the actors the right direction but not being exact at that very moment. According to Chatfield & Yar (2008), selection of a correct method of forecasting is sometimes a very complex issue.

In Kenya, the effective procurement concept has only attracted the attention of the organizations in private sector. In parastatals of the government, no significant measures which have been taken so as to enhance the implementation procurement practices in an effective manner (Patrick 2008). Matunga, Nyanamba and Okibo (2013) carried out a study on the influence of e-procurement on the efficient of public hospitals procurement. It was evident that d that Kisii Level 5 hospital employs e-quotations, e-tendering and e-sourcing as the major e-procurement applications. The greatest challenges encountered while using e-market provider include inadequate funding, inability of the organization to carry out change management and lacking of good training of employees on the use of the system.

Many studies have done in Kenya by many researchers to determine factors that influence procurement in various organizations. For example Chilikona and Muturi (2015) determined to evaluate the factors that influence procurement function performance but in Kisumu County but focusing on technical institutions of the public. Questionnaires were used in collecting primary data and later using descriptive and inferential statistics in its analysis. It was concluded from the study that staff competency, ethics and information technology positively affected procurement performance in these technical institutions of training. Even though that is the case, this study will focus on procurement performance in an organization but will not examine technology itself.

Mahmood (2010) in Bangladesh, studied Public procurement and corruption. The study focussed on opportunities and challenges facing public procurement. The study states that it has been greatly recognized that it is one of the professions that is said to have played a very significant role in the success of managing of public resources. For this reason a good number of countries have been made aware of the importance of procurement being an area that is very vulnerable to corruption and mismanagement. Efforts have therefore been made so as to integrate the procurement function into strategic view of government efforts while planning. Governments have therefore started to use their respective annual procurement plans to solve problems that may arise. In public procurement process, accountability is the central pillar. There is danger of corruption and misuse of funds in case there is no accountability.

A study by Davis (2014) established that not always should allocations emphasizes be on the function of financial aspects in regard to procurement performance. More specifically, perceptions of the viability of influencing management of procurement are supposed to play a significant role in shaping the extent to which rules and regulations are being acted upon since socially responsible methods are sometimes perceived to be more expensive as compared to other methods. Many a times organizations face budget constraints as well as countervailing objectives. For this reason, perceptions about the cost-effectiveness as a result of better management are supposed to play a specific significant role. Public organizations are therefore to pursue the allocation of resources in sectors taken to be of urgency and of greater benefits.

According to Smee (2012), governments of many developing countries suffer from financial and technical capacity inadequacy so as to carry out their oversight and control functions effectively as well as tracking and reporting of the allocations made together with the disbursement of financial resources and their use. It is possible that political and bureaucratic leakage, together with fraud, corruption and abuse practices can take place at all stages of the process due to poor management of expenditure systems, organizational deficiencies ineffective supervision and auditing as well as ineffective fiscal controls regarding the flow of public funds (Peters, et al., 2010).

2.2 Critique of Existing Literature
One main and standard critique regarding the institutional theory is that is very static despite the fact that the world of politics which it explains is very dynamic. It is possible that this critique may at times be exaggerated but the fact is that there must be an element of validity in it. Since institutional theories are variance theories, they better explain differences that exist among different types of institutions as compared to explaining the development that may exist in an individual institution (Peters, 2010).

The inherently static nature critique many a times is applicable when using empirical approach based on the fact that it is the epitome of Mohr’s “variance” theory in regard to organizations. The question that can be asked is whether the existence of different types of
structures results to any difference in regard to different decisions being made by the institutions. Even though that is the case, on the other part of the coin the focus is on individual institutions and how they develop their internal and common appropriateness as given weight by March and Olsen (2011). The concern is therefore more on institutional development rather than on fundamental changes.

Quayle (2006) asserts that the said sub-functions should not be held in isolation from each another. For instance it might lead to an increase in efficiency because of the practice of specialization in allocating either expediting issues or strategic ones so as to bring a separation between persons. Even doing the operational work can also result to selection of more reliable suppliers. For the same reason of making better decisions, it is obvious that the purchasing of strategic matters as well as sales operations are being controlled one and same person. It facilitates smooth flow of the information in the entire organization.

Outsourcing business activities that are of different units and belonging to a given company are usually handled by one central function (Gadde et al., 2007). SCOR has been proven with a good number of clients to have been shared both best as well as worst practices with. Given the higher adoption, your odds of being able to actually do some meaningful benchmarking once you’ve rolled out the process model are much better. SCOR has been criticized for its inability to support the entire scope of the value chain but quite honestly, to a single company who has been able to roll out a process model that spans from product design to service and still maintains a level of detail that’s actually usable (Kanji et al., 2010).

Formalization of the institution expresses the level to which the instructions, patterns of communication, procedures, etc are kept in the company and how they are being followed. According to Wood (2005), it is just the existence as well as prevalence of the written documentation. These two attributes are mostly chosen purposely for adjustment because of the reasons that they are easily applicable and even involving the two structures of an organization be it formal or informal. Governments should hence decentralize their functions. Organizations that offer professional services need to be formalized as they deal with complex procedures. This formalization has to be designed in a way so as to realize the desired outcome from the members and as a result professionals are able to share authority in decision making. It is therefore suitable for the setting of universities and hospitals (Wood, 2005).

2.3 Research Gaps

Many researches have been done both locally and internationally with an aim to determine the factors affecting outsourcing in public sector (Odhiambo, 2013; Chiang, Hillmer & Suresh, 2012). Many of them have concentrated on strategic sourcing but it is only a few that deals with the influence on organizational performance. A study by Odhiambo (2013) focusing on strategic sources of sourcing and factors that influence practices of strategic sourcing of multinational corporations in the manufacturing industry in Kenya. It was found out that the strategic practices of sourcing that are more outstanding include internal integration, strategic purchasing as well as information sharing. Nyagari et al. (2014) have considered the relationship that exists between strategic sourcing and the triple bottom line in Kenya’s commercial banks.

Chiang et al. (2012) did a study on the effect of strategic sourcing and flexibility on supply chain agility of firms. Findings were that the supplier evaluation, strategic supplier partnership, sourcing flexibility as well as sense of trust in members of supply chain are very key on matters of strategic sourcing. These studies show that research that has been done on key drivers that influence the implementation of procurement sources of outsourcing practices in Kenyan government parastatals. Unavailability of reliable as well as valid data remains to be one of the major obstacles as far as the understanding of the procurement performance determinants in Kenya’s public entities is concerned. This study therefore strives to build on the locally available data though scarce. A number of studies tend to identify performance of procurement that may impact an organization’s performance even though they are not empirically tested (Kanji et al., 2010; March & Olsen, 2011). Such studies also do not provide a complete as well as coherent cause of the problems associated with traditional procurement and even the potential benefits as well as the facilitators of performance in procurement in the public sector. This study therefore intends to fill this gap by investigating the procurement performance determinants in Kenya’s public entities. The study will provide a far richer and deeper data set even though it builds on factors that have already been identified by other studies.

3. RESEARCH METHODOLOGY

A descriptive research design was used in this study to establish the determinants of procurement performance in the public entities in Kenya. Studies of this research design are designed in such a way so as to obtain necessary and precise information regarding the current state of the phenomena and where possible be able to draw valid conclusion based on the discovered facts. The design also attempts to give a deeper and clear description of various opinions, views attitudes and preferences of the researcher. In addition to this it aims to obtain information from a representative of the population and the researcher is able to present the outcome of the study and the entire population even though information of the representatives was used (Kothari & Garg, 2014). It is on this premise; the descriptive survey used it to provide the current study with appropriate procedure for examining determinants of procurement performance in the public entities in Kenya.

The target population in this study was 86 employees; the study targeted each division that was involved in the process of procurement at the Kenya School of Law. The study selected five categories that resulted in dividing the target population into five
categories, these categories are classified as Human resource & Administration, Finance & control, legal, procurement and Audit divisions. The target population is as illustrated in Table 3.1.

### Table 3.1: Target Population

<table>
<thead>
<tr>
<th>Division</th>
<th>Population</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human resource &amp; Administration,</td>
<td>28</td>
<td>37.74%</td>
</tr>
<tr>
<td>Finance &amp; control</td>
<td>20</td>
<td>26.42%</td>
</tr>
<tr>
<td>Legal</td>
<td>8</td>
<td>7.55%</td>
</tr>
<tr>
<td>Procurement</td>
<td>16</td>
<td>15.09%</td>
</tr>
<tr>
<td>Audit</td>
<td>10</td>
<td>9.43%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>86</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

**Source: Kenya School of Law (2018)**

In the study, the sampling frame was drawn from the list of the employees in the human and administration, finance and control, legal and audit departments which consists of 86 employees as per the payroll personnel data in the Human Resource department. The study adopted a census to collect primary data. It is recommended that a census survey is used when the population (106) is small that is less than 200 and manageable to collect information for the study (Yin, 2013).

Questionnaires were used to collect primary data from the respondents that were involved as research tools (Kothari, 2005). According to Young (2009), questionnaires are appropriate because they collect information that cannot be observed directly since they inquire about motivations, feelings, attitudes, as well as accomplishments and individual experiences. Questionnaires also have added advantage as they are less costly and not time consuming. Semi-structured questionnaires were used and this type of a questionnaire was administered using the method of drop and pick-later to the sample of a population. This study used primary data which was later compared with secondary data which was available. The respondents were assured that their information was to be treated with confidentiality but only used for study purposes and therefore questionnaires were formulated on the same declaration. The permission was asked to collect data from the target population by attaching an introductory letter on each questionnaire. Introductory letter was therefore sought from the university before proceeding to the field indicating that the researcher is just a student who needs that permission to collect data only for academic purposes. A permit was also sought from the National Council of Science and Technology. Approval from the organization was given and the data collection was given a go ahead. Pilot study was done which involved questionnaire pre testing on 8 respondents. This is supported by (Neumann, 2006) who asserts that a proportion of 10% of the population be used in pilot testing. According to Cooper & Schindler (2008) no statistical conditions are needed therefore there was convinine in selecting responents in pilot study.

Validity is the extent to which the test item sample represents the content that it is designed to measure. Validity of the instruments was assured through use of simple language not contaminated with jargon that made it very easy to the respondents to understand. The supervisor and other experts were also engaged in giving advice on whether the questions to be asked will real contribute positively to what was supposed to be measured. Content validity was adopted by the researcher. In most cases a CVI of 0.78 is recommended for the research instruments (Lefort & Urzua, 2008) and the study was based on that threshold.

According to Yin (2013), Cronbach alpha refers to the basic formula used to determine reliability but based on internal consistency. By inclusion of many similar items on a measure, reliability is increased and this was done through testing of many individual samples using uniform procedures. Reliability of the instruments was tested through relying on internal consistency techniques using Cronbach’s Alpha. The study was based at a threshold of 0.7 which falls within the range of between 0.6-0.7.

The study collected both qualitative and quantitative data and analysis was done using both qualitative and quantitative methods with the aid of (SPSS) version. The qualitative data was analyzed by the use of content analysis which helped the study in giving recommendation in line with the conclusions drawn for the whole population under study. Quantitative analysis gave rise to quantitative reports through measures of central tendency, percentages and tabulations. Statistical techniques like pie charts, bar charts, percentages as well as frequency counts were used to quantitative data. On the other hand qualitative data was analyzed using content analysis and presented descriptively. Correlation analysis as well as multiple regression analysis was also employed by the study to show the degree of relationship that exists between the variables. The model that was used is as follows:

\[
Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \epsilon,
\]

Where;

\(Y\) = Implementation of procurement outsourcing practices in state corporations (dependent variable); \(\beta_0\) = constant (coefficient of intercept);

\(X_1\) = Inventory Management

\(X_2\) = Supply chain forecasting
X3 = ICT integration
X4 = Resources
ε = Disturbance term; β1…β4 = regression coefficient of four variables.

4. RESEARCH FINDINGS AND DISCUSSIONS

4.1 Response Rate

In total the questionnaires that were given was 85 and were distributed to the targeted respondents of the identified respondents. Only 60 returned the questionnaires representing a response rate 72.73%. According to Mugenda (2012), a response rate of 50% is said to be adequate, that of 60% and above is said to be good but above 70% is said to be very good. The response rate of 72.73% found in this study is therefore quite adequate. This agreed with Orodho (2009) recommendation that a response rate of over 50% is sufficient.

Table 4.1: Showing Response Rate of Respondents

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual Response</td>
<td>64</td>
<td>72.73%</td>
</tr>
<tr>
<td>Non-Response</td>
<td>24</td>
<td>27.7%</td>
</tr>
<tr>
<td>Total</td>
<td>88</td>
<td>100%</td>
</tr>
</tbody>
</table>

4.2 Pilot Study

The computation of the Cronbach alpha was in terms of inter-correlations whose average was calculated among various items that measured the concepts. If the Cronbach alpha is closer to 1 then there is high reliability (Sekaran, 2008). A 0.7 value at the lowest is recommended. Cronbach’s alpha is the one that is commonly used to measure internal consistency and it is computed since Reliability was done through testing of both stability and consistency. Consistency show how well the items that measure the concepts are held together as a set. Since Cronbach’s alpha was employed to measure reliability, it was done on four main objectives of this study. The Cronbach’s alpha results range between 0.723 and 0.873 thus acceptable.

Table 4.2: Reliability Results

<table>
<thead>
<tr>
<th>Items</th>
<th>Alpha</th>
<th>Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Inventory Management</td>
<td>0.92</td>
<td></td>
</tr>
<tr>
<td>2. Supply chain Forecasting</td>
<td>0.87</td>
<td></td>
</tr>
<tr>
<td>3. ICT Integration</td>
<td>0.79</td>
<td></td>
</tr>
<tr>
<td>4. Resources</td>
<td>0.82</td>
<td></td>
</tr>
</tbody>
</table>

4.3 Demographic Information

The study determined to find the demographic characteristics of the sampled population. The analysis of the findings in Table 4.3 shows the distribution of the respondents of the study as per gender, age categories, duration of service and education level. The Table 4.2 shows that most of the respondents (83.1%) were male while female accounted for 16.9%. This shows that both male and female were represented in the study though male gender category was most mainly dominant. In addition, more than half of the respondents (51.4%) were within the age category of 31 to 40 years. This shows that most employees in the commercial state corporations were fairly young hence energetic to perform the tasks ahead. The findings show that most respondents had served in the service for 5-10 years and above 15 years as accounted by 31.7% and 30.4% respectively. Those who had served for Less than 5 years and 11-15 years accounted for 17.4% and 20.5% respectively. This shows that most respondents were well experience in the police service and therefore knowledgeable with the information sought in the study. The findings further show that most respondents’ had bachelor’s degree accounted by 63.6%. Respondents who had primary education were 4.4% while respondents who possessed Diploma certificates were 13.5%. This shows that most respondents joined the commercial state corporations after O’ level hence had professional training before joining the organizations. These findings generally show that the study gathered responses from diverse categories of the respondents within the commercial state corporations.

Table 4.3: Demographic Information

<table>
<thead>
<tr>
<th>Demographic Information</th>
<th>Categories</th>
<th>Frequency (n)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender of the Respondents</td>
<td>Male</td>
<td>50</td>
<td>83.1</td>
</tr>
</tbody>
</table>
4.4 Inventory Management

The study determined to assess the influence of inventory management on performance of the public entities in Kenya. The findings in this section are provided in regard to the statements that were posed concerning the responses that were given on a five-point likert scale, that is, Strongly Agree which was given 5; Agree which was given 4; Neutral which was given 3; Disagree which was given 2 and Strongly Disagree which was given 1. Table 4.4 gives the findings. The scores were given and those of ‘strongly disagree’ as well as those of ‘disagree’ represent a statement of not agreed upon which equivalent to an average score of between 0 and 2.5 is. The ‘Neutral’ score represents a statement that is moderately agreed and it is equivalent to an average score of between 2.6 to 3.4. Also the score of ‘agree’ as well as ‘strongly agree’ represent a statement of highly agreed which is equivalent to an average score of between 3.5 and 5.0. The findings are as given in Table 4.4.

As per the tabulation, most of the respondents were found to be neutral and the organization has ensured that there is tracking of inventory to enhance controlling, procuring of materials, coordination of materials accessibility, utilization and reduction of stock outs in the organization (3.2345); The original equipment manufacturer is used to predict demand beyond a 4 week horizon (3.4908); The forecasting accuracy demonstrate improvements and related observations results in inventory markdowns (3.6723); The organization has advanced forecasting tools that can enable improvements in cost reduction (3.5689). The forecasting tool accuracy tools synchronizes the demand and supply cycle than using the real time information (3.2248); The organization has adopted Just-in-Time system as the method used in inventory that is designed to ensure that there is minimization of inventory, and at the end of the day move it to the field to be used when exactly needed (3.5232). The findings of the study agree with those of Onkundi and Bichanaga (2016).

Table 4.4: Influence of Inventory Management on Procurement Performance

<table>
<thead>
<tr>
<th>Inventory Management</th>
<th>Mean</th>
<th>Std. Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>The organization has ensured that there is tracking of inventory to enhance controlling, procuring of materials, coordination of materials accessibility, utilization and reduction of stock outs in the organization</td>
<td>3.23</td>
<td>0.33</td>
</tr>
<tr>
<td>The original equipment manufacturer is used to predict demand beyond a 4 week horizon</td>
<td>3.49</td>
<td>0.14</td>
</tr>
<tr>
<td>The forecasting accuracy demonstrate improvements and related observations results in inventory markdowns</td>
<td>3.67</td>
<td>0.22</td>
</tr>
<tr>
<td>The organization has advanced forecasting tools that can enable improvements in cost reduction</td>
<td>3.56</td>
<td>0.23</td>
</tr>
</tbody>
</table>
4.5 Supply Chain Forecasting

The study determined to assess the influence of supply chain forecasting on procurement performance of the public entities in Kenya. Responses were given on a five-point likert scale, that is, Strongly Agree which was given 5; Agree which was given 4; Neutral which was given 3; Disagree which was given 2 and Strongly Disagree which was given 1. Table 4.5 gives the findings. The scores were given and those of ‘strongly disagree’ as well as those of ‘disagree’ represent a statement of not agreed upon which equivalent to an average score of between 0 and 2.5 is. The ‘Neutral’ score represents a statement that is moderately agreed and it is equivalent to an average score of between 2.6 to 3.4. Also the score of ‘agree’ as well as ‘strongly agree’ represent a statement of highly agreed which is equivalent to an average score of between 3.5 and 5.0. Findings are as given in Table 4.5.

As indicated by high levels of agreement in Table 4.5, a majority of respondents affirm that the they have the correct forecasting methods thus reduction of stock outs in the organization (mean of 3.2145 and Std of 1.2231) though the sentiments were very much contested as shown by a standard deviation above 1.0.; The original equipment manufacturer was used to predict demand beyond a 4 week horizon (mean of 3.6723 and Std of 1.6753) though the sentiments were very much contested as shown by a standard deviation above 1.0.

