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Obstacle Avoidance and Location Indication System for the Visually Impaired Person

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Abstract — This paper presents a theoretical model with a system providing an assistive guided robot for a visually impaired person. The overall operation of this system works together with OBJECT DETECTION and LOCATION DETECTION. The robot consists of two parts - the HOUSING: is composed of five units: Main Unit (Arduino) , the Obstacle Detection And Avoidance Unit (Ultrasonic Sensors) and the Location Detection Unit (GPS , GSM , and micro SD card adapter); and the HANDLE: is equipped with a Thumb-Controlled Joystick to control the robot and also provides significant force feedback to the hand of the user to help guide their path.

Keywords — Arduino, GSM , GPS , Micro SD card Adapter , Thumb-Controlled Joystick , Ultrasonic Sensors

I. INTRODUCTION

Visually impaired refers to the group of people who are lack of the ability of visual perception. There is a significant impact on their mobility due to this deficiency. This project proposes an assistive-guide robot to help the visually impaired person to travel safely to any unknown environments and to find the location of the blind person using Global System for Mobile communications (GSM) and Global Positioning System (GPS). By using this system, the user can travel anywhere with confidence and independence.

The system is divided into two parts: Objection Detection and Location Detection. In object detection, the robot algorithm is divided into two parts: user control and avoidance

unit. User control algorithm applies when no obstacle is detected. The user is able to control the speed and orientation of the robot using the thumb-controlled joystick integrated in the handle. Obstacle avoidance algorithm applies when obstacle is detected.

Throughout the project, an assistive-guide robot that operates for object detection and location detection is designed. During object detection, the robot will avoid any disturbance in its path automatically and it will be mainly controlled by the user control system most of the time. Using location detection system, the control center can easily know where the user will be at any time. Ultrasonic sensors are implemented for obstacles detections. Thumb-controlled joystick will be used to input the user command. Motor driver shield and DC motors are used for the movements of the robot.

Location Detection System is interfaced to the controller to detect the blind person's location. The GPS module sends the location information to the controller continuously. The same data is routed to the GSM modem through the controller. GSM module forwards this information to the predefined mobile number in the Centre after receiving the message. If the person from the Centre wants to know the location of the blind person, he just has to send one message like " INFORM " immediately and he will get the blind person's location coordinates. Moreover, data from GPS is saved in SD card , so that the traveled path of the user can be tracked down easily.

II. SYSTEM DESIGN

Arduino is used as a main board of the robot , which is interfaced with all the components used for the robot. The components used for Object Detection are : thumb-controlled joystick for user control , ultrasonic sensors for obstacle avoidance , speaker for warning alert , and motor driver module with two DC motors for speed and orientation.



Fig 1. An Assistive Guided Robot System

In order to operate location detection system, GPS , GSM and Micro SD card adapter are needed.

III. SOFTWARE DESIGN

As soon as the system starts, the distances are acquired from each sensor, and if the distance from the front sensor is less than or equal the 60 cm that is assigned, the obstacle avoidance will be performed. If not, the user will continuously control the assistive robot using thumb-controlled joystick.

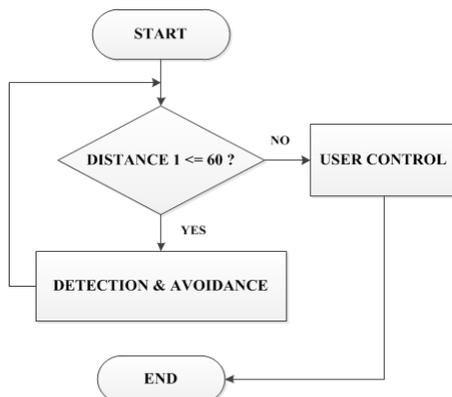


Fig 2. Overall Flow Chart of Object Detection System

Whenever no obstacle is found, the system will be in standby mode and controlled by the user. In order to decide the direction which user desires, firstly it is needed to read the x- and y- direction input data from the joystick. Based on those data , when the input data is from the x-direction , the robot moves forward if the x-value is less than the assigned value '100' , elsewise it moves backward if that value is greater than '140'. In the case of the y-direction, the robot turns right if the y-value is less than '100'. If not, it turns left when that value is greater than '140'.