The forecasting accuracy demonstrate improvements and related observations results in inventory markdowns (mean of 3.3332 and Std of 1.0009) though the sentiments were very much contested as shown by a standard deviation above 1.0; The organization has advanced forecasting tools that can enable improvements in cost reduction (mean of 3.9003 and Std of 1.2373) though the sentiments were very much contested as shown by a standard deviation above 1.0. The organization has advanced forecasting tools that can enable improvements in cost reduction (mean of 3.6782 and Std of 1.3801) though the sentiments were very much contested as shown by a standard deviation above 1.0.

The forecasting tool accuracy tools synchronizes the demand and supply cycle than the using real time information (mean of 3.6782 and Std of 1.3801) though the sentiments were very much contested as shown by a standard deviation above 1.0.; To have years of demand data helps the organization to better have a prediction on the future demand thus timely purchases-stock out reduction (mean of 3.0091 and Std of 1.6732) though the sentiments were very much contested as shown by a standard deviation above 1.0.

The forecasting tool accuracy tools synchronizes the demand and supply cycle than the using real time information (mean of 3.6782 and Std of 1.3801) though the sentiments were very much contested as shown by a standard deviation above 1.0.; To have years of demand data helps the organization to better have a prediction on the future demand thus timely purchases-stock out reduction (mean of 3.0091 and Std of 1.6732) though the sentiments were very much contested as shown by a standard deviation above 1.0.

Table 4.5: Influence of Supply Chain Forecasting on Procurement Performance

<table>
<thead>
<tr>
<th>Supply Chain Forecasting</th>
<th>Mean</th>
<th>Std</th>
</tr>
</thead>
<tbody>
<tr>
<td>We have the correct forecasting methods thus reduction of stock outs in the organization</td>
<td>3.21</td>
<td>1.22</td>
</tr>
<tr>
<td>The original equipment manufacturer is used to predict demand beyond a 4 week horizon</td>
<td>3.67</td>
<td>1.67</td>
</tr>
<tr>
<td>The forecasting accuracy demonstrate improvements and related observations results in inventory markdowns</td>
<td>3.33</td>
<td>1.0009</td>
</tr>
<tr>
<td>The organization has advanced forecasting tools that can enable improvements in cost reduction</td>
<td>3.90</td>
<td>1.23</td>
</tr>
<tr>
<td>The forecasting tool accuracy tools synchronizes the demand and supply than using real time information</td>
<td>3.67</td>
<td>1.38</td>
</tr>
<tr>
<td>To have years of demand data helps the organization to better predict future demand thus timely purchases-stock out reduction</td>
<td>3.01</td>
<td>1.67</td>
</tr>
</tbody>
</table>

4.6 Information Communication and Technology Integration

This section presents findings to survey questions asked with a view to establish the influence of Information Communication Technology integration on procurement performance in public entities in Kenya. Responses were given on a five-point likert scale, that is, Strongly Agree which was given 5; Agree which was given 4; Neutral which was given 3; Disagree which was given 2 and Strongly Disagree which was given 1. Table 4.5 gives the findings. The scores were given and those of ‘strongly disagree’ as well as those of ‘disagree’ represent a statement of not agreed upon which equivalent to an average score of between 0 and 2.5 is. The ‘Neutral’ score represents a statement that is moderately agreed and it is equivalent to an average score of between 2.6 to 3.4. Also the score of ‘agree’ as well as ‘strongly agree’ represent a statement of highly agreed which is equivalent to an average score of between 3.5 and 5.0. Findings are as given in Table 4.6.

http://dx.doi.org/10.29322/IJSRP.8.5.2018.p7780
As indicated by high levels of agreement in Table 4.6, a majority of respondents affirm that the intranet and internet are highly reliable (mean of 3.3345 and Std of 1.7654) though the sentiments were very much contested as shown by a standard deviation above 1.0. The systems can accommodate and process massive data at once (mean of 3.4561 and Std of 1.5432) though the sentiments were very much contested as shown by a standard deviation above 1.0. The staff are well trained in the existing IT services provided (mean of 3.8923 and Std of 1.3245) though the sentiments were very much contested as shown by a standard deviation above 1.0. Additional investments should be made on existing infrastructure (mean of 3.0921 and Std of 1.2135) though the sentiments were very much contested as shown by a standard deviation above 1.0.

The existing IT infrastructure can lead to greater productivity (mean of 3.6542 and Std of 1.6324) though the sentiments were very much contested as shown by a standard deviation above 1.0. This is in tandem with Bedey (2012) who asserts that overall, enterprises employing organized procedures as well as resources and even ICT systems so as to consistently employ and even align all strategies of procurement in a consistent as well as integrated method that has outperformed peers in matters of cost savings, compliance, expenditure under management, supplier integration, and even greater contribution to value of the enterprise. Simms (2008) adds that most of the entities of the public lack clear accountability in regard to how the provided resources impact their performance thus going against the public procurement fundamental principles due to lack of adoption of information communication and technology.

<table>
<thead>
<tr>
<th>ICT Integration</th>
<th>Mean</th>
<th>Std</th>
</tr>
</thead>
<tbody>
<tr>
<td>The intranet and internet are highly reliable</td>
<td>3.33</td>
<td>1.76</td>
</tr>
<tr>
<td>The systems can accommodate and process massive data at once</td>
<td>3.45</td>
<td>1.54</td>
</tr>
<tr>
<td>The staff are well trained in the existing IT services provided</td>
<td>3.89</td>
<td>1.32</td>
</tr>
<tr>
<td>Additional investments should be made on existing ICT infrastructure</td>
<td>3.09</td>
<td>1.21</td>
</tr>
<tr>
<td>The existing IT infrastructure can lead to greater reduction of costs</td>
<td>3.65</td>
<td>1.63</td>
</tr>
</tbody>
</table>

### 4.7 Resources

This sub section of the chapter gives the findings to questions that were asked with a view to determine the influence of resources on procurement performance of the public entities in Kenya. The study sought to establish the extent to which respondents agreed with the statements relating to resources in procurement on performance of the organization. A scale of 1-5 was used on a five-point likert scale, that is, Strongly Agree which was given 5; Agree which was given 4; Neutral which was given 3; Disagree which was given 2 and Strongly Disagree which was given 1. Table 4.5 gives the findings. The scores were given and those of ‘strongly disagree’ as well as those of ‘disagree’ represent a statement of not agreed upon which equivalent to an average score of between 0 and 2.5 is. The ‘Neutral’ score represents a statement that is moderately agreed and it is equivalent to an average score of between 2.6 to 3.4. Also the score of ‘agree’ as well as ‘strongly agree’ represent a statement of highly agreed which is equivalent to an average score of between 3.5 and 5.0. The results were given in mean and standard deviation. The average was generated using SPSS version 22.

Further, as presented in Table 4.7, a majority of respondents highly agrees that human resources availability improves the performance level (4.093); and that information technology improve the performance (3.952). A majority however only moderately agrees that procurement plans are followed (3.359) while a majority further disagrees with the view that budget allocation is enough to carry out procurement for the year (2.319). From the foregoing, it can be deduced that human and technological resources are among the key resources influencing procurement performance in the public sector. The budget allocation is enough to carry out procurement for the year (3.995). The organization uses IT in our Procurement process (4.107). This is of the implication that considering these resources are not allocated in sufficient levels; efforts to address the same could prove beneficial in assuring procurement performance thereof.

Respondents were further asked to briefly provide their input on how resources allocation can be improved in the service. To this end, a range of measures were suggested common among which including the need to identify funding resources as well as technical ones so as to support the training of the staff training on how this type of contract is used; reviewing regulations of national procurement so...
as to ensure that any policy barriers that limit the use of this contract are not in existence; also strengthening the logistics management information systems, streamlining systems of distribution, identifying resources of financial to be used in procurement as well as supply chain operations, and at the same time necessitate forecasting and even procurement planning.

This is in tandem with Bedey (2012) who asserts that overall, enterprises employing organized procedures as well as resources and even ICT systems so as to consistently employ and even align all strategies of procurement in a consistent as well as integrated method that has outperformed peers in matters of cost savings, compliance, expenditure under management, supplier integration, and even greater contribution to value of the enterprise. Simms (2008) adds that most of the entities of the public lack clear accountability in regard to how the provided resources impact their performance thus going against the public procurement

Table 4.7: Influence of Resources on Procurement Performance

<table>
<thead>
<tr>
<th>Statement</th>
<th>Mean</th>
<th>Std.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the human resource in the procurement department adequate?</td>
<td>4.103</td>
<td>0.33</td>
</tr>
<tr>
<td>Are the finances allocated to NPS sufficient for the organization’s annual procurement requirement?</td>
<td>3.954</td>
<td>0.37</td>
</tr>
<tr>
<td>Technological resource is sufficient to influence procurement performance</td>
<td>4.016</td>
<td>0.44</td>
</tr>
<tr>
<td>Do the funds allocated by the government on areas of spend influence procurement performance?</td>
<td>3.997</td>
<td>0.65</td>
</tr>
<tr>
<td>Do budgetary allocations influence procurement performance</td>
<td>4.108</td>
<td>0.33</td>
</tr>
<tr>
<td>Is the human resource in the procurement department adequate?</td>
<td>3.959</td>
<td>0.37</td>
</tr>
<tr>
<td>Are the finances allocated to NPS sufficient for the organization’s annual procurement requirement?</td>
<td>2.01</td>
<td>0.45</td>
</tr>
<tr>
<td>Our organization uses IT in our Procurement process</td>
<td>3.00</td>
<td>0.66</td>
</tr>
<tr>
<td>There is enough human resource in our procurement Department</td>
<td>4.10</td>
<td>0.32</td>
</tr>
<tr>
<td>We follow annual procurement plans in our organization</td>
<td>3.95</td>
<td>0.36</td>
</tr>
<tr>
<td>Our budget allocation is enough to carry out procurement for the year</td>
<td>4.0</td>
<td>0.65</td>
</tr>
<tr>
<td>Our organization uses IT in our Procurement process</td>
<td>4.10</td>
<td>0.32</td>
</tr>
</tbody>
</table>

4.8 Procurement Performance of Public Entities

The study sought to examine the determinants of procurement performance of public entities, attributed to the influence of inventory management, supply chain forecasting, ICT integration and resources. The study sought to determine procurement performance in the public sector with reference to NPS, attributed to the influence of resources, inventory management, supply chain forecasting and ICT integration The study was particularly interested in three key indicators, namely Quality of goods purchased, Cost reduction and Timely Purchases-stock out reduction, with all the three studied over a 5 year period, running from 2013 to 2017. Table 4.8 below presents the findings.

Findings in Table 4.8 above reveal improved procurement performance across the 5 year period running from the year 2013 to 2017. Quality of goods purchased recorded positive growth with a majority affirming to less than 10% in 2011 (42.3%) and 2012 (37.7%), to 10% in 2013 (36.1%) then more than 10% in 2014 (41.1%) and 2015 (37.5%). A similar trend was recorded in Cost reduction, growing from less than 10% (44.1%) in 2011, to more than 10% in 2013 (36.4%), 2014 (40.4%) and 2015 (37.3%).

Timely Purchases-stock out reduction further recorded positive growth with a majority affirming to less than 10% in 2011 (37.9%) and 2012 (35.9%), to 10% in 2013 (35.9%) and 2014 (35.3%) then by more than 10% in 2015 (36.2%). It can be deduced from the findings that key procurement performance indicators have considerably improved as influenced by among other procurement management attributes, the influence of resources, government laws and regulations, procurement planning and contract management.
Quality of goods purchased and Timely Purchases-stock out reduction have particularly improved by at least 10 percent across most of the institutions pointing to the significance of supplier relations management in the supply chain process.

<table>
<thead>
<tr>
<th>Table 4.8: Procurement Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality of goods purchased</td>
</tr>
<tr>
<td>Increased by less than 10%</td>
</tr>
<tr>
<td>Increased by 10%</td>
</tr>
<tr>
<td>Increased by more than 10%</td>
</tr>
<tr>
<td><strong>Cost reduction</strong></td>
</tr>
<tr>
<td>Increased by less than 10%</td>
</tr>
<tr>
<td>Increased by 10%</td>
</tr>
<tr>
<td>Increased by more than 10%</td>
</tr>
<tr>
<td><strong>Timely Purchases-stock out reduction</strong></td>
</tr>
<tr>
<td>Increased by less than 10%</td>
</tr>
<tr>
<td>Increased by 10%</td>
</tr>
<tr>
<td>Increased by more than 10%</td>
</tr>
</tbody>
</table>

### 4.8 Multiple Regression Analysis

SPSS version 22 was used to compute the measurements so as to find the relationship that exist between independent variables and the dependent variable, that is procurement performance in Public Entities in Kenya. Multiple regression analysis explains variation in a dependent variable as the result of change in independent variables. This is assessed with the help of the coefficient of determination (R square) and if the coefficient is large, then the effect of the independent variable on the dependent variable is also larger. The R Square ranges between 0.000 to 1.000, where 1.000 shows a perfect fit indicating that each point lies on the line (Carver, 2009).

The coefficients allows the researcher to provide a comparison of the relative significance of each of the independent variable. Both unstandardized and standardized coefficients have been given for this study but only the standardized ones will be used for study. It is notable that there is a strong positive relationship between independent and dependent variable since value of R is 0.890. The coefficient of determination (R²) is 79.2 meaning that changes in the independent variables explain 79.20% of the procurement performance. This implies that other factors that were not considered in the study only contribute to 20.80% of the procurement performance. These variables therefore are very significant thus necessary for them to be considered in any effort to boost procurement performance in the organization. The study therefore identifies the set of the independent variables influence procurement performance of public entities.

<table>
<thead>
<tr>
<th>Table 4.9: Model Summary.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model.</td>
</tr>
<tr>
<td>1</td>
</tr>
</tbody>
</table>

### 4.8.1. ANOVA Results

F-test is carried out so as to test the effect on dependent variable by the independent variables simultaneously. It tests whether all the independent variables held jointly affect the dependent variable. Based on the study results of the ANOVA Test or F-test in Table 4.10 obtained F-count (calculated) was 10.765 greater the F-critical (table) (8.123) with significance of 0.000. Since the significance level of 0.000< 0.05 we therefore conclude that the set of independent variables affect the procurement performance of the organization and this shows that the overall model was significant.
Table 4.10: ANOVA Results

<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>10.890</td>
<td>4</td>
<td>2.7225</td>
<td>10.765</td>
<td>.000a</td>
</tr>
<tr>
<td>Residual</td>
<td>13.908</td>
<td>55</td>
<td>.25229</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>24.798</td>
<td>59</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NB: F-Critical Value = 8.123

Table 4.11 gives the results of the regression. From the study findings on the regression equation established, taking all factors into account (independent variables) constant giving it a value of zero, procurement performance will be 9.859. Also with all other independent variables held at zero, a unit increase in inventory management will lead to a 0.763 increase in procurement performance; a unit increase in supply chain forecasting will lead to a 0.690 increase in procurement performance, a unit increase in ICT integration will lead to 0.632 increase in procurement performance and a unit increase in resources will lead to 0.598 increase in procurement performance. This infers that inventory management contributed most to procurement performance in the public entities. Based at 5% level of significance, inventory management had a .000 level of significance; supply chain forecasting show a .003 level of significance, ICT integration show a .009 level of significance and resources show a .012 level of significance hence the most significant factor was inventory management.

Table 4.11: Coefficient Results

<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>9.859</td>
<td>0.002</td>
<td>5.32</td>
<td>0.00</td>
</tr>
<tr>
<td>X1_Inventory Management</td>
<td>0.76</td>
<td>0.18</td>
<td>0.47</td>
<td>4.33</td>
</tr>
<tr>
<td>X2_Supply chain Forecasting</td>
<td>0.69</td>
<td>0.16</td>
<td>0.35</td>
<td>4.22</td>
</tr>
<tr>
<td>X3_ICT Integration</td>
<td>0.63</td>
<td>0.16</td>
<td>0.26</td>
<td>4.01</td>
</tr>
<tr>
<td>X4_Resources</td>
<td>0.60</td>
<td>0.18</td>
<td>0.23</td>
<td>3.25</td>
</tr>
</tbody>
</table>

The general form of the equation was to predict procurement performance from inventory management, supply chain forecasting, ICT integration and resources is: \( Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \epsilon \) becomes: \( Y = 9.859 + 0.763 X_1 + 0.690 X_2 + 0.632 X_3 + 0.598 X_4 \) This indicates that procurement performance = 9.859 + 0.763* Inventory Management + 0.690*Supply Chain Forecasting + 0.632*ICT Integration + 0.598*Resources + 9.859.

5. SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Summary of Findings

From the descriptive statistics the study established that the organization has ensured that there is tracking of inventory to enhance coordination of materials accessibility, controlling, utilization and procuring of materials. They have correct forecasting methods thus reduction of stock outs in the organization. To a moderate extent the original equipment manufacturer is used to predict demand beyond a 4 week horizon. The forecasting accuracy demonstrates improvements and related observations results in inventory markdowns. The organization has advanced forecasting tools that can enable improvements in cost reduction. The forecasting tool accuracy tool synchronizes the demand and supply cycle than using real time information. The organization has adopted Just-in-Time system as the inventory control method designed to minimize inventory, and move it to the field for use exactly when needed.

The study established to a moderate extent that majority of respondents affirm that they had the correct forecasting methods thus reduction of stock outs in the organization. The original equipment manufacturer was used to predict demand beyond a 4 week horizon. The forecasting accuracy demonstrates improvements and related observations results in inventory. The organization has advanced forecasting tools that can enable improvements in cost reduction. The organization has advanced forecasting tools that can
enable improvements in cost reduction. The forecasting tool accuracy tools synchronize the supply and demand cycle than the use of real time information. Having years of demand data helps the organization to better predict future demand thus timely purchases-stock out reduction.

The study established that ICT Integration influence procurement performance in the public entities in Kenya. The systems can accommodate and process massive data at once and the staff are well trained in the existing IT services provided. The additional investments should be made on existing infrastructure and can lead to greater reduction of costs. Employing organized procedures, resources and ICT systems to consistently employ and align all procurement strategies in a consistent and integrated method outperformed peers in cost savings, expenditure under management, compliance, supplier integration, and greater contribution to enterprise value. The public entities lack clear accountability on how the resources provide impact on their performance therefore going against the fundamental principles of public procurement due to lack of adoption of information communication and technology.

The study established that resources influence procurement performance in the public entities in Kenya. The majority of respondents highly agree that human resources availability improves the performance level and that information technology improve the performance to a moderate extent the procurement plans are followed and budget allocation is enough to carry out procurement for the year. The budget allocation is enough to carry out procurement for the year and rarely the organization uses IT in our Procurement process.

5.2 Conclusion

Based on the study findings, the study concludes that procurement performance in the public entities in Kenya is affected by the independent variables. The inventory management is the first important factor which influences procurement performance in the public entities in Kenya. The regression coefficients of the study show that inventory control has a significant influence procurement performance in the public entities in Kenya. This implies that increasing levels of inventory control would increase the procurement performance in the public entities in Kenya.

The study concludes that supply chain forecasting is the second most important factor which influences procurement performance in the public entities in Kenya. The regression coefficients of the study show that supply chain forecasting has a significant influence procurement performance in the public entities in Kenya. This implies that increasing levels of supply chain forecasting would increase the procurement performance in the public entities.

The study concludes that ICT integration is the third most important factor which influences procurement performance in the public entities in Kenya. The regression coefficients of the study show that ICT integration has a significant influence procurement performance in the public entities in Kenya. This implies that increasing levels of ICT integration would increase the procurement performance in the public entities.

Finally, the study concludes that resources are the fourth most important factor which influences procurement performance in the public entities in Kenya. The regression coefficients of the study show that a resource has a significant influence procurement performance in the public entities in Kenya. This implies that increasing levels of resources would increase the procurement performance in the public entities in Kenya.

5.3 Recommendations

Better management of inventories would release capital for use elsewhere productively. Hence Inventory control implies the coordination of materials accessibility, controlling, utilization and procuring of material. The inventory control includes cost minimization, profit maximization, avoidance of running out of stock and to prevent surplus stock that are unnecessary. The study recommends for most efficient ways of inventory control is the use of Just-in-Time system.

The study recommends for correct forecasting methods thus reduction of stock outs in the organization. The forecasting accuracy can lead to improvement and related observations results in inventory markdowns. The organization should have advanced forecasting tools to synchronize the supply and demand cycle than the use of real time information and minimize inventory, and move it to the field for use exactly when needed.

The study established that ICT Integration influence procurement performance in the public entities in Kenya. The systems can accommodate and process massive data at once and the staff are well trained in the existing IT services provided. The additional investments should be made on existing infrastructure and can lead to greater reduction of costs. Employing organized procedures as well as resources and even ICT systems to consistently use and align all procurement strategies in a consistent and integrated method outperformed peers in cost savings, expenditure under management, compliance, supplier integration, and greater contribution to enterprise value. The public entities lack clear accountability on how the resources provide impact on their performance therefore going against the fundamental principles of public procurement due to lack of adoption of information communication and technology.
In determining how effective the whole process of procurement will be, resource allocation is a significant aspect to be considered. This therefore calls for public enterprises to try and ensure balance in allocating resources and even allocating more funds to the department of procurement. This is because procurement acts as the base on which all other departments depend on and its success is felt in the whole organization.

It is advisable that as the allocation of procurement resource plan is being prepared, caution need to be taken so that the planning is done in a manner while taking care of the pursued strategic fit in the public entities.

5.4 Areas for Further Research
This study is significant for further study in this field of procurement performance in Africa and particularly in Kenya. The findings have demonstrated influence of the inventory management, supply chain forecasting, ICT Integration and resources on procurement performance in the public entities in Kenya. The current study therefore need to be expanded further in future so as to determine other factors that may influence procurement performance in the public enterprises in Kenya since the study established there could the remaining 20.80% is explained by the variables or other aspects outside the model. Further, the available literature shows that as a future avenue of research, it is important to undertake same type of research in other private organizations and public sector in general in Kenya so as to find out whether the factors that have been explored can be generalized.

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Neuromuscular Inhibitory Effects of the Aqueous and Methanol Extracts of *Alchornea laxiflora* in Adult Albino Mice

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**Abstract**- The study investigated the median lethal dose and the effects of the aqueous and methanol extracts of *Alchornea laxiflora* in two neurobehavioural models of motor coordination, the traction (grip strength) and rotarod tests. This was with a view to providing information on the acute toxicity and the effects of the plant extracts on neuromuscular function. The LD₅₀ for the aqueous and methanol extracts of *A. laxiflora* in the oral route was > 1600 mg/kg respectively, and found to be safe in animals. However, the LD₅₀ (i.p.), was found to be 400 mg/kg for the methanol extract, which was relatively toxic and > 1600 mg/kg for the aqueous extract. Mice of both sexes (n=6) weighing 18 – 22 g were used for the study, which were randomized into control and test groups, which summed up to seven (VII) groups. The control group (1) received 10 % Tween 80 (vehicle), 0.1 ml/10 g mouse while the test groups (II,III,IV,V,VI) were administered graded doses (100, 200, 400, 800, 1600 mg/kg, p.o.) of the extracts. The standard group (VII) received Diazepam (4 and 10 mg/kg, i.p.). The animals were individually observed for fall off time from the revolving horizontal bar in the rotarod test and for the loss of muscle grip or grip strength in the traction test. They were appropriately scored after observation at intervals of 30, 60, 90, 120 and 150 min post intra-peritoneal and oral administrations of vehicle, extracts or drugs respectively. The results showed that *A. laxiflora* possesses significant (P ≤ 0.05) inhibitory effect on neuromuscular function due to the increase in the time taken for the animals to grasp the horizontally stretched wire with the hind limbs in the traction test. However, the extracts did not demonstrate any significant (P > 0.05) effects on the fall off time in the rotarod performance test. The study concluded that *A. laxiflora* possesses skeletal muscle relaxant activity in mice.

[http://dx.doi.org/10.29322/IJSRP.8.5.2018.p7781](http://dx.doi.org/10.29322/IJSRP.8.5.2018.p7781)
**Index Terms:** *Alchornea laxiflora*, rotarod, traction, diazepam, motor coordination and mice

I  INTRODUCTION

*Alchornea laxiflora* (Bentham) Pax and Hoffman (Euphorbiaceae) is a deciduous shrub or a forest understorey tree of about 6m high growing in Nigeria. The leaves are thinly textured turning an attractive yellow or red in dry season, while the young leaves appear purple in colour (Hutchinson and Dalziel, 1937). It is found in the riverine vegetation and mixed deciduous woodland, often on rocky outcrops in the Cameroons, and it is widespread in the Central and Southern tropical Africa. *A. laxiflora* is commonly known as lowveld beadstring, while the local names are Urievwu (Urhobo), Uwenuwen (Edo), Ububo (Igbo), Ijan or Pepe (Yoruba). The leaves of *A. laxiflora* are employed in ethnomedicine for the management of neurological and cardiovascular disorders viz. anxiety, insomnia, hypertension etc. The decoction of the leaves is used in the treatment of inflammatory and infectious diseases, as well as an important component of anti-malarial formulations (Adewole, 1993). The leaves are recorded as amongst those used to preserve the moisture of kolanuts in packing (Muanya, 2009). The stem (especially, the branchlets) is used in Nigeria as chewing sticks for teeth cleaning (Farnsworth et al., 1985). The plant enters the Yoruba incantation to make “bad medicine” rebound to sender (Burkill, 1994). A previous report has demonstrated that extract from the leaves of *A. laxiflora* can reverse sickling phenomenon *in vitro*, and thus can be employed in the management of Sickle cell anaemia (Muanya, 2009). The bioactive chemical constituents from *A. laxiflora* include flavonoids, which is the dominant constituent in the leaves of the plant but present in lesser quantities in the roots and stems, exhibit anti-microbial activity (Ogundipe et al., 2001), and this activity has been found to be significant against gram – ve and gram +ve organisms. This justifies the use of the plant as chewing stick in folkloric medicine. Farombi et al. (2003) demonstrated the anti-oxidant property of *A. laxiflora* leaf and root extracts, thus validating its use in the preservation of the moisture content of kolanuts during packing. Another study has also, shown that the methanol extract of the leaves of *A. laxiflora* possesses sedative and anxiolytic activities in mice *in vivo* (Nwonu, 2011). This novel development necessitated further scientific enquiry into the neuromuscular inhibitory effects of the plant.

II  MATERIALS AND METHODS:

**Plant Collection**

*Alchornea laxiflora* Bentham leaves were collected in the month of February, 2013 at the medicinal plant garden, Pharmacognosy plot II, Teaching and Research Farm located within the Obafemi Awolowo University campus. The plant was identified and authenticated in the Faculty herbarium by Mr. Ifeoluwa I. Ogunlowo, a taxonomist with the Department of Pharmacognosy. A voucher specimen (Voucher number: Ife – 17592) of the leaves of *A. laxiflora* was deposited at the Department of Botany, Obafemi Awolowo University, Ile-Ife, Nigeria.

**Plant Extraction**

The leaves of the plant were allowed to air-dry at laboratory room temperature (about 37 °C), and then pulverised, using a milling machine (Christy and Dorris Ltd., Model No. 7445). The powdered plant material (350 g) was subjected to cold extraction in a percolator (thrice) using 2.5 litres of 100 % methanol (absolute methanol) for 72 hours, with occasional stirring. The marc was re-extracted using another equal volume of methanol for 72 hours. The filtrate generated was concentrated to dry residue in a rotary evaporator under reduced pressure at 40 °C. The extraction process yielded 90.0 g of sticky, black crude extract (25.7 %). The aqueous extraction process was carried out using hot extraction method. The pulverised plant (500 g) was extracted using boiling method under reflux. The extraction was made to simmer for 3 hours. The decoction (menstrum) was concentrated to dryness *in vacuo* using the rotary evaporator at 40 °C. Little amount of methanol was added to the aqueous extract to facilitate easy concentration to dryness. The weight of the dry
extracts was determined and the percentage yield calculated. The extraction process for the decoction yielded 38.6 g (7.7%) of a sticky, dark brown crude extract.

**Animals**

Adult albino mice (Vom strain of the National Veterinary Research Institute, Vom, Jos, Nigeria) of both sexes (18 – 22 g) were used in the study. Animals were bred and housed in galvanised cages in a well-lit and aerated room of 12/12 h light/dark cycle in the animal facility, Faculty of Pharmacy, Obafemi Awolowo University, Ile-Ife. Animals had unimpeded access to safe drinkable water and standard laboratory pellet diet (Guinea Feeds Brand, Bendel Feeds and Flour Mills, Ltd, Ewu, Edo State, Nigeria). The animal cages were regularly cleaned. All the animals were maintained on ideal environmental and nutritional state throughout the period of the study. Animals were allowed to acclimatize for 30 min before being used for experiment where they were moved from the animal facility to the laboratory. The guidelines for the care and use of animals in neuroscience and behavioural research (NIH, 1991; NRC, 1996) were strictly adhered to.

**Preparation and Dosing**

*A. laxiflora* extracts were prepared fresh on each day of the experiment using 10% Tween 80 as vehicle. All the extracts were administered to animals. The volume of the vehicle used was 0.1 ml/10 g mouse. Injection was administered slowly orally for the test doses, while both the oral and intraperitoneal routes were used in the determination of acute toxicity and the LD$_{50}$.

**Drugs**

The following drugs and chemical reagents were used in the study: Diazepam (F. Hoffmann-La Roche, Basel, Switzerland), Ethanol and Methanol (BDH Chemicals Ltd., Poole, England), Tween 80 (Sigma-Aldrich Inc., St. Louis, USA).

**EXPERIMENTAL DESIGNS**

**Acute Toxicity Tests**

The acute toxicity and LD$_{50}$ of the plant extracts were determined using the Lorke’s Method (1983). The graded doses (100, 200, 400, 800, 1600 mg/kg, i.p. and p.o.) of *A. laxiflora* was used for toxicity testing. The number of death(s), behavioural changes (and the nature of death), time of death were recorded. One animal (n=1) was used for each dose level in phase I study, while four animals (n=4) of three dose levels were chosen in the phase II. The same procedure was employed in both the intra-peritoneal and the oral routes of toxicity testing. LD$_{50}$ (the index of acute toxicity) was calculated within 24 h. Animals were observed hourly for the first 8 h, then 6 hourly for 24 h, and then daily for 14 days (Wafai and Mehta, 1986). The number of deaths were recorded on the day of experiment, and those that survived the acute toxicity were weighed daily for 14 days. Weight increase in each animal was regarded as having survived the acute toxicity, and thus the experiment was discontinued.

**Assessment of the Effects of A. laxiflora on Motor Coordination in Mice**

**Rotarod Performance Test**

Male mice (18–22 g) were pre-selected 72 h (with twice daily training) in advance to eliminate those animals which could not stay on the horizontal bar at a speed of 16 rpm for a period of 60 s. Animals were treated orally with vehicle (10% Tween 80, 0.1 ml/10 g, p.o.) and graded doses of ALM (100, 200, 400, 800 and 1600 mg/kg, p.o.) or Diazepam (4 mg/kg, i.p.). The maximum period of time was 60 s, with three (3) reintroductions to the rota-rod (Tread Mill 7600; Model No. 09481, Ugo Basile Biological Apparatus, Comerio-(va)-Italy) were allowed (Rosiland et al., 1990).
**Traction Test**

The screening of animals was performed by placing the fore paws of male mice in a small twisted wire rigidly supported above a bench top. Normally, the mice grasp the wire with the fore paws and place at least one hind foot on the wire within 5 s, when allowed to hang freely. The test was conducted on five groups of animals (n=5), which were previously screened to exclude mice with limb dysfunction or other neuromuscular disorders, 1 h post administration of ALM (100, 200, 400, 800 and 1600 mg/kg, p.o.) or vehicle (10 % Tween 80, 0.1 ml/10 g, p.o.), while 30 min was allowed prior to Diazepam (10 mg/kg, i.p.) administration. The inability of animals to put at least one hind foot within 5 s was considered as failure in the traction (grip strength) test (Rudziket *et al*., 1973).

### III RESULTS

**Acute Toxicity Tests**

The LD$_{50}$ was 400 mg/kg, i.p. and > 3200 mg/kg, p.o. for the methanol extract, and > 1600 mg/kg, i.p. and p.o. for the aqueous extract.

**Table 1. Effect of the Methanol Extract of *A. laxiflora* on Skeletal Muscle Relaxation: Rotarod Performance Test**

<table>
<thead>
<tr>
<th>Treatment group (mg/kg, p.o.)</th>
<th>30 Min</th>
<th>60 Min</th>
<th>90 Min</th>
<th>120 Min</th>
<th>150 Min</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTR</td>
<td>60.00±0.00</td>
<td>60.00±0.00</td>
<td>60.00±0.00</td>
<td>60.00±0.00</td>
<td>60.00±0.00</td>
</tr>
<tr>
<td>100</td>
<td>60.00±0.00</td>
<td>60.00±0.00</td>
<td>60.00±0.00</td>
<td>60.00±0.00</td>
<td>60.00±0.00</td>
</tr>
<tr>
<td>200</td>
<td>60.00±0.00</td>
<td>60.00±0.00</td>
<td>59.78±0.22</td>
<td>60.00±0.00</td>
<td>59.90±0.10</td>
</tr>
<tr>
<td>400</td>
<td>60.00±0.00</td>
<td>60.00±0.00</td>
<td>60.00±0.00</td>
<td>60.00±0.00</td>
<td>60.00±0.00</td>
</tr>
<tr>
<td>800</td>
<td>60.00±0.00</td>
<td>57.40±2.60</td>
<td>58.50±1.50</td>
<td>60.00±0.00</td>
<td>60.00±0.00</td>
</tr>
<tr>
<td>1600</td>
<td>60.00±0.00</td>
<td>60.00±0.00</td>
<td>60.00±0.00</td>
<td>60.00±0.00</td>
<td>60.00±0.00</td>
</tr>
<tr>
<td>DZP (4mg/kg,i.p.)</td>
<td>2.80±0.92*</td>
<td>9.40±7.91*</td>
<td>18.60±11.04*</td>
<td>25.80±14.00*</td>
<td>55.80±4.20</td>
</tr>
</tbody>
</table>

One-way ANOVA revealed a significant difference between the treatments: F = 3865; F = 36.4; F = 13.63; F = 5.97; P = 0.000. The result shows no significant difference between the control and the test doses. However, a significant difference was observed between the control and the reference drug, diazepam. *Indicates a significant difference from control, 10 % Tween 80.
Table 2. Effect of Aqueous Extract of *A. laxiflora* on Skeletal Muscle Relaxation: Rotarod Performance Test

<table>
<thead>
<tr>
<th>Treatment group (mg/kg, p.o.)</th>
<th>30 Min</th>
<th>60 Min</th>
<th>90 Min</th>
<th>120 Min</th>
<th>150 Min</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTR</td>
<td>60.00±0.00</td>
<td>60.00±0.00</td>
<td>60.00±0.00</td>
<td>60.00±0.00</td>
<td>60.00±0.00</td>
</tr>
<tr>
<td>100</td>
<td>60.00±0.00</td>
<td>60.00±0.00</td>
<td>60.00±0.00</td>
<td>60.00±0.00</td>
<td>60.00±0.00</td>
</tr>
<tr>
<td>200</td>
<td>60.00±0.00</td>
<td>60.00±0.00</td>
<td>60.00±0.00</td>
<td>60.00±0.00</td>
<td>60.00±0.00</td>
</tr>
<tr>
<td>400</td>
<td>60.00±0.00</td>
<td>60.00±0.00</td>
<td>60.00±0.00</td>
<td>60.00±0.00</td>
<td>60.00±0.00</td>
</tr>
<tr>
<td>800</td>
<td>60.00±0.00</td>
<td>60.00±0.00</td>
<td>60.00±0.00</td>
<td>60.00±0.00</td>
<td>60.00±0.00</td>
</tr>
<tr>
<td>1600</td>
<td>60.00±0.00</td>
<td>60.00±0.00</td>
<td>60.00±0.00</td>
<td>60.00±0.00</td>
<td>60.00±0.00</td>
</tr>
<tr>
<td>DZP (4mg/kg, i.p.)</td>
<td>2.80±0.92*</td>
<td>9.40±7.91*</td>
<td>18.60±11.04*</td>
<td>25.80±14.00*</td>
<td>55.80±4.20</td>
</tr>
</tbody>
</table>

One-way ANOVA revealed a significant difference between the treatments: $F = 3865; F = 40.92; F = 14.06; F = 5.97; P = 0.000$. The result shows no significant difference between the control and the test doses. However, a significant difference was observed between the control and the reference drug, diazepam. *Indicates a significant difference from control, 10% Tween 80.

Table 3. Effect of the Methanol Extract of *A. laxiflora* on Muscle Relaxation: Traction Test

<table>
<thead>
<tr>
<th>Treatment group (mg/kg, p.o.)</th>
<th>30 Min</th>
<th>60 Min</th>
<th>90 Min</th>
<th>120 Min</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTR</td>
<td>0.51±0.04</td>
<td>0.55±0.05</td>
<td>0.61±0.05</td>
<td>0.51±0.05</td>
</tr>
<tr>
<td>100</td>
<td>0.61±0.04</td>
<td>0.54±0.03</td>
<td>0.51±0.04</td>
<td>0.71±0.09</td>
</tr>
<tr>
<td>200</td>
<td>0.42±0.02</td>
<td>0.42±0.06</td>
<td>0.31±0.05</td>
<td>0.51±0.06</td>
</tr>
<tr>
<td>400</td>
<td>0.42±0.03</td>
<td>0.69±0.09</td>
<td>0.92±0.06</td>
<td>0.97±0.10</td>
</tr>
<tr>
<td>800</td>
<td>0.53±0.05</td>
<td>0.69±0.03</td>
<td>0.64±0.04</td>
<td>0.98±0.05</td>
</tr>
<tr>
<td>1600</td>
<td>0.67±0.04*</td>
<td>0.84±0.06*</td>
<td>0.69±0.03</td>
<td>0.62±0.03</td>
</tr>
<tr>
<td>DZP (10 mg/kg, p.o.)</td>
<td>5.00±0.00*</td>
<td>5.00±0.00*</td>
<td>4.21±0.79*</td>
<td>4.20±0.80*</td>
</tr>
</tbody>
</table>

One-way ANOVA revealed a significant difference between the treatments: $F = 2333.68; F = 984.57; F = 20.69; F = 18.57; P = 0.000$. The result shows a significant difference between the control and 1600 mg/kg, p.o.
at 30 min and 60 min respectively. A significant difference was observed between the control and the reference drug, diazepam at different time intervals. *Indicates a significant difference from control, 10 % Tween 80.

Table 4. Effect of the Aqueous Extract of A. laxiflora on Muscle Relaxation: Traction Test

<table>
<thead>
<tr>
<th>Treatment group (mg/kg, p.o.)</th>
<th>Mean Time Hind Foot Grasp of an bElevated Horizontal Wire mesh/ 5 s</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>30 Min</td>
</tr>
<tr>
<td>CTR</td>
<td>0.51±0.04</td>
</tr>
<tr>
<td>100</td>
<td>1.24±0.24*</td>
</tr>
<tr>
<td>200</td>
<td>0.97±0.07*</td>
</tr>
<tr>
<td>400</td>
<td>1.06±0.07*</td>
</tr>
<tr>
<td>800</td>
<td>0.99±0.04*</td>
</tr>
<tr>
<td>1600</td>
<td>0.75±0.10</td>
</tr>
<tr>
<td>DZP (10 mg/kg, p.o)</td>
<td>5.00±0.00*</td>
</tr>
</tbody>
</table>

One-way ANOVA revealed a significant difference between the treatments: F = 211.26; F = 35.25; F = 9.90; F = 6.78; P = 0.000. The result shows a significant difference between the control, the test doses and the reference drug, diazepam at different time intervals. *Indicates a significant difference from control, 10 % Tween 80.

IV DISCUSSION

Motor coordination refers to a balanced combination of movements that involves more than one part of the body. It is an index of an individual’s ability to utilize the muscles and the joints, as well as the nerves and other parts of the human or animal body to perform a given task. The cerebellum plays a pivotal role in the neural control of movement, and damage to this part of the brain or its connecting structures and pathways results in the impairment of coordination (motor deficit), known as ataxia. Drugs that relax the skeletal muscles are essential in surgical practice, allowing a low, safe level of anaesthesia to be adopted (Randall et al., 2009). Skeletal muscle relaxants are drugs that act peripherally at the neuromuscular junction and muscle fibres or centrally in the cerebrospinal axis to decrease muscle tone and/or cause paralysis (Tripathi, 2008). Myorelaxants relieve musculoskeletal pain or spasm and severe musculoskeletal spasticity. In the study, the fall off time of animals from the revolving rod in the rotarod coordination test and the loss of muscle grip or grip strength (i.e. the inability of animals to place at least a hind foot to the horizontally stretched wire mesh elevated above the laboratory bench top within five seconds) in the traction tests were regarded as indices of skeletal muscle relaxation.

The rotarod performance test was essentially employed to evaluate neurological (motor) deficits in mice. The loss of motor coordination is pathognomonic of many neurological disorders (e.g. transient ischaemic attack (mini stroke), cerebrovascular disease (stroke), traumatic brain injury, etc.). This clinico-pharmacological effect can be easily detected in cases of drug intoxication (Massaquoi and Hallet, 1998). In motor coordination deficits, there is abrupt loss of connectivity between the central nervous system (brain and spinal cord) and the muscles or direct abnormal functioning (dysfunction) of the muscles of the body. The loss of neural
Connectivity can be between the central nervous system (CNS) and the motor end plate (the terminal portion where the axon of a motor neurone makes synaptic contact with a muscle fibre). It, therefore, means that motor deficits can occur anywhere along the neural stretch between the CNS and the motor end plate. Any drugs or candidate drugs that has the potential to induce skeletal muscle relaxation through the interference with the animal’s ability to remain on a revolving (or rotating) rod at a specific speed is referred to as a skeletal muscle relaxant. The methanol and aqueous extracts of A. laxiflora did not affect rotarod performance in the animals, as all the animals stayed on revolving rod for 60 s without falling off the rod. It, therefore, means that the leaf extracts of A. laxiflora produced little or no effect on physical performance, endurance and inhibition of neuromuscular function, since there was no significant decrease in the fall off time of the animals from the rotating rotarod. Therefore, the leaf extracts A. laxiflora had no effects on motor coordination on the rotarod model.

The traction test was used to study neuromuscular function, and is often combined with the rotarod motor coordination test, a standard validated behavioural paradigm used to screen drugs and candidates. The methanol extract at the highest tested dose used in this study significantly inhibited neuromuscular function in the fore limbs of the animals stretched horizontally to a stretched wire at 30 and 60 min time intervals respectively. The time taken for the animals to put at least one of the hind limbs to the horizontally stretched wire was prolonged relative to control. Diazepam, the reference drug significantly prolonged the time taken for the animals to place a hind limb to the horizontally stretched wire at the different time intervals in the methanol extract. In the aqueous extract, there was a significant prolongation in the time taken for the animals to put at least one hind limbs to the horizontally stretched wire. This activity was demonstrated at 30 and 120 min time intervals in low to moderate and high doses, and at the lowest tested dose respectively. At 60 and 90 min time intervals, an increase in the time required for the animals to place either one of the hind limbs to the horizontally stretched wire was observed, but this was not significant. This was an indication of neuromuscular inhibition, and shows that A. laxiflora has the potential to induce neurological deficits, and thus modulate motor coordination. The loss of skeletal muscle grip in the animals was due to decreased neuromuscular excitability of the CNS induced by the plant extracts. However, diazepam, the standard drug and a benzodiazepine neurospasmolytic agent, produced a prominent effect on skeletal muscle relaxation relative to control by significantly decreasing motor coordination in the experimental animals at different time intervals.

**V CONCLUSION:**

The study concluded that Alchornea laxiflora possesses skeletal muscle relaxant activity in the traction test. However, the plant extracts did not demonstrate any motor coordination deficits in the rotarod performance test.

**Statistical Analysis**

All data were expressed as Mean±S.E.M. Analysis of data was done using one-way ANOVA and multiple comparison of treatment groups performed by employing the Student-Newman-Keuls test using the primer of biostatistics (Version 3.01) (Glantz, 1992). Probability level of ≤ 0.05 (5 %) was considered statistically significant for all treatments relative to control (Steel and Torrie, 1960).

**Acknowledgement**

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**Conflicts of interest**

The authors declare that there is no competing interests.
REFERENCES


Metallurgical treatment processes of metals (Fe and Steel, Al, Cu, Au) and their detrimental environmental issues- A mini review

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http://dx.doi.org/10.29322/IJSRP.8.5.2018.p7782

Abstract

The aims of this study are to evaluate the fruitful process and industrial production of common metals (Fe and Steel, Al, Cu, Au) and possible environmental issues through their production which is detrimental for human beings. First of all, iron and steel are the most important materials for human, especially of making constructions, furniture, cooking materials, etc. even we cannot think a single day without it. But, due to production of it, iron ores impurities, slags, lime stones, blast furnace flue, sulfur dioxide, hydrogen sulphide gases, suspended solids and metals, oil, greases, and mill scales etc. are produced as major serious by-product wastages which have active and passive effects of mankind. Similarly, aluminium is another important metal for mankind which can be mixed with almost any other metal and form alloys typically good strength, however, greenhouse gases (carbon dioxide, perfluorocarbons, sodium fluoride, sulfur dioxide, polycyclic aromatic hydrocarbon and a vast list of other problematic elements), caustic red sludge, toxic mine tailings, red muds etc. are produced significantly. In addition, as a red metal, copper is the extensively used in architectural focal point of many modern buildings, energy-saving applications, making cookeries, ornaments etc., sulfuric acid, sulfur dioxide (SO2), sulfur trioxide (SO3) etc. come from their production. In contrast, gold is the most precious metal which has prominent attraction as a jewellery product, in particular for women due to their good colours and non-reactive to environment. But, the usage and disposal of cyanide and cyanide gas come from gold industry would have extremely toxicity nature and adverse environmental risks. Through this review, good production-based literature knowledge will appear as well as identify specific hazard materials due to general concern which have life time risk for human exposure.

Index Terms: Metals (Fe and Steel, Al, Cu, Au) productions, Hazard chemicals, detrimental effects, Environmental issues

1. The metallurgical treatment processes of Iron (Fe) and Steel and Environmental issues.

From Sun to Planets, microorganisms to human being, and some metabolic systems of human body, it could lesser be thought without iron. It is the part and parcel in human’s daily life for various reasons. To advance growth and development of human life style, steel is the great collaborator working together with all other materials. It contributes the last 100 years of betterment. Further, it will take the significant rules to meet the challenges of the next 100 years. [1]. Based on World Steel Association (World steel) reports, Global steel production rose by 1.9% from a year ago in August, saw the 1.5% growth in July. China was the main contributor for this outstanding achievement, but global output ex-China too has risen in the past few months. Right now, China dominates the steel discussion; for instance, its productivity rose by 3% versus 0.9% for the rest of the world in August [2].

In iron (Fe) main interstitial carbon constituent is in the range of 0.12–2.0%. However, steel or iron alloy is classified as: Low-carbon steel (C is up to 0.3%); Medium-carbon steel (C is approximately 0.3–0.6%); High-carbon steel (C is approximately 0.6–1.0%) and Ultra-high-carbon steel (C is approximately 1.25–2.0%) [3]. It contains some other ingredients as a trace amount like- Mn, Si, Cr, S, P, N, Cr, Ni, Mo, Cu etc. [4]. Here, it would be discussed step wisely about generations of carbon steel and the difference between the various steel making techniques.
First steelmaking was started by Egypt to stabilize Charcoal kilns through the production of charcoal and the reduction of iron ores. In early middle ages, it was developed by introducing bloomery technology that was invented in 2000 years BC in Anatolia and did continue in Middle Ages in Europe. For more than 3000 years, therefore, iron was smelted from ore in bloomery and further steeled by cementation and case hardening and formed sophisticated blades by forge welding. It was the solid-state transformation. Further improvement was ‘Catalan Forge’, a precursor to the Blast Furnace by its shape and then Wolf Furnace which produced 100 to 150 tons of iron/year surpassing the production capability of a Catalan forge [5]. In 18th century, another breakthrough come from Europe which is ‘Blast Furnace’ technology by which liquid metal production was possible. Steel making thus evolved over a period extending from the High Middle Ages to the end of the 20th century. Furthermore, this technology was updated as puddling furnace, Siemens-Martin furnace/ Open Hearth Process and Induction furnaces which are frequently using in different countries right now. However, it was a main drawback such as, steel was not yet liquid all throughout the route [6].

Coming back to European timeline, Open hearth Process rapidly did breakthrough by Bessemer process which was continued until the middle of the 20th century. However, electricity had not been invented yet. After then, Scientist Paul Heroult invented the Electric Arc Furnace in 1905 [7]. We are now traveling to present (Middle age of the 20th century), in present technology, scientists are ensuring for mankind the iron units stem from ore and scrap, liquid steel is processed by either Oxygen Converter or Electric Arc Furnace, solidification is carried out by a series of Continuous Casting process, coated and composite materials are producing by specialized plants. However, Green House Gas (GHG), especially CO₂ emission is quite high using this technology. Hence, CO₂ emission presumably takes part for Global warming issue which would be the most alarming [8, 9].

1.1. Raw materials:

The major raw materials of iron and steel productions are iron ore, coking coal, Silica, limestone and dolomites, Ferrous scrap, alloying elements- ferromanganese, and silicomanganese etc.

1.2. Major Reactions:

i. \[ 3 \text{Fe}_2\text{O}_3 + \text{CO} = \text{CO}_2 + 2 \text{Fe}_3\text{O}_4 \] (Temperature 850° F)

ii. \[ \text{Fe}_3\text{O}_4 + \text{CO} = \text{CO}_2 + 3 \text{FeO}(\text{Temperature 1100° F}) \]

iii. \[ \text{FeO} + \text{CO} = \text{CO}_2 + \text{Fe} \] (Temperature 1300° F)

iv. \[ \text{FeO} + \text{C} = \text{CO} + \text{Fe} \]

v. \[ \text{C} + \text{O}_2 = \text{CO}_2 + \text{Heat} \]

vi. \[ \text{CO}_2 + \text{C} = 2\text{CO} \]

vii. \[ \text{CaCO}_3 = \text{CaO} + \text{CO}_2 \]

viii. \[ \text{FeS} + \text{CaO} + \text{C} = \text{CaS} + \text{FeO} + \text{CO} \]

ix. The CaS becomes part of the slag. The slag is also formed from any remaining Silica (SiO₂), Alumina (Al₂O₃), Magnesia (MgO) or Lime (CaO) as silicates, Aluminates, Phosphates etc.

1.3. Composition of Iron, making by Blast Furnace:

Normally iron contains some alloying element where carbon percentages are a little bit higher which affects the characteristics of metals. The compositions are: Iron (Fe)= 93.5-95.0%; Silicon (Si)=0.30-0.90%; Sulfur (S)=0.025-0.050%; Manganese (Mn)= 0.55-0.75%; Phosphorus (P)= 0.03-0.09%; Titanium (Ti)=0.02-0.06%; Carbon (C)= 4.1-4.4%.

However, Steel by electric Arc Furnace (EAC) is only reducing of Carbon (0.15- 1.70%, based on iron carbon phase diagram) and increasing alloying elements based on the requirement of using various purposes [10].

1.4. Treatment process or Methodology:

No table of figures entries found.
1.4.1. Process Description: The figure 1 shows a flowchart of the integrated manufacturing process of iron and steel using the blast furnace (BF) and basic oxygen furnace (BOF) which are the most commonly used method (51% of global steel production) at present. After the BF-BOF process, molten steel is controlled to a target composition by maintaining the desire temperature and then cast by continuous casting machine to produce slabs, blooms and billets. These solid materials are reheated and rolled to the required dimensions by the rolling mill to produce steel products. The smelting and refining process for iron and steel in the BF-BOF process involves the carbon reduction of iron ore (Fe₂O₃) in the BF to make molten iron, and decarburization of molten iron in the BOF to make molten steel.

Major reducing agent in the BF is the carbon monoxide gas (CO) generated by the oxidation of the carbon (C) in coke. The main reaction in this process is the oxidization of the carbon in the hot metal by both pure oxygen gas (O₂) and iron oxide (Fe₂O₃). The
residual oxygen, after contributing to this decarburization reaction, remains in the molten steel. This oxygen is fixed and removed by deoxidation reagents such as silicon and aluminum as SiO₂ and Al₂O₃ or is removed as carbon monoxide gas in the subsequent vacuum degassing process.

In addition to the BF-BOF process, there is another process which utilizes mainly scrap as an iron source, with some direct reduced iron whenever necessary. The direct reduced iron is produced by reducing iron ore with reformed natural gas, whose principal components are hydrogen, carbon monoxide, and methane. The scrap, along with direct reduced iron, is then melted in an electric arc furnace (denoted EAF hereinafter) to produce molten steel which is subsequently processed by the continuous casting machine, as mentioned above.

The molten steel from the Basic Oxygen Furnace (BOF) and Electric Arc Furnace (EAF) is then deoxidized and alloying elements (ferromanganese, and silicomanganese) are added with the prescribed amounts. The molten steel is then held at the target temperature and continuously cast through Continuous Casting Machine (CCM), and the obtained castings are cut to the prescribed length. After heating to the rolling temperature in a reheating furnace, these castings are hot-worked to the required products. Steel shapes, bars, and wire rods are worked on section and bar mills and wire-rod mills equipped with caliber rolls, plates are worked on reversing mills, and hot-rolled steel sheets are worked on hot strip mills. After pickling to remove scale from the surface, the hot-rolled steel sheets are worked to cold-rolled steel sheets on reversing rolling mills, and the cold-rolled steel sheets are tinned or galvanized as required to produce various surface-treated steel sheet products. Steel pipe is produced by forming and welding steel sheets or plates, or by piercing a billet and rolling to the final dimensions without a seam.

1.5. Environmental Issues:

Slags, limestones, and iron ores impurities (by-products), blast furnace flue, Sulfur dioxide, and hydrogen sulphide gases, suspended solids and metals, oil, greases, and mill scales etc. are the major serious by-products from steel industries.

- Researchers measure that Sintering operations can emit significant dust levels of about 20 kilograms per metric ton (kg/t) of steel. Pelletizing operations can emit dust levels of about 15 kg/t of steel. Air emissions from pig iron manufacturing in a blast furnace include particulate matter (PM), ranging from less than 10 kg/t of steel manufactured to 40 kg/t; sulfur oxides (SOx), mostly from sintering or pelletizing operations (1.5 kg/t of steel) [11].

- Nitrogen oxides (NOx), mainly from sintering and heating (1.2 kg/t of steel); hydrocarbons; carbon monoxide; in some cases dioxins (mostly from sintering operations); and hydrogen fluoride (HF). Wastewaters, including those from cooling operations, are generated at an average rate of 80 cubic meters per metric ton (m³/t) of steel manufactured [12].

- Major pollutants remain in untreated wastewaters generated from pig iron manufacture include total organic carbon typically 100–200 milligrams per liter, mg/l); total suspended solids (7,000 mg/l, 137 kg/t); dissolved solids; cyanide (15 mg/l); fluoride (1,000 mg/l); chemical oxygen demand, or COD (500 mg/l); and zinc (35 mg/l). Major pollutants in wastewaters generated from steel manufacturing using the BOF include total suspended solids (up to 4,000 mg/l, 1030 kg/t), lead (8 mg/l), chromium (5 mg/l), cadmium (0.4 mg/l), zinc (14 mg/l), fluoride (20 mg/l), and oil and grease. Besides, mill scale may amount to 33 kg/t. The process generates effluents with high temperatures [11].

- Process solid waste from the conventional process, including furnace slag and collected dust, is generated at an average rate ranging from 300 kg/t to 500 kg/t, of which 30 kg may be considered hazardous depending on the concentration of heavy metals present. However, 65% of BOF slag from steel manufacturing can be recycled in various industries such as building materials and, in some cases, mineral wool [11].

2. The metallurgical treatment processes of Aluminum (Al) and Environmental issues

Aluminium or aluminum (in North American English) is a chemical element of the boron group with symbol Al and atomic number 13. The Earth's crust contains the valuable Aluminium (Al) metals about 8.2%. It is the third most abundant element in the crust and the most plentiful metallic element; however, it never be found on its own in nature. Bauxite is the most commonly ore mined for aluminium in which aluminium occurs as hydroxide minerals. Aluminium is a silvery-white, tough and lightweight metal that’s specific gravity is 2.7. It is a good conductor of heat and electricity, and very resistant to atmospheric corrosion. It is also nontoxic, inflammable, nonmagnetic, non-sparking, malleable and ductile. Due to these properties, it has become an important metal of this globe.
Aluminium can be mixed with almost any other metals and these alloys typically combine lightness with strength. As a result, they are used in a great variety of industries. Aluminium metal is so chemically reactive that native specimens are rare and limited to extreme reducing environments. Instead, it is found combined in over 270 different minerals. [13] The Bayer process is the principal industrial means of refining bauxite to produce alumina (aluminium oxide). Bauxite, the most important ore of aluminium, contains only 30–54% aluminium oxide, (alumina), Al₂O₃, the rest being a mixture of silica, various iron oxides, and titanium dioxide.[14, 14] The aluminium oxide must be purified before it can be refined to aluminium metal.

2.1. Raw materials:

Bauxite, Corundum, Cryolite, Nepheline are the major raw materials of Aluminum. The process of extracting aluminium from its oxide, alumina, generally by the Hall-Héroult process. Alumina is extracted from the ore bauxite by means of the Bayer process at an alumina refinery. Aluminum ores especially composition of Bauxite are 30~50% Al₂O₃, 3~13% SiO₂, and 10~18% TiO₂.

2.2. Major Reactions:

(a) Bauxites Production (Bayer Process):
   i.  SiO₂ + 2NaOH → 2 NaSiO₃ + H₂O
   ii. 2 NaSiO₃ + 2 NaAlO₂ → 2 Na₂Al₂Si₂O₈ + 2H₂O + NaOH
   iii. Al₂O₃ + 2 NaOH → 2 NaAlO₂ + H₂O
   iv. 2 NaAlO₂ + CO₂ → 2 Al(OH)₃ + Na₂CO₃ + H₂O
   v. 2 H₂O + NaAlO₂ → Al(OH)₃ + NaOH
   vi. 2 Al(OH)₃ → Al₂O₃ + 3 H₂O  Temperature at 1200 ℃

(b) Aluminum Production (Hall- Heroult process):

Al₂O₃ (dissolved) +3C (s) =4 Al (l) +3 CO₂ (g).

2.3. Treatment process or Methodology:
2.3.1. Process Description:

In the Bayer process (Figure 2), bauxite ore is heated in a pressure vessel along with a sodium hydroxide solution at a temperature of 150 to 200 °C. At these temperatures, the aluminium is dissolved as sodium aluminate in an extraction process. The aluminium compounds in the bauxite may be present as gibbsite (Al(OH)₃), boehmite (AlOOH) or diaspore (AIOOH); the different forms of the aluminium component will dictate the extraction conditions. After separation of the residue by filtering, gibbsite (aluminium hydroxide) is precipitated when the liquid is cooled and then seeded with fine-grained aluminium hydroxide. This treatment also dissolves silica, but the other components of bauxite do not dissolve. Sometimes lime is added at this stage to precipitate the silica as calcium silicate. The solution is clarified by filtering off the solid impurities, commonly with a rotary sand trap and with the aid of a flocculant such as starch, to remove the fine particles. The undissolved waste after the aluminium compounds are extracted, bauxite tailings, contains iron oxides, silica, calcia, titania and some unreacted alumina. The original process was that the alkaline solution was cooled and treated by bubbling carbon dioxide through it, a method by which aluminium hydroxide precipitates. But later, this gave way to seeding the supersaturated solution with high-purity Al(OH)₃ crystal, which eliminated the need for cooling the liquid and was more economically feasible.

Bauxites containing more than 10% silica; the Bayer process becomes uneconomic due to insoluble sodium aluminium silicate being formed, which reduces yield, and another process must be chosen. Over 90% of the aluminium oxide so produced is used in the Hall–Héroult process to produce aluminium.

The Hall- Héroult process is an example of Aluminium smelting process and is used industrially. Aluminium cannot be produced by an aqueous electrolytic process because hydrogen is electrochemically much nobler than aluminium. Thus, liquid aluminium is produced by the electrolytic reduction of alumina (Al₂O₃) dissolved in an electrolyte (bath) mainly containing Cryolite (Na₃AlF₆).

2.4. Environmental Issues:

Overall, the entire process of extracting aluminium from raw bauxite, many hazards produce which have the detrimental effects on living beings. The effects are as follows:
Since pure aluminum ore is so stable, an extraordinary amount of electricity is required to produce the final product and, at least in the U.S., half of the smelting energy consumed is courtesy of coal, one of the most notoriously polluting fuel sources known to mankind.

The EPA says that the release of perfluorocarbon during the aluminum smelting process is 9,200 times more harmful than carbon dioxide in terms of its effect on global warming [16].

When bauxite is extracted from the earth, the strip-mining process removes all native vegetation in the mining region, resulting a loss of habitat and food for local wildlife as well as significant soil erosion.

The remaining caustic red sludge and toxic mine tailings are commonly deposited into excavated mine pits where they ultimately seep into aquifers, contaminating local water sources.

Greenhouse gas released during smelting and processing (which have been found to blanket surrounding regions with toxic vapors) include carbon dioxide, perfluorocarbons, sodium fluoride, sulfur dioxide, polycyclic aromatic hydrocarbon and a vast list of other problematic elements.

Particulates released during processing that are known to compromise air quality include combustion by products, caustic aerosols, dust from bauxite, limestone, charred lime, alumina and sodium salt [17].

Compare to producing virgin aluminum from raw bauxite, recycling old aluminum consumes just 5% of the energy and releases a mere 5% of the greenhouse gases.

Landfills across the globe may be the final resting place for infinite numbers of aluminum beverage cans. When these cans are incinerated they contaminate air with toxic compounds and take up to 500 years to fully decompose.

Red mud is a toxic solid waste by-product generated in the industrial production of alumina through the digestion of bauxite ore. The auto production of caustic red mud makes the Bayer process a complex calculation for an environmentally challenging process. It is quite alarming issue in the term of environmental pollution for modern civilization. Chemical analysis shows that red mud contains silicium, aluminium, iron, calcium, titanium, sodium as well as an array of minor elements namely K, Cr, V, Ba, Cu, Mn, Pb, Zn, P, S, As and etc. The variation in chemical composition between red muds worldwide is high. Typical composition of red mud is Fe2O3 (30-60%w/w), Al2O3 (10-20%w/w), SiO2 (3-50%w/w), Na2O (2-10%w/w), CaO (2-8%w/w) and TiO2 (trace-25%w/w) [18]. Generally, the major mineralogical phases of red mud from the Bayer process are gibbsite (Al(OH)3), boehmite (γ-AlOOH), hematite (FeO(OH)), quartz (SiO2), anatase (TiO2), rutile (TiO2) and calcite (CaCO3), and the principal mineralogical constituents of red mud from the sintering process are β-CaO.SiO2, calcite (CaCO3), aragonite (CaCO3), hematite (Fe2O3), gibbsite (Al(OH)3) and perovskite (CaTiO3) [19].

3. The metallurgical treatment processes of Copper (Cu) and Environmental issues:

Copper is one of the basic chemical elements. Pure copper is a reddish-orange metal known for its high thermal and electrical conductivity. It is commonly used to produce a wide variety of products, including electrical wire, cooking pots and pans, pipes and tubes, automobile radiators, and many others. The energy efficiency resulting from the use of copper in high efficiency motors, electrical transformers, underground power lines, air conditioning and refrigeration equipment, electric vehicles, etc. has a significant impact on the release of greenhouse gases resulting from the generation and use of fossil fuel based electrical power. Likewise, newly developed, high efficiency automobile radiators reduce fuel consumption by being smaller, lighter and having a lower pressure drop than their aluminum counterparts [20].

Copper was first used as early as 10,000 years ago. Copper pearls were found in Northern Iraq near 8700 B.C. It has been proved that that near 6400 B.C. copper was being melted and then cast into objects in the area now known as Turkey. By 4500 B.C., this technology was also being practiced in Egypt. Most of the copper used before 4000 B.C. came from the random discovery of isolated outcroppings of native copper or from meteorites that impacted Earth. The first mention of the systematic extraction of copper ore came from about 3800 B.C. when an Egyptian reference described mining operations on the Sinai Peninsula. In about 3000 B.C., large deposits of copper ore were found on the island of Cyprus in the Mediterranean Sea. When the Romans conquered Cyprus, they gave the metal the Latin name aescyprium, which was often shortened to cyprium [21]. In the United States, the first copper mine was opened in Branby, Connecticut, in 1705, followed by one in Lancaster, Pennsylvania, in 1732. Despite this early production, most
copper used in the United States was imported from Chile until 1844, when mining of large deposits of high-grade copper ore around Lake Superior began. The development of more efficient processing techniques in the late-1800s allowed the mining of lower-grade copper ores from huge open-pit mines in the western United States. Today, the United States and Chile are the world's top two copper producing countries, followed by Russia, Canada, and China [22].

Owing to its natural color, Copper is traditionally known as the red metal. However, it is also known as a "green" metal because it forms green patina react with environment. Indeed, patinized copper is the architectural focal point of many modern buildings for its natural look. Beyond this, however, copper can truly be cited as the "green" metal both for its role in protecting the natural environment through its use in energy-saving applications and for the achievements that have been realized in the production of the metal in an environmentally sound manner [23].

3.1. Raw materials:

Pure copper is rarely found in nature; but it is usually combined with other chemicals in the form of copper ores. There are about 15 copper ores mined commercially in 40 countries around the world. The most common are known as sulfide ores in which the copper is chemically bonded with sulfur. Others are known as oxide ores, carbonate ores, or mixed ores depending on the chemicals present. Many copper ores also contain significant quantities of gold, silver, nickel, and other valuable metals, as well as large quantities of commercially useless material. Most of the copper ores mined in the United States contain only about 1.2-1.6% copper by weight.

The most common sulfide ore is chalcopyrite, CuFeS₂, also known as copper pyrite or yellow copper ore. Chalcocite, Cu₂S, is another sulfide ore. Cuprite, or red copper ore, Cu₂O, is an oxide ore. Malachite, or green copper ore, Cu(OH)₂·CuCO₃, is an important carbonate ore, as is azurite, or blue copper carbonate, Cu(OH)₂·2CuCO₃. Other ores include tennantite, boronite, chrysocolla, and atacamite. In addition to the ores themselves, several other chemicals are often used to process and refine copper. These include sulfuric acid, oxygen, iron, silica, and various organic compounds, depending on the process used.

3.2. Major Reactions:

i. Anode-oxidation: Cu metal (impure) ---> Cu^{+2} + 2e⁻
ii. Cathode - reduction: Cu^{+2} + 2e⁻ ---> Cu metal (pure)

3.3. Treatment process or Methodology:
3.3.1. Process Description: The SX/EW Process (shown in Figure 3) is a hydrometallurgical process since it is operated at ambient temperatures and the copper is in either an aqueous environment or an organic environment during its processing to get the metal.

The process involves leaching the material with a weak acid solution. This solution, known as pregnant liquor, is recovered and then contacted with an organic solvent, referred to as the extractant, in the solvent extraction stage (SX). Here the copper is extracted from the aqueous phase leaving behind most of the impurities that were in the leach solution. Since the copper ion is exchanged for hydrogen ion, the aqueous phase is returned to its original acidity and recycled to the leaching step of the process. Meanwhile, the copper-bearing organic phase is stripped of its copper by contacting it with a strongly acidified aqueous solution at which time the copper is moved to the aqueous phase while the organic phase is reconstituted in its hydrogen form. The copper-bearing aqueous phase is advanced to the electrowinning (EW) stage of the process while the barren organic phase is returned to the extraction stage of the process. In the electrowinning stage of the process the copper is reduced electrochemically from copper sulphate in solution to a metallic copper cathode. Electrowinning copper cathodes are as pure as or purer than electro refined cathodes from the smelting process. Thus, they are well received by the market.

3.4. Advantages of these Methods:
The electro winning of copper requires considerably more electrical energy than the electro refining process. Electro winning process requires about 8 MJ/kg while electro refining process requires about 1.5 MJ/kg. In electro winning process, the copper must be reduced from the cupric form to metal; whereas, in electro refining process the copper is already in metallic form and is merely transported from the anode to the cathode to purify it. Steps are under development to reduce the energy requirement in electro winning process by about 40% through a modification of the anode reaction [20, 24].

Another advantage of the electro winning process is its low capital investment requirement relative to the smelting process and its ability to be operated economically in a small scale. In China, for example, where copper deposits are not plentiful and tend to be small, there are 40 to 50 "mom & pop" leaching operations involving SX/EW.

3.5. Disadvantages of these methods:

Because of its dependence on sulphuric acid, the at present not SX/EW Process is not used as substitute, but rather an adjunct to conventional smelting. However, it is also applicable in locations where smelter acid is not available by the purchasing of sulphuric acid or the manufacturing of sulfuric acid from sulphur or pyrite.

In addition, it offers the opportunity to recover copper from an entirely different set of ores and smelting mined by-products namely, oxidized materials. These may be mined copper minerals that are in oxidized form - minerals such as Azurite (2CuCO3·Cu(OH)3), Brochantite (CuSO4), Chrysocolla (CuSiO3·2H 2O) and Cuprite (Cu2O), residual copper in old mine waste dumps whose sulphide minerals have been oxidized by exposure to the air or sulfidic copper minerals that have been oxidized by another new technology-bacterial leaching. In addition, the process can be used to extract copper in situ [23]. That is, without removing the material from the waste pile or from the ground. The net result of the usage of this process is that copper can be produced from sources that in the past would have gone untouched, thus reducing the reliance on conventional ore bodies. Further, the process is capable of removing copper from waste materials where otherwise it would have been considered a contaminant to the environment.

3.6. Environmental Issues:

The production of copper, as in the utilization of any other natural resource, has an impact on the environment. This cannot be avoided since the earth must be disturbed in order to extract copper from it; however, the object of the copper mining industry has been to make this impact as small as possible. Significant improvements have been made in environmental impact as new technologies have been applied to the production of copper. Great strides have been accomplished in the conventional treatment of copper ores, such as at the Bingham Canyon mines, in Utah and the adjoining copper smelters.

- Acid plants convert the sulphur dioxide in emissions to sulfuric acid (H2SO4). Other conversions, including to gypsum, elemental sulphur, and liquid SO2 are technologically feasible, but usually not economically viable [25].

- In making sulfuric acid, the hot gases are first collected from the roasters, furnaces, and converters. The gases are cooled, cleaned (through three series of dust collection systems) to recover copper from the dust and prevent fouling of the acid plant, and then treated with sulfuric acid to remove any water vapor. Catalysts convert the SO2 gas to sulfur trioxide (SO3), which is absorbed in a circulating stream of 98.5 percent sulfuric acid and 1.5 percent water, and reacts with the water to form more concentrated acid. There are two basic types of acid plants. In single contact/single absorption (SC/SA) plants, the gas goes through the system once; such plants average conversion (SO2 to H2SO4 ) efficiencies of 96 to 98 percent. Double contact/double absorption (De/DA) plants maximize SO2 capture by returning the gas stream to the converters through an intermediate absorption tower. These plants are capable of 99.7 to 99.8 percent conversion efficiencies [26].

- The design of an acid plant is unique to each smelter. The key variables affecting the efficiency and economics of acid production are the total gas volume; and the SO2 concentration, water vapor concentration, and free oxygen content of the treated gases. The physical dimensions and energy requirements of the acid plant are largely determined by the maximum volume and minimum concentration of SO2 gas.

- There are several reasons why acid plants are so widely used by the U.S. copper industry. The technology is well proven and is the least expensive method of smelter SO2 control. Sulfuric acid is used in solution mining, and also is the most common form in which other industries consume sulphur; thus it can be a salablebyproduct rather than a waste. However, non-leaching markets for sulfuric acid generally are a long way from the smelters in the United States, and the resulting transportation costs can turn the by-product credit into a deficit. Moreover, it often is cheaper for industrial consumers to buy sulphur and produce the sulfuric acid themselves than to purchase acid produced elsewhere.
In the United States, for example, copper is considered as toxic material released to the environment once it is mined under Emergency Planning and Community Right-to-Know Act (EPCRA) and the Environmental Protection Agency's Toxic Release Inventory (TRI). Copper mine dumps and flotation tailings constitute a significant inventory of copper that is considered to be a contaminant to the environment under TRI.

In some countries, such as Japan, a very high level of SO2 control is achieved by copper smelters as part of a government policy to provide sulfuric acid for industrial development [27].

4. The metallurgical treatment processes of Gold (Au) and Environmental issues:

Gold, recognizable by its yellowish cast, is one of the oldest metals used by human civilization. As far back as the Neolithic period, humans had collected gold from stream beds, and the actual mining of gold was traced as far back as 3500 B.C., when early Egyptians (the Sumerian culture of Mesopotamia) used mined gold to craft elaborate jewelry, religious artifacts, and utensils such as goblets [28]. Gold's aesthetic properties combined with its physical properties have long made it a valuable metal. Throughout history, gold had often been the cause of both conflict and adventure: the destruction of both the Aztec and Inca civilizations, for instance, and the early American gold rushes to Georgia, California, and Alaska. The largest deposit of gold is found in South Africa in the Precambrian Witwatersrand Conglomerate. This deposit of gold ore is hundreds of miles across and more than two miles deep. It is estimated that two-thirds of the gold mined comes from South Africa. Other major producers of gold include Australia, the former Soviet Union, and the United States (Arizona, Colorado, California, Montana, Nevada, South Dakota, and Washington) [29].

About 65 percent of processed gold is used in the arts industry, mainly to make jewelry. Besides making jewelry, gold is also used in the electrical, electronic, and ceramics industries. These industrial applications have grown in recent years and now occupy an estimated 25 percent of the gold market. The remaining percentage of mined gold is used to make a type of ruby coloured glass called purple of Cassius, which is applied to office building windows to reduce the heat in the summer, and to mirrors used in space and in electros copy so that it reflects the infrared spectrum [30].

Cyanide (CN), a single carbon atom triple-bonded to a nitrogen atom, has proved extremely useful in extracting gold from ore [31]. However, with a toxic reputation dating back to the Holocaust, its use in mining has been very controversial. Through a process called "gold cyanidation", "the cyanide process", or "cyanide leach mining", cyanide is used to extract gold from the surrounding rock. While cyanide is both effective and economical, its use and transportation present significant environmental risks.

4.1. Raw materials:

The most important gold mines are native gold and electrum. Besides, calaverite (AuTe₂), sylvanite [(Au, Ag) Te₂], muthmannite [(Au, Ag)Te] are also the sources of Au. (Te-tellurium). The main Ag mine is sulphide ore such as argentite, chaorargyrite, stephanite, etc. which always accompanying in (lead, zinc, copper, antimony) sulfide minerals. Silver has a higher grade of mineral deposits, while more than 50% gold symbiosis scattered in the lead, zinc, copper, nickel minerals. Secondary resources are also the main source of gold and silver.

4.2. Major Reactions:

The chemical reaction of Cyanidation methods for the dissolution of gold, the "Elsner Equation", follows:

\[ 4 \text{Au} + 8 \text{NaCN} + \text{O}_2 + 2\text{H}_2\text{O} \rightarrow 4 \text{Na[Au(CN)}_2] + 4 \text{NaOH} \]

In this redox process, oxygen removes, via a two-step reaction, one electron from each gold atom to form the complex Au(CN)−2 ion.

4.3. Treatment process or Methodology:
4.3.1. Process Descriptions:

Cyanide can be used to extract gold, either in a controlled mill environment, or more crudely on rock piles in the open. Cyanide "vat leaching" mixes crushed ore with a cyanide salt finely in water. The cyanide binds to the gold ions, and makes them soluble in water, thereby allowing separation from the rock. This process usually takes place inside a mill or other mining facility. Cyanide, in the form of a very dilute sodium cyanide solution, is used to dissolve and separate gold from ore. Cyanidation also involves using chemicals to separate the gold from its contaminants. In this process, the ground ore is placed in a tank containing a weak solution of cyanide. Next, zinc is added to the tank, causing a chemical reaction in which the end result is the precipitation (separation) of the gold from its ore. The gold precipitate is then separated from the cyanide solution in a filter press. A similar method is amalgamation, which uses the same process with different chemicals. First, a solution carries the ground ore over plates covered with mercury. The mercury attracts the gold, forming an alloy called an amalgam. The amalgam is then heated, causing the mercury to boil off as a gas and leaving behind the gold. The mercury is collected, recycled and used again in the same process.
4.4. Environmental Issues:

Gold is a precious metal which is prominent attraction as a jewellery product specially for women due to its good colours and non-reactive with environment. However, the production of gold sometimes produces some toxic wastes which have detrimental effects on the environment. Besides, both the usage and disposal of cyanide have significant safety and environmental risks. Cyanide and cyanide gas are both extremely toxic and great care has to be taken during ore processing to avoid exposure for workers which are given below:

- Modern industrial gold mining destroys landscapes and creates huge amounts of toxic waste. Due to the use of dirty practices such as open pit mining and cyanide heap leaching, mining companies generate about 20 tons of toxic waste for every 0.333-ounce gold ring. The waste, usually a gray liquid sludge, is laden with deadly cyanide and toxic heavy metals [32].

- Many gold mines dump their toxic waste directly into natural waterbodies. The Lihir gold mine in Papua New Guinea dumps over 5 million tons of toxic waste into the Pacific Ocean each year, destroying corals and other ocean life. Mining companies for gold and other metals dump at in total at least 180 million tons of toxic waste into rivers, lakes, and oceans each year—more than 1.5 times the waste that U.S. cities send to landfills on a yearly basis [33].

- To minimize the environmental damage, mines often construct dams and place the toxic waste inside. But these dams do not necessarily prevent contamination of the surrounding environment. Toxic waste can easily seep into soil and groundwater, or be released in catastrophic spills. At the world’s estimated 3,500 dams have been built to hold mine waste, one or two major spills occurs every year.

- Toxic waste spills have had devastating consequences in Romania, China, Ghana, Russia, Peru, South Africa, and other countries. In 2014, a dam collapsed at the Mount Polley gold and copper mine in British Columbia, sending about 25 million cubic meters of cyanide-laden waste into nearby rivers and lakes—enough to fill about 9,800 Olympic-sized swimming pools. The spill poisoned water supplies, killed fish, and harmed local tourism.

- One of the common breakdown products is nitrate, which itself can cause both environmental and human health problems. Lastly, cyanide can form complexes with certain metals, such as cobalt, and these can persist for many years in groundwater.

- Many old mines, and some current mines, simply place cyanide waste into the mine tailings ponds along with other mining waste. Failure of a tailings dam containing cyanide can be a massive environmental problem, resulting in the sterilization of large areas downstream. In 2000, a tailings dam failure in Romania dumped an estimated 100 tons of cyanide into a river system, contaminating drinking water and killing fish up to 250 miles downstream, with effects purportedly lasting for years.

- In comparison to acid mine drainage, cyanide has a higher toxicity, but is shorter lived. Acid mine drainage can last for thousands of years, whereas cyanide will break down within a few years at most. However, its high toxicity means that even a relatively small spill can have major consequences.

- Many modern mines now use a "de-toxification" process that converts cyanide into the less toxic cyanate before combining it with the mine tailings waste. In addition, the majority of cyanide gold mines use "impermeable" liners in their tailings ponds and underneath their heap leaching operations. However, leaks and tears in these liners have been a continual problem at many mines. Mining companies often argue that the combination of de-toxification and the use of liners makes the use of cyanide an acceptable risk, but there have been numerous accidents over the last decade.

As a result of these environmental concerns, a few countries and US states have banned the use of gold cyanidation. In response, the gold mining industry has promoted adherence to a voluntary "cyanide management code" with strict independent audits of signatory companies. Some environmental organizations have applauded the code for increasing transparency and others have condemned it as "greenwashing". Considering its environmental effects another modern concepts can be find out which would be the effective solution for environmental issues [34].

Conclusion:

To sum up, we need to optimize the previous processes of metal production (Fe and Steel, Al, Cu, Au) and develop new methods to reduce the environmental pollution so that we save this beautiful globe from the harmful effects of pollutants of those industries. Since
industrialization is booming, in parallel, environmental pollution is increasing, modern research should be needed to overcome or capture these contamination products so as to ensure tidy and healthy environment for all living beings.

References:


The difference between Risk in Islamic banks and commercial banks

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Abstract:

Purpose – The purpose of this paper is to examine the difference between Risk in Islamic banks and commercial banks in general. The importance of this paper lies in assessing the performance of conventional and Islamic banks is important because of its importance in the banking structure.

Design/methodology/approach – this research paper relies on the inductive method in a manner available to a researcher from the research sources of electronic research and books, periodicals supports research topic.

Findings: The risks in Commercial and Islamic banks are similar many of them in (risk of theft and loss, cybercrime risk), and also a lot of difference, especially with regard to interest rate risk in classical banks without Islamic banks as well as risks related to financing. Also, Profit in Commercial banks is interest paid on deposits and interest received from loans - Islamic banks (Profit is realized from work and profit Halal). Islamic banks suffer from high liquidity risks, which increases the opportunity cost of using these funds more than Commercial banks. Despite the possibilities and modern methods used by conventional banks in risk management and hedging, they are more vulnerable than Islamic banks. Because the Islamic banks' style of participation enabled them to choose sound projects that avoid them from taking risks.

Practical Implication: Considering the importance of risk management practices in Islamic and conventional banks; Bankers, investors, regulators, and policymakers are likely to benefit from the results of the study as a guide when developing and reforming the existing risk management practices.

Originality: this paper will add value to literature and will be useful for conventional banks, Islamic banks, practitioners as well as for academic point of view.

Key Words: Islamic banks, Conventional Banks, Risks, Risk management, risk classification, Transactional Risks, Credit Risk, Liquidity Risk, Market Risk, Operational Risk, Murabaha financing risk, Participatory financing risk - Mudaraba, Risks of Salaam Financing.

1-1- - Introduction

The Bank is a financial intermediary that collects the savings of individuals and institutions through various spot deposits and deposits on a term basis and in turn transfers these deposits or savings to loans through various financing operations. In addition to this main activity, the Bank carries out a large number of other secondary activities.

It is through knowledge, Risk management to achieve higher profits and returns. However, failure to manage these risks in a correct scientific manner may lead to loss of revenues and failure to achieve the Bank's strategic objectives.

With the growing sophistication of the banking industry, the use of electronic means and electronic funds, the banking services provided by banks have grown and diversified, and the complexity of banking operations has increased in a market characterized by intense competition. In order to cope with this development and the associated risks, it is necessary to monitor the level of
risks surrounding the work and to establish the necessary control measures to control and manage the adverse effects of these risks in a proper manner.

The banking industry witnessed technological developments in the field of communication and globalization, increasing the number of branches and dealers, and the volume of transactions of Islamic banks, which led to increased competition between banking institutions, especially between conventional and Islamic banks. Traditional and Islamic banks play the role of financial intermediation between those with financial deficits and those with surplus financial resources. However, the activity of traditional banks is based on the interest rate system, whether in attracting depositors' money or granting funds to investors. But Islamic banks are based on the rules of the system of participation derived from the fundamentals of financial transactions in Islamic and law does not deal with the benefit at all not by taking or giving.

Islamic banking emerged as a practical reality and started functioning in the 1970s. Since then it has grown continuously all over the world. The Islamic banking industry has reached US$1.0 trillion US dollars by the end of 2008. International Rating Agency, Standard & Poor estimate that the Islamic financial industry has potential to grow to US$4.0 trillion over the medium term. The speed of the growth of Islamic banking in most the world has been expedited since 2002. (Awan, 2009).

The research aims to know the relationship between Islamic banks and conventional banks and discuss the risks of Islamic and conventional banks.

It is appropriate then to put the research problem into context using the following main question: Is there a difference in the risk to Islamic banks and commercial banks?

The current research is divided into three main parts, which are as follows:

1- Conventional Banking products, Financial risks, Banking Risks.
2- Islamic banking, Risk management.
3- Conclusion.

1- Conventional Banking products, Financial risks, Banking Risks:

1-1- commercial banks

This is a financial institution providing services for businesses, organizations and individuals. Services include offering current, deposit and saving accounts as well as giving out loans to businesses.

Commercial banks make their profits by taking small, short-term, relatively liquid deposits and transforming these into larger, longer maturity loans. This process of asset transformation generates net income for the commercial bank. (lexicon.ft.com/Term?term=commercial-bank).

1-2- Financial risks and The Basel Committee's work

1-2-1- The concept of Risk Financial risks

"The Basel Committee also knows identified the risks as: "the probability of the Bank being exposed to unexpected and unplanned losses or the fluctuation of the expected return on a particular investment, resulting in a negative effect, which has the potential to affect the achievement of the desired objectives of the Bank and to implement its strategy successfully" .(Keegan, 2004).

"Risk financial are fluctuations in the market value of the enterprise” (Union of Arab Banks, March 2005, p. 42).

1-2-1- risk classification

Risk is classified into Two categories, systematic risk, and unsystematic risk.
The commercial banks are facing the several risks of which:

Credit risk, operational risk, liquidity risk, market risk, interest rate risk, foreign exchange risk, solvency risk, counter-party risk, compliance risk, sovereign risk and legal risk (Bhattachariya, 2010).

1-2-1- The systemic risk arises when the failure of a single entity or cluster of entities can cause a cascading failure, due to the size and the interconnectedness of institutions, which could potentially bankrupt or bring down the entire financial system. (Indian, 2003, pp250).

1-2-1-2- Risk unsystematic The risk that affects a very small number of assets. Specific risk, as its name would imply, relates to risks that are very specific to a company or small group of companies. This type of risk would be the opposite of an overall market risk or systematic risk.

Sometimes referred to as "Specific or diversifiable risk."

Moreover, Oldfield and Santomero (1997) mentioned that there are three risk-mitigation strategies generally:

- Eliminate or avoid risks by simple business practices.
- Transfer risks to the other participants.
- Actively managing risks at the bank level (acceptance of risk).

1-3- Banking Risks

Risks arise from the uncertainties surrounding the probability of achieving or not realizing the expected return on investment. (Matar, 2004, p22).

"Risk in simple words is uncertainties arising due to adverse fluctuation of profits and losses. The main risks faced by conventional banks include credit risk, liquidity risk, operational risk, market risk, interest rate risk, foreign exchange risk, and mismatch risk". (Bessis, 2002).

The commercial banks are facing the several risks of which:

Credit risk, operational risk, liquidity risk, market risk, interest rate risk, foreign exchange risk, solvency risk, counter-party risk, compliance risk, sovereign risk and legal risk (Bhattachariya, 2010).

1-3-1- Transactional Risks

These risks create hurdles for individuals and companies in dealing with different foreign currencies as exchange rates of currencies might change over a short time-period. This effect can be decreased by using currency swaps and other similar securities. (Vyas and Singh, 2010).

1-3-2- Credit Risk


" Credit risk is the risk that customers default on payment (In the sense they are, they fail to meet their obligations) and result in a total or Partial loss of any amount of lender to counterparty" (Hammad, 2007, p 197).

Credit risk is divided into following credit risk component:

1-3-2-1- Customer's risk: This type of risk arises because of the Credit Reputation of the customer and its financial solvency.

1-3-2-2- Risks of the economic sector to which the customer belongs: These risks are related to the nature of the activity in which the customer operates. Each economic sector has risks that vary according to the operational, productivity and competitive conditions of the sector's units.

1-3-2-3- Risks of general conditions: These risks are related to economic conditions and developments Political and social.

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Risks associated with bank errors: These risks are related to the efficiency of the credit management of the bank in following up the credit provided to the customer and to verify that the customer meets the agreed terms in the Credit Grant Agreement. One of these errors is the bank's failure to deposit deposits customer, which placed it as collateral for credit facilities and customer withdrawal of these deposits.

Effective credit risk management Be aware the need to identify, measure and monitor credit risk, as well as maintain capital adequacy levels that enable it to cover losses that may arise from credit risk, thus contributing to the success of any banking institution in the long term. (Zubaidi, 2002, p179).

It is important to recognize first that any lending process is subject to certain risks and that these risks vary according to each process. The lender, Bank must therefore try its best to prevent these risks from becoming a reality because if it does not, it will not achieve the desired return. These risks may also lead to the loss of lending money also, so the lender bank estimates the risk of giving individuals have a loan.

It analyzes the borrower's ability to repay, Hence it must form the payment installments (monthly, quarterly, semi-annual, annual).

The bank often asks the customer to provide a guarantee that the bank can use if the borrower fails to pay.

It also grants loans to an individual borrower or borrowers linked to the bank through ownership, if not subject to proper control and may lead to the creation of many problems. Because the determination of the borrower's eligibility is not objective, such as granting advances to shareholders, the parent company, subsidiaries and executives, In such cases, granting loans depends on the bias, which leads to the risk of losses caused by these loans.

1.3-3- Liquidity risk

These risks are the inability of the bank to pay the financial liabilities when they mature, and the bank that cannot meet its short-term Term obligations is the beginning of the occurrence of the deficit phenomenon, which if it continues can lead to bankruptcy.

Liquidity risk is the difference in the net income and market value of equity arising from the difficulty the Bank faces in obtaining cash at a reasonable cost, either from selling assets or acquiring new loans. The liquidity risk increases when the Bank cannot anticipate the new loan or draw Deposits and cannot access new sources of money. The liquidity of assets is identified by indicating the owner's ability to transfer cash assets at the lowest loss from the drop in price. Most banks have some assets that can be sold immediately at a value close to the underlying value. To meet the needs of If the bank needs money, it can sell assets or increase loans, and Banks are constantly monitoring their core cash flows and their ability to meet these needs and commitments. (Kurdi, 2010).

Liquidity risk refers to the risks faced by banks when they do not have sufficient funds to meet their financial obligations at the set time. Liquidity risk includes short-term and long-term risks. The bank must meet the demand for liquidity arising from customers wanting to withdraw part of their deposit On loans, if the bank has two sources of liquidity are (Ramadan, 2013, p. 57).

1.3-3-1. Assets and liabilities.

1.3-3-2 - borrowing from others (it means is borrowing from the central bank and other banks).

Banks can not maximize their returns or maximize their liquidity. High liquidity means sacrificing returns while low liquidity forces them to borrow. The higher the bank's liquidity, the higher the risk.

A decline in the return because most of the money has not been operated and invested and remained with the bank as funds disabled, and this in itself risk to the bank and in this case will face the risks (inflation, time value of the leader, In the event of theft, increase tax base).

The lower the bank's liquidity, the higher the risk, and the higher the return is likely, because most of the money was operated by the bank and thus the bank will face the risk of bankruptcy and inability to take advantage of opportunities in the market.
Liquidity is not an end in itself, if there is a point of balance between the amount of liquidity with the bank and what the bank is trying to reach from the proceeds so should not be deviated from them to increase or decrease.

- Opinions differ on the causes of these risks such as

Reasons related to the difficulty of liquidating current assets

Increased incidence withdrawals are especially large, which causes the bank to liquidate some of its assets at a value that is less than its carrying value to settle the liabilities, which affects profitability.

- Reasons on both sides of the budget range

1- Commitments side: Meaning when the applications for withdrawing depositors are increased, the bank may have to borrow at an additional cost from other banks or to issue more securities such as bonds.

2- Assets side: whereas The service of letters of guarantees, which done are extrabudgetary and which as soon as they do the client a loan under which they appear in the budget arises liquidity risk, which causes the bank to pay for the sale of a compulsive value of less than the value due to provide liquidity.

- Reasons related to different due dates

We find that the maturity dates are not suitable for short-term deposits for the long-term loan repayment dates due to the Bank.

- Reasons related to the imbalance between inflows and outflows. (Nasr, 2013, p. 57).

1-3-4- Market Risk

They are related risks which are revenue as a result of changes in interest rates and fluctuations in exchange rates, prices of securities and commodity prices.

Led engagement of banks, especially major banks in trading activities, led to exposure to market risks, which resulted from the adverse movements in the prices and rates of the financial market (asset prices and interest rates). This increased the total risks to which it was exposed, which made many regulatory authorities in Many developed countries, As well as the Basel Committee for Banking Supervision That bank should reserve capital to cover market risks. (Hashad, 2005).

Market risks occur due to the changes in the market value of the interest rates, exchange rate and changes in the prices of bonds, equities and commodities. Banks are facing market risks in regards to management of balance sheet and trading operation (Ghosh, 2012). The following are the market risk factors.

1-3-4-1- Interest rate risk: These risks arise as a result of changes in the level of market interest rates in general. As a general rule, With other factors remaining unchanged, whenever the higher the interest rate levels in the market, The market value of trade securities decreased.

The interest rate is influenced by the liquidity condition in the financial market, price movements, fiscal and monetary policy, exchange rate movements, development in local and international financial markets.

It is difficult to predict the interest rate movements that may increase, decrease or remain constant over a time period.

And bears the economists of the bank to analyze the interest rate movements critically and draw a guideline on interest rate movements for a bank (Ghosh, 2012, p. 370).

1-3-4-2- the risk of exchange rate fluctuations: They result from dealing in foreign currencies and currency fluctuation occurs, requiring fully conversant and adequate studies on the causes of price fluctuations.

1-3-5- Operational Risk

(King) Operational risk is defined as "not dependent on how the business is financed, but how it runs its business" and "operational risk" is the link between the activity of the institution and the change in the outcome of the business". (TanTanKawtar, 2007/2008, p.15).
They are defined as "the risk of weakness in internal control or weakness of people and systems or external circumstances. The risk of loss resulting from the probability of inadequate information systems, technical failure, violation of control systems, embezzlement, natural disasters all lead to Unexpected losses". (Marco Micocci, June 2012, Roma, p10).

Bessis (2011) explains that operational risks exist at following levels:

1-3-5-1- Internal Fraud: Acts of the kind intended for fraud, misuse of property, circumvention of law, regulations, or company policy by its officers or employees.

1-3-5-2- External Fraud: Any acts by a third party of the type intended for fraud, misuse of property, or circumvention of the law.

1-3-5-3- Work and safety practices in the workplace: works that do not conform to the nature of the job and the requirements of health and safety laws or any agreements or acts that result in compensation for personal injury.

1-3-5-4- Practices related to customers, products, and businesses: Unintentional or negligent failure to meet professional obligations to specific customers, including requirements for validity, reliability or failure resulting from the nature of the product design.

1-3-5-5- Damage to physical assets: Losses or damage to physical assets caused by natural disaster or other events.

1-3-5-6- knock off work and malfunctions in systems including computer systems: any disruption of business or system failure.

1-3-5-7- Execution and transaction management: failure to execute transactions or manage operations and relationships. Banks should identify and assess all types of operational risks they face in all their business processes and policies. Before starting any new product or activity, or any change in the system, the Bank must identify this change in the Operational Risk Management Plan. (Abdelfattah, June 2000).

2- Islamic banking, Risk management.

2-1- Islamic Banking

The Islamic banking system has the same purpose as conventional banking, i.e. to earn a profit on capital by investing a proportion of its earnings while adhering to Islamic law.

But, Islamic banks do not operate its activities on an interest-based system. It works in accordance with the Shariah principles, known as Fiqh Al-Muamalat (Islamic guidelines for transactions). The basic belief of Islamic banking is to share profit and loss and the prevention of Riba (interest). The main argument against Riba (interest) is that money is not to be considered as a commodity with which one can earn profits, but it should be earned on the sale of goods and services rather than control of money itself.

Among the common Islamic finance theories and models, following products are commonly used by Islamic banks, such as profit and loss sharing (Mudarabah), a joint venture (Musharakah), cost plus (Murabahah), safekeeping (Wadia) leasing (Ijarah) and Islamic insurance (Takaful).

Prohibitions of interest, gambling, excessive risk, etc. supports the social equality and defend the benefits of all parties involved in market transactions (Ahmad, and Chapra, 2000, pp. 5-20). According to the Iqbal and Molyneux (2005), Islamic banking is constructed upon the norms of brotherhood and mutual aid, which stands for a system of sharing equity, risks and profits. Islamic finance promotes a system of sharing and cooperation between the investors and users of the funds.

2-1-1- Definition of Islamic Banks

2-1-1- " The Islamic Bank is defined as a "financial institution operating in an Islamic framework that performs banking and financial services. It also carries out financing and investment activities in various fields in the light of Islamic Shari'a rules and regulations". (Dr. Mahmoud, 2003, p96).

2-2- Risk management

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Risk management is defined as "the process by which risks are monitored, identified, measured, monitored and controlled in order to ensure full understanding and assurance that they are within acceptable limits and the framework approved by the Bank's Board of Directors for risks. (Abu Muhaimid, 2008, p. 19).

In other words, risk management in Islamic banks focuses on the actions taken by management to understand, define and analyze risks so that they can be avoided or attempted to reduce them to a minimum.

Whereas Islamic financial institutions have a comprehensive risk management framework and reporting process with the appropriate board of directors and senior management oversight for identifying, measuring, monitoring, reporting and controlling various types of risks and where necessary, they should maintain capital adequacy against such risks. The process should take appropriate steps to comply with Shariah rules and regulations, and also to ensure the adequacy of relevant risk reporting to the supervisory authority.

Therefore, the risk management process should be comprehensive and integrated covering all departments and departments of the bank so that there are awareness and Perception of this Administration, and depends on the following main elements:

Accurate definition of the risks involved in the Bank's activities, effective risk reduction, based on accurate and correct risk assessment and of procedures, methods, and tools, through a sound monitoring and follow-up, and appropriate organizational, human and technical infrastructure. Risk management is primarily designed to ensure that all legal requirements are met at all times, to capture total exposure to risk, as well as to determine risk concentration and avoidance. (Khatib, 2005, p19-20).

2-2-1- Credit risk

Credit risk in the bank Islamic: Credit risk is the most important risk faced by banks in both systems, because borrowers' inability to pay may lead to liquidity risk, interest rate risk, erosion of asset values, and other risks. For this reason, the degree of credit risk will negatively affect the quality of existing banking assets. The question that arises here is: Do Islamic banks face more or less credit risks than conventional banks?

The initial answer to this question depends on a number of factors, such as: the general features of credit risk in Islamic finance, the counterpartys risk profile of certain Islamic financing formats. Provides artistic methods to mitigate the effects of risk, accuracy in the calculation of expected losses of credit.

Credit risk is in the form of settlement risks or payments that arise when one of the parties to the transaction has to pay money (for example, in the case of a Salaam contract). There are some risks which are specialized to Islamic financing formulas are concerned with:

2-2-1-1- Murabaha financing risk: Murabaha contract is the most widely used Islamic financial contracts. If possible, the consolidation of the contract can be close to the risk of conventional financing. In view of this similarity, a number of financial and regulatory authorities in a number of countries have accepted this contract as a financing formula. It is noted that the jurisprudential views are not in agreement with the contract in its current form.

This divergence of views could be a source of the so-called risks of the other party to the contract.

There is a jurisprudential consensus that the murabaha financing contract, which is an updated contract (drafted by collecting a number of different contracts), has been approved as a form of forward sale.

The condition of the validity of this contract comes from the fact that the bank must own the commodity through the purchase and then transfer it to the customer (the borrower); the order issued by the latter to buy does not represent a sale contract but it is a promise to buy.

According to the decision of the Islamic Fiqh Academy of the Organization of the Islamic Conference, the promise may be binding on one party in the Murabaha contract. Accordingly, the Islamic Fiqh Academy, the Accounting Authority and most Islamic banks consider this promise binding on the customer. But the jurists of others consider the promise is not binding on the customer, and that the customer can retreat from the completion of the purchase contract even after the promise is made and he has to pay the deposit.
Hence, it is clear to us that the first and most important risk of this contract may arise from disagreement about the nature of the contract and subsequent judicial problems. The other potential risk associated with this contract is the customer's delay in repaying the debt, especially since the Islamic banks do not take any more than the price of the agreed commodity, which exposes the bank to the loss in the event of a slowdown or delay in payment by the customer. (Hammad, 2003, p243,246).

2-2-1-2- Participatory financing risk - Mudaraba: The expected risk in Techniques of participation and speculation increases due to the fact that there is no guarantee requirement with the potential for moral hazard and wrong selection of customers, and because of the poor efficiency of these banks in the field of project evaluations.

Many studies confirm that the Islamic banks use the funds on the basis of participation and speculation is better than using them in accordance with the fixed income formulas such as Ijara, Istisna, and speculation, but in practice, Islamic banks do not use participation and speculation Only within limits, because of the high risks they generate. One way to get rid of the risks associated with profit sharing techniques is for Islamic banks to operate as comprehensive banks that hold shares in their investment portfolios.

2-2-1-3- Risks of Salaam Financing: There are at least two types of risks in the Salaam decade sourced by the other party to the contract:

- The risk of the other party's non-delivery of the Muslim in a timely manner or of non-delivery of it is entirely different from that of the peace agreement. Since the peace contract is based on the sale of agricultural products, the risks of the other party may be due to factors unrelated to the financial solvency of the customer, for example the insufficient agricultural crop that the customer earns in quantity and quality due to natural disasters, although the customer has a good credit rating. As agricultural activity naturally faces disaster risks, the risks of the other party are more likely to be in the peace.
- The Salaam contracts are not traded on regulated markets or abroad. They are a two parties’ agreement that ends with the delivery of goods in kind and the transfer of ownership. These commodities need to be stored so there is an additional cost and price risk for the bank that owns the commodity under the Salaam contract. This type of cost and risk is specific to Islamic banks only. (Khan, 2003, P. 68-70).

2-2-1-4- Financing risks Istisna'a: According to the funding formula by contract the Istisna'a financing formula, the Bank offers its capital to a number of special risks to the counterparty. These risks include:

- Risk of default by the buyer of a general nature, meaning not to pay in full on the date agreed with the bank.
- If Istisna'a is considered a permissible contract a non-binding contract, according to some jurisprudential opinions, there may be risks to the other party, which may depend on the non-validity of the contract and retract it.
- The risks of the other party in the Istisnaa contract faced by banks and private to deliver the goods sold in a manner similar to the risks of the Salaam contract. Where the other party can fail to deliver the item on time or is a bad commodity. In the case of Istisna'a, the commodity is the subject of the contract under the control of the customer (the other party) and less vulnerable to natural disasters compared to the sold goods. For this reason, it is expected that the risk of the other party (contractor) in Istisna'a will be much less serious compared to the customer risk in the Salaam contract.
- If the customer is treated in the Istisna transaction as a client in the Murabaha contract and if he has the option of withdrawing from the contract and refusing to deliver the commodity on time, there is an additional risk faced by the Islamic Bank when dealing with the Istisna'a contract.

These risks may arise because the Islamic Bank, when entering into an Istisna'a contract, takes the role of manufacturer, builder, and supplier. Since the bank has not specialized in these professions, it relies on subcontractors. (Khan, 2003, P. 71-73).

2-2-2- Liquidity Risk Management in Islamic Banks

2-2-2-1- The concept of liquidity management in Islamic banks

The Central Bank of Malaysia has issued a standard defining the concept of liquidity management in Islamic banks and that the: "The Bank maintains sufficient cash flows to meet sudden or unusual large withdrawals". (Bank Negara Malaysia, 2002, liquidity framework for Islamic Financial Institutions).
The availability of liquidity is very important to face depositors' withdrawals while maintaining large liquidity reduces the profitability of the bank and gives a negative indication of the bank's limited investment capacity, all of which falls within the liquidity risk defined by the Islamic Financial Services Council however, it is offering the Islamic Financial services corporation a loss arising from its inability to meet its obligations or finance the increase in assets as they accrue without incurring unacceptable costs or losses. In order to achieve this, the Islamic Bank must effectively manage liquidity risk. (Akram, Said, December 2011).

2-2-2- Liquidity risk in Islamic banks

Liquidity risk in Islamic banks arises from the inability of the Bank to meet its obligations towards others or finance the increase in assets, which affects the profitability of the Islamic Bank, especially when impossibility the liquidation of the assets at an acceptable cost.

The main liquidity risks facing Islamic banks can be summarized as follows: (Qanatqji, 2010, p. 433).

- Weak liquidity planning in the bank leading to Incompatibility between Assets and liabilities in terms of the maturity period
- The sudden shift of some occasional commitments into actual commitments.
- Poor distribution of assets into uses that are difficult to convert into liquid assets.
- Some external factors such as economic stagnation and crises in financial markets contribute to exposure to liquidity risk.
- In addition to lack of liquidity in the Islamic secondary market and the lack of short-term instruments to invest excess liquidity.
- Lack of special facilities for the last lender.
- Limited banking market potential among Islamic banks.
- The Legitimacy restrictions on the sale of debts, which represent a large part of the assets of Islamic banks.

It has developed Traditional banks their tools to make use of the funds available to them, Compliance periods control between deposit term and duration of the loans, facilitated by this task that its relationship with the users of money is a creditor relationship with a debtor for a specific time despite this ease of arrangement they often fall into liquidity crises resulting from the investment of short-term deposits in long-term loans. (Khalidi18 to 20 December 2011).

Islamic banks differ on commercial banks in that they do not provide money in the form of limited term loans, but finances real projects that are difficult in most cases to control the dates of liquidation and collect the results resulting in the difficulty of finding the necessary liquidity in a timely manner to refund deposits at maturity, but in contrast, complains of the availability of liquidity due to the inflow of deposits and a large amount of capital. The problem lies in the nature of the system itself, which necessitates the establishment of controls on the forms of investment used by banks to ensure the term of time and liquidation of any assets of the bank in the event that the maturities are not compatible and these controls are reflected in the means of reducing the following liquidity risks: (Attia,1986)

- To adopt the principle of time-limits in mainly and to choose formulas that would achieve this principle.
- The liquefaction of deposits: The transfer of the largest possible amount of the assets of the Islamic Bank of the elements can be delivered and this is only issued negotiable certificates represent the assets of the Bank is available for this situation and create a market for the circulation of these certificates so that become an important part of the assets of the investment bank to a degree of liquidity allows to measure And to adjust the liquidity situation of Islamic banks.
- The development of formulas used, by adding the conditions of the options and alternatives
- Which ensure the exit of Islamic Bank out of the investment process before its end to achieve the liquidity that may need.
- Developing the tools and devices on the secondary market: the natural expression of the exit from investment before the end of its duration by another investor replacing the investor wishing to exit.

Islamic banks suffer from high liquidity risks, leading to higher levels of monetary and non-monetary assets, which increases the opportunity cost of using these funds more than conventional banks.

2-2-3- Operational Risks

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Operational risks are associated with the failure of the system, technology related issues and functioning, including policies, procedures and weak internal processes of the Islamic banks, which lead to potential losses for the banks. Operational risk arises because of failure of internal and external processes which result in direct and indirect losses to the Islamic banks (Bessis, 2002, 2007, p 63).

Sundararajan (2005) asserted that operational risk arises in the Islamic banks due to following aspects, cancellation of Murabahah and Istisna’ contract, dilemmas in internal control system for managing problems in operational processes and back office functions, technology risks, potential risk related to the enforcement of Islamic contract in a big legal environment, the risk of non-compliance with Shariah rules and regulations, and potential cost for monitoring equity based contracts and legal risks associated with these contracts (Van Greuning and Iqbal, 2008).

In addition, operational risk consists of other risks, such as legal risk (Archer and Abdullah, 2007; Djojosugito, 2008; Fiennes, 2007; Khan and Ahmed, 2001; Sundararajan, 2005), Shariah non-compliance (IFSB, 2007; IFSB, 2005), fiduciary risks (IFSB, 2005) and reputational risk (Archer and Abdullah, 2007; Akkizidis and Bouchereau, 2005; Fiennes, 2007; Standard and Poor’s, 2008).

At the list of risk exposures, operational risks are considered significant and one of the prominent risks faced by Islamic banks. Khan and Ahmed (2001) found that managers at Islamic banks believed that operational risks are more significant after mark-up risks. It has been found in the survey conducted by Khan and Ahmed (2001) that operational risks are higher in Salaam and Istisna’ mode of Islamic financing and is lower in Murabahah and Ijarah contracts. The highest ranking of the risks in the instruments showed that the banks consider it difficult to implement these contracts.

3- Conclusion

1- The risks in classical and Islamic banks are the similar many of them, (risk of theft and loss, cybercrime risk), and also a lot of difference, especially with regard to interest rate risk in classical banks without Islamic banks as well as risks related to financing formats.

2- Profit in Commercial banks is the difference between the Benefit the Creditor and Interest paid (interest paid on deposits and interest received from loans) - Islamic banks: Profit is realized from (work and profit Halal).

2- The basis of financing: commercial bank: Based on lending at a specific interest rate without work, bank Islamic: based on working according to the rule of profit and loss

3- Islamic banks suffer from high liquidity risks, leading to higher levels of monetary and non-monetary assets, which increases the opportunity cost of using these funds more than conventional banks.

4- Despite the possibilities, methods and modern methods used by traditional banks in risk management and hedging, but it is the more vulnerable risk than Islamic banks this is to get away the latter about all that is Haram and its style in the participation it enabled them to choose sound projects that avoid incidence in the risk.

5- Islamic banks differ from commercial banks in that they do not provide money in the form of limited term loans, but finances real projects that are difficult in most cases to control the dates of liquidation and collect the results resulting in the difficulty of finding the necessary liquidity in a timely manner to refund deposits at maturity.

6- In Islamic banks, the relation between the Bank and its Depositors is that of Mudarib and Rabb-ul-Maal (in case of Savings Account and Term Deposits) Either in commercial banks the relation between Bank and Depositors (the Borrower and Lenders).

7- The Bank Islamic invests the funds it receives at the depositors’ own risk (in case of Savings Account and Term Deposits) but being a trustee, is accountable to the depositors in case of its negligence resulting in loss but Conventional Banks provide a guarantee of the capital to their depositors.

8- Profit is shared in bank Islamic with the Rabb-ul-Maal at a pre-agreed ratio, that is, the Bank pays a share of the profits it actually earns from its operations to its depositors, but Conventional Banks provide a guarantee of the capital to their depositors, depositors are paid on a pre-agreed interest rate.

9- Despite the possibilities, methods and modern methods used by conventional banks in risk management and hedging, they are more vulnerable than Islamic banks. Because the Islamic banks' style of participation enabled them to choose sound projects that avoid them from taking risks.
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RELATIONSHIP BETWEEN DRY EYES SYNDROME WITH CATARACT SURGICAL TECHNIQUES IN PATIENTS AFTER CATARACT SURGERY AT H. ADAM MALIK HOSPITAL MEDAN AND NETWORK

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Abstract

Background : Dry eye syndrome (DES) is an aggregate of symptoms that include disorders of the tear film caused by decreased tear film production or increased evaporation of tears, causing symptoms of discomfort in the eye and can lead to diseases of the eye surface. The prevalence increases with age which is about 5% of the population in the fourth decade. One of the risk factors that caused dry eye syndrome is involves corneal surgery (LASIK), intracapsular and extracapsular cataract extraction. The corneal incision may lead to instability of the tear film that can trigger dry eye syndrome.

Aim : The purpose of this study to investigate the effect of cataract surgery techniques to the occurrence of dry eye syndrome.

Method : This study was a cross sectional descriptive and analytical. The number of samples in each technique are 28 people on ECCE, SICS, and phacoemulsification. The total sample was 84 and already had cataract surgery for one week and to came to outpatient clinic Haji Adam Malik Hospital and co, in Lens and Cataract Sub Division. Each patient was examined visual acuity and anterior segment examination with slitlamp to get rid of any signs of infection after cataract surgery. Then examined the tears volume using Schirmer paper stripes. Then recorded the valueon schirmer paper stripes.

Result : Distribution by sex the most subjects were male as many as 54 people (64.3%), the age of most cataract patients are aged 60-79 years as many as 57 people (67.9%). The most age who suffer from des with ECCE cataract surgery technique is the age of 60 -79 years as many as 14 people (50.0%) and most who suffer dry eyes syndrome after cataract surgery with ECCE technique are male as many a as 17 people (60.7%) , The most age who suffer dry eyes syndrome after ECCE cataract surgery technique are age 60 -79 years as many as five people (17.9%) and most who suffer gender des post cataract surgery with SICS technique are age 60-79 years as many as 4 people (14.3%) , The most age who suffer from dry eye syndrome after cataract surgery with phacoemulsification technique are age 60-79 years as many as 8 people (28.6%) and most who suffer dry eyes syndrome after cataract surgery with phacoemulsification technique are male 5 people (17., 9%).

Conclusion : No relationships between the technique or type of incision cataract surgery (ECCE, SICS, and phacoemulsification) with the occurrence of dry eye syndrome.

Keywords: dry eyes syndrome, ecce,sics, phacoemulsification

I. INTRODUCTION

Dry eye syndrome (SMK) is a collection of symptoms that include disturbances in the tear layer caused by decreased tear production and increased evaporation of tears, resulting in symptoms of discomfort in the eyes and can cause disease on the surface of the eye (American Academy of Ophthalmology, 2010 Smolin G, Thoft RA, Lippincott Williams and Wilkins, 2005)1,22,23

Dry eye syndrome is a disease with various causes that affect the tear layer and the ocular surface with symptoms of ocular discomfort, visual impairment and teardrop instability that cause ocular surface damage with increased osmolarity of the tear layer and the inflammation of the ocular surface (Dry Eye Workshop,2007)7

Tear layer on the surface of the eye serves to moisten and lubricate the eye to feel comfortable. Teardrop consists of 3 layers of the outermost layer of lipid produced by meibom glands, a layer of aequos produced by the lacrimal gland and the innermost layer of the mucin layer produced by conjunctival goblet cells (American Academy of Ophthalmology,2011-2012 a)1

Tear secretion is influenced by the neural system involving a complex unit of lacrimal function. Stimulation on the surface of the eyeball will stimulate lacrimation reflexes. The lacration reflex is important primarily as a protection against the eyeball (American Academy Ophthalmology, 2011-2012 b)2

The prevalence of dry eye syndrome increases with age, about 5% of the adult population during the fourth decade of life and increases by 10-15% at age over 65 years. The highest prevalence is found in women (60%) and 40% in men. In the United States of 4,910,000 the population of 3.230 million million women and 1.680 million million men, aged ≥ 50 years. In Indonesia the prevalence of dry eye is 27.5%. (Gayton,2009)8
One of the risk factors for dry eye syndrome is surgical action involving the cornea (LASIK), intracapsular and extracapsular cataract extraction. Disorders caused by incisions in cataract surgery can lead to tear drop instability that can trigger dry eye syndrome.

Cataract is the main cause of blindness and the most visible impairment and treatment through surgery. From WHO (2002) data of 17 million (47.8%) of the 37 million blind people worldwide due to cataracts. This number is expected to increase to 40 million by 2020. Indonesia is the third country with the highest number of blindness in the world and the highest first rank in Southeast Asia (American Academy of Ophthalmology, 2010-2011; Depkes RI Survey Kesehatan Indera Penglihatan 1998; Hutasoit H, 2010).6,10

Until now the main handling of cataract patients is through surgery techniques. Along with the development of time and time, more and more developed techniques of cataract surgery. Begin with cataract surgery technique with corneosklera incision in Extra Capsular Cataract Extraction (ECCE) involving cutting of conjunctiva and sclera to phacoemulsification with transcorneal incision with superior and temporal incisional location variation. The incision will cause damage from the eye, among others, on the cornea, conjunctiva, and tear layer that trigger the occurrence of some complications post cataract surgery, among others, can occur dry eye syndrome (SMK) (American Academy of Ophthalmology, 2010-2011; Zhang S and Li YZ, 2010).

The results of Cho (2009) study that the incision in phacoemulsification can lead to the occurrence of SMK in patients who previously did not suffer from SMK. Similarly, Roberts (2007) reported that there is a clinically significant proportion in some post-phacoemulsification sufferers who experience vocational symptoms, as many as 73% of patients have complaints of foreign body sensation in the eyes. While 27% never experienced the complaint. It was also revealed by Barabino (2010), that most post-phacoemulsification patients who had been diagnosed with previous SMK experienced significant increases in clinical complaints and clinical features of SMK. From the results of research conducted by Ratna (2008) found the difference of examination results of tear layer quality and subjective complaints on the first postoperative day between phacoemulsification and ECCE (American Academy of Ophthalmology, 2010 Javadi MA and Feizi S, 2011; Smolin G, Thoft RA, Lippincott Williams and Wilkins, 2005; Sitompul R, Sancoyo GS, Hutauruk JA, and Gondhowiarjo TD, 2008; Smolin G, Thoft RA, Lippincott Williams and Wilkins, 2005).

II. METHODS

This research is observational with cross sectional measurement method by taking data in patient of Rejection Eye Poly at H Adam Malik Hospital Medan from September 2016 until sample fulfilled.

Inclusion criteria were all post-cataract patients 1 week who visited the eye polyclinic of RSUP H. Adam Malik Medan and Hospital Hospital, and were willing to take part in the study. Exclusion criteria were patients with post-cataract surgery and patients with corneal burn post cataract surgery.

The study sample identity data consisted of patients post-cataract surgery one week and no signs of postoperative infection. All samples are examined sharply with Snellen Chart. Examination of the anterior segment with slitlamp biomicroscopy. Then tested Schirmer1: a thin strip of paper (5mm width, 35mm long) placed in the inferior fornix near the lateral canina with the eyes closed. Wetting ≤10mm for 5 minutes is a diagnostic for dry eye syndrome.

Assessment and interpretation of dry eye syndrome degree in post-cataract surgery patients from the examination was recorded as research data to be the result of the study.

III. RESULT

This research is a cross sectional observational that aims to find out the relationship of dry eye syndrome incidence in post cataract surgery patients by taking data in patients of Rejection Eye Poly at H Adam Malik Hospital Medan. Patients with ECCE technique were 28 people, patients with SICS technique were 28 people and patients with phacoemulsification technique were 28 people.

<table>
<thead>
<tr>
<th>Table 4.1.1 Distribution subjects by sex and age</th>
<th>Variabel</th>
<th>Frekuensi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Man</td>
<td>54 (64.3%)</td>
<td></td>
</tr>
<tr>
<td>Woman</td>
<td>30 (35.7%)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>84 (100%)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 4.1.2 Distribution of Dry Eye Syndrome With ECCE Techniques Based on Age and Sex</th>
<th>ECCE (+) SMK</th>
<th>(-) SMK</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age 40-59</td>
<td>10%</td>
<td>2%</td>
<td>12%</td>
</tr>
<tr>
<td>60-79</td>
<td>14%</td>
<td>0%</td>
<td>14%</td>
</tr>
<tr>
<td>≥80</td>
<td>2%</td>
<td>0%</td>
<td>2%</td>
</tr>
<tr>
<td>Total</td>
<td>26%</td>
<td>2%</td>
<td>28%</td>
</tr>
</tbody>
</table>

In the table above shows that the subjects of most research are male (54.3%) and most of them are 60-79 years old (57.9%).

In table 4.1.2 above obtained the most age who suffer from dry eye syndrome post ECCE surgery is on 60-79 years about 14 people (50.0%) and male sex as many as 17 people (60.7%).
Based on Chi-Square diatas menyatakan bahwa P value pada ECCE adalah 0.48, P value pada SICS adalah 0.998 dan P value pada Phacoemulsifikasi adalah 0.791, berdasarkan uji chi-square menunjukkan tidak ada hubungan sama sekali antara teknik atau tindakan operasi katarak dengan terjadinya sindroma mata kering.

IV. CONCLUSION
It is recommended that a subjective complaint anamnesa be used with the Ocular Surface Disease Index (OSDI) questionnaire criteria, and additional checks such as ferning and Tear Break UpTime (TBUT) tests before and after surgery as a diagnostic standard in dry eye syndrome.

V. DISCLOSURE
Patients have been approved prior to the study conducted and cost involved in this research is borne by researcher

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ASSESSING THE KNOWLEDGE OF VEHICLE USERS AND VULCANIZERS OF TYRE PROFILE ON VEHICLE PERFORMANCE


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Abstract- Motor vehicle tyres are costly and plays an important role in the motor vehicle handling, hence it is important they are handled by well-trained people. A survey of one hundred and eighty (180) drivers and twenty (20) vulcanizers at Sekondi -Takoradi metropolis, Ghana were conducted to assess their knowledge of tyre profile on vehicle performance. The objectives of the study were to identify the knowledge of vehicle users and vulcanizers on tyre mixing on vehicle performance, to determine the knowledge of vehicle users and vulcanizers on the life cycle of tyre on vehicle performance and also to find out whether vehicle users and vulcanizers have knowledge on tyre inflation/loading as an effect on vehicle performance. The survey adapted a descriptive study design. Both simple random and snow ball techniques were used to select the sample for the study. Questionnaire design on a likert scale was employed for the primary data collection. The deviation around the mode of their knowledge on tyre mixing, tyre life cycle indicated that, the respondents had low knowledge in tyre mixing and tyre life cycle as a way of affecting vehicle performance. On the tyre inflation/loading, the respondents had excellent knowledge in inflation pressures of tyre but had fair knowledge in tyre loading as a way of affecting vehicle performance. The responses to the survey on tyre rating showed that, the respondents had excellent knowledge in rim size, but had low knowledge in the areas of speed of tyres and aspect ratio. The survey draws a conclusion that, most licensed drivers and vulcanizers within the study area had low knowledge in tyre profile and it’s usage as a way of affecting vehicle performance.

Index Terms- Tyre profile, Expiring date, Aspect ratio, Inflation pressure

I. INTRODUCTION

The vehicle handling is directly related to the tyre-road contact. The tyres absorbs and transfer the horizontal and vertical forces acting on the vehicle as a result of steering, braking and driving in combination with possible road disturbances or external disturbances. The tyre is a rubber construction, significantly re-enforced by metal and composite materials. The tyre is the sole point of interaction between ground and vehicle. While a rubber compound acts as the final interface towards the texture of the track, its performance is also affected by various mechanical re-enforcements and chemical additives, working to offer good maneuverability to the driver [7]. The tyre is a complex technical component of today’s motor cars and must perform a variety of functions. It must cushion, dampen, assure good directional stability, and provide long-term service [2].

The role of tyres is crucial in vehicle performance and hence, it is important that vehicle users must be knowledgeable in its handling. The vehicle users and vulcanizers require special knowledge, skills and training. It is also important that tyres are handled by well-trained people (vulcanizers) due to the role the tyre plays in vehicle performance. Having the requisite background of tyre profile is a key to an efficient and effective tyre handling. Therefore, there is a need to assess the knowledge of vehicle users and vulcanizers on tyre profile as an effect on vehicle performance. Results from the study could be used for making policy decisions on acquisition of driver’s license and also training of tyre mechanics. The objectives of the study were to identify the knowledge of vehicle users and vulcanizers on tyre mixing on vehicle performance, to determine the knowledge of vehicle users and vulcanizers on the life cycle of tyre on vehicle performance and also to find out whether vehicle users and vulcanizers have knowledge on tyre inflation and vehicle loading as an effect on vehicle performance.

II. TYRE PROFILE

There are a large number of tyres for passenger cars and light trucks intended to meet the needs of a wide variety of consumers, vehicles and operating conditions. Selecting and utilizing the proper tyre starts with an understanding of the basics of tyre size, type and load capacity (or load range), [8]. The tyre profile also includes, tyre mixing and life cycle.
A. Loading and tyre inflation

The load carrying capacity of a tyre depends on the tyre size, construction, inflation pressure, operating speed and the duration of loading. Inflation pressure is governed by the load carried by a given tyre, although manufacturers vary the pressure to modify the steering characteristics. Large section tyres use lower pressure for a given load and greater comfort is achieved, but the resistance to rolling is increased. The pressure recommended by the manufacturer is applicable to a cold tyre i.e. it is the pressure before the tyre is used, and takes into account the average pressure rise (28kN/m²) which is caused by the temperature during use [4]. Tyres should be inflated to ensure their suitability for the purpose they are being used, usually this means in line with the vehicle manufacturer’s recommendation. Tyres are designed to accept a maximum load as indicated by their Load Index and then only when correctly inflated. If the maximum load is exceeded or the inflation pressure used is inadequate for the load being carried, it will result in reduced service life, increased fuel consumption and in severe cases premature failure of the tyre [9]. Also inadequate tyre pressure and over loading will result in difficult steering.

B. Tyre rating or specification

The sidewall of tyre provides the information about the tyre including the specifications, the brand, etc. All the codes on tyres are standardized and recognized by all tyre manufacturers worldwide. Figure 1 shows a side wall of tyre specification and rating.

![Tyre side wall specification and rating](image)

Meaning of codes marked on tyre in fig.1:
1. Tyre width (in mm)
2. Aspect Ratio
3. Rim Diameter (in inches)
4. Load Index
5. Speed rating

Specifications of tyre marked on sidewall on above image as 235/45R17 97W
- The ‘235’ indicates the section width of the tyre in millimeters.
- The ‘45’ tells the ‘profile’ of the tyre, or the width of the tyre compared to its height. It is expressed in percentage. (45%, in this case).
- The ‘R17′ indicates the size (in inches) of the wheel rim to which the tyre is designed to be fitted.
- The ‘97’ indicates the tyre’s load index, and
- The ‘W’ denotes the speed rating [5; 6].

C. Tyre mixing

To achieve optimum performance, vehicle should be fitted with a matching set of tyres. For certain high performance cars, matching sets of vehicle manufacturer approved tyres are recommended to maintain the handling characteristics of the vehicle. It is not proper to mix tyre sizes and to mix tyre constructions e.g. radial, cross-ply etc., across an axle. It is also improper to fit radial tyres to the front axle and cross-ply to the rear. It is inadvisable to mix tyres of different categories on a vehicle, e.g. summer tyres, winter tyres, and “run flat” tyres, on/off road tyres, etc. and never across an axle. It is also not recommended that tyres with significantly different states of wear be mixed across an axle. Special care should also be taken with 4x4 vehicles where some vehicle manufacturers specify a maximum tread depth difference between axles, [9].
D. Life cycle of tyre

Consumers also need to be aware that the age of a tyre can influence service performance and should seek advice in order to establish if a tyre needs replacement. Conditions of storage and use will influence the rate at which a tyre ages. Typical symptoms of tyre ageing are cracked/crazed sidewalls and/or distorted tread. There is nothing in the current legislation that requires a tyre over a certain age to be replaced.

However, some tyre and vehicle manufacturers do specify a recommended maximum age at which tyres should be replaced, [9]. Figure 2 shows an example of tyre expiring date code:

![Tyre date expiring date code](image)

Fig. 2 Tyre date expiring date code [1]

Tyres have expiring date. To start with, vehicle tyre has a 6-year validity period from their date of manufacture (DOM). To find out whether your tyre has expired, a stamp like this (*1612*) in fig.2, is indicated on the tyre. There is an asterisk at the beginning and at the end of this serial number (some tyres don't have asterisk). The first two digits (16) indicates the week and the second two digits (12) indicates the year of manufacturing. Therefore, *1612* shows that, the said tyre is manufactured in the sixteenth (16th) week of the year 2012. Tyre aging is a “hidden hazard” because most consumers do not know that tyres expire in six years and it is difficult for most consumers to tell how old a tire is without deciphering an 11-digit code that is imprinted on the side of the tyre. Federal rules mandate that the tyres with Department of Transport (D.O.T.) code be clearly branded or etched on the side of each tyre. For most tyres, the D.O.T. number is typically 11 digits. If the tyre has only 10 digits, the tyre was manufactured before the year 2000. Figure 3 below shows a current D.O.T. number for a tyre made in the fifth week of 2011, [1].

![Current D.O.T number for a tyre](image)

Fig. 3 Current D.O.T number for a tyre [1]

A survey conducted by [5] showed that, only 4% of consumers are aware that tyres become more dangerous as they age. A large body of scientific evidence supports that most tyres should be replaced six years from the date they are manufactured. This six-year expiration date begins from the day the tyre was manufactured at the plant not the date it was sold to a consumer or the date that it was installed on a vehicle. Most consumers either do not know that this code exists or do not understand its significance.

III. RESEARCH METHODOLOGY

A. Research Design

The design used for this study was that of survey which relied on questionnaire to generate data for the analysis. The study was to find out the knowledge of tyre profile on vehicle performance among vehicle users and vulcanizers in the Sekondi-Takoradi Metropolis.
B. Study Area

Sekondi-Takoradi Metropolis is located at the south-eastern part of the Western Region. The Metropolis is bordered to the west by Ahanta West District and to the east by Shama District. At the south of the Metropolis is the Atlantic Ocean and at the northern part is Wassa East District. The Metropolis covers land size of 191.7 km² and Sekondi-Takoradi is the regional administrative capital. Though the smallest district in terms of land size, the Sekondi-Takoradi Metropolis is the most urbanized among the 22 districts in the region.

The population of Sekondi-Takoradi Metropolis, according to the 2010 Population and Housing Census, is 559,548 representing 23.5 percent of the region’s total population. Males constitute 48.9 percent and females represent 51.1 percent. Ninety-six percent of the population is urban. The Metropolis has a sex ratio of 95.6, [3].

C. Study Population and Sample

The study populations were: (a) vulcanizers (b) saloon car users (c) commercial cars (trotro) drivers and (d) Heavy duty truck vehicle drivers. The populations included people with valid driving license, vulcanizers and have at least two (2) years’ experience as field experience. A simple random sampling technique was used for the vehicle users and snow ball for the vulcanizers.

D. Instrument and Data Collection

The data used in this study were collected during a survey mounted by the researcher between July and October 2017. By means of structured questionnaires, data were obtained from a total of 200 respondents. The 200 respondents which includes, 20 vulcanizers, 80 saloon car users, 60 commercial car users (trotro), 40 heavy duty vehicle drivers. For the purposes of the study, the respondents were selected within Sekondi-Takoradi metropolis.

The questionnaires were personally administered by the researcher that gave the opportunity to interact with the respondents, explained in details the rationale for the research and gave explanation where necessary. Enough time was giving to the respondents to answer the questionnaire of which the questionnaires were collected on the same day. A likert scaling questionnaires were used and was rated as 1. Excellent, 2. Very good, 3. Good, 4. Fair, 5. Poor

IV. RESULTS AND DISCUSSIONS

A. Tyre mixing

The respondents were asked to state their knowledge of tyre mixing on vehicle performance in relation to tyre plier, tyre arrangement and the thread pattern. Fig. 4 presents the summary of the responses on tyre mixing.

Fig. 4: Tyre mixing

The results indicate that, out of the 200 responses, the deviation around the mode indicates that, the knowledge of tyre mixing which is a subset of tyre profile on vehicle performance is poor. This means, the respondents do not have keen knowledge of tyre mixing as a way of affecting vehicle performance.
B. Tyre life cycle

The summary of respondents’ responses on life cycle as a subset of tyre profile is shown in fig.5

![Life Cycle](image)

Fig. 5: Life cycle of tyre

On tyre life cycle, the results indicated the deviation around the mode to be 5, which means that, all the respondents have poor knowledge of life cycle of tyre in relation to manufacturing date, expiring date and usage period on vehicle performance.

C. Tyre inflation/loading

The respondents were asked to indicate whether inflation/loading of the tyre have impact on vehicle performance. Fig 6. Shows the summary of results.

![inflation/loading](image)

Fig. 6 Tyre inflation/loading

Invariably, the respondents indicated deviation around the mode of 4, which shows fair knowledge of tyre loading as a way having impact on vehicle performance but in relation to over inflation, under inflation and the normal required tyre pressure for vehicle operation, the results indicated deviation of the mode around 1, which implies that, the respondents have excellent knowledge of over inflation, under inflation and required tyre pressures.
D. Tyre rating

The respondents were asked to indicate their knowledge of tyre rating in relation to speed rating of tyres, aspect ratio and rim size. Fig. 7 shows the summary of the results.

![Tyre Rating](image)

Fig. 7: Tyre rating

The results indicates that, the deviation around the mode was 5 on the knowledge of speed of tyres and aspect ratio, this implies that, the knowledge is poor, again the knowledge of rim size is 1 around the mode, which shows that, the respondents have excellent knowledge of rim size.

V. CONCLUSION AND RECOMMENDATION

The survey draws a conclusion that, most licensed drivers and vulcanizers within the study area have low knowledge in tyre profile and it’s usage as a way of affecting vehicle performance.

The study recommends that law enforcing agencies should ensure vehicle tyre users adhere to manufacturers recommended tyre operating conditions, since it plays a role in vehicle handling. The study recommends that, tyre technicians, vehicle examiners and tyre sales staff need the ability to read and interpret a range of data and related specifications as found in vehicle manuals, tyre catalogues and tyre markings. This not only requires the ability to read and extract the information but also the knowledge to understand what it means and the skills to communicate this orally (for example, to a customer, supervisor or driver). Additionally, the vehicle examiners should educate tyre users on tyre profile thus; tyre mixing, rating/specification, inflation/loading and tyre rating as a way of affecting vehicle performance.

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