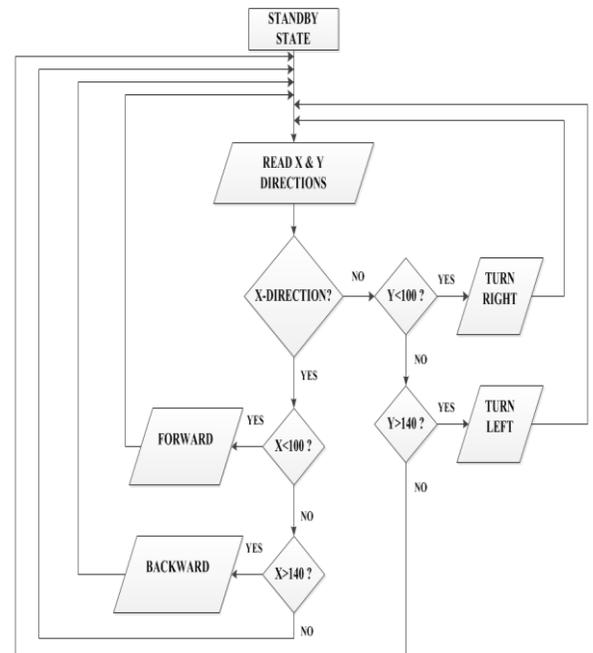


Fig 3. Flow Chart of User Control

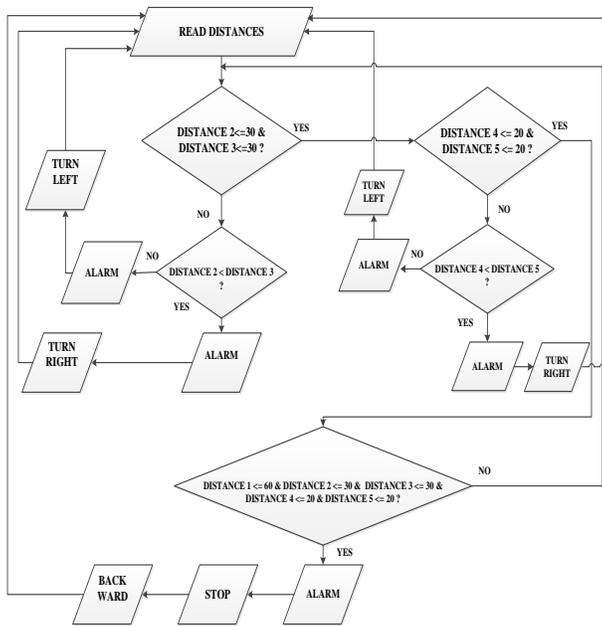
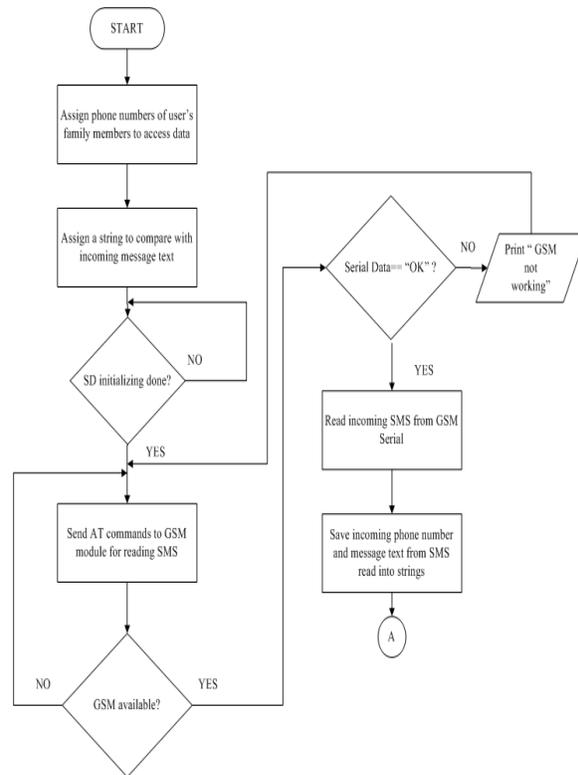


Fig 4. Flow Chart of Obstacle Avoidance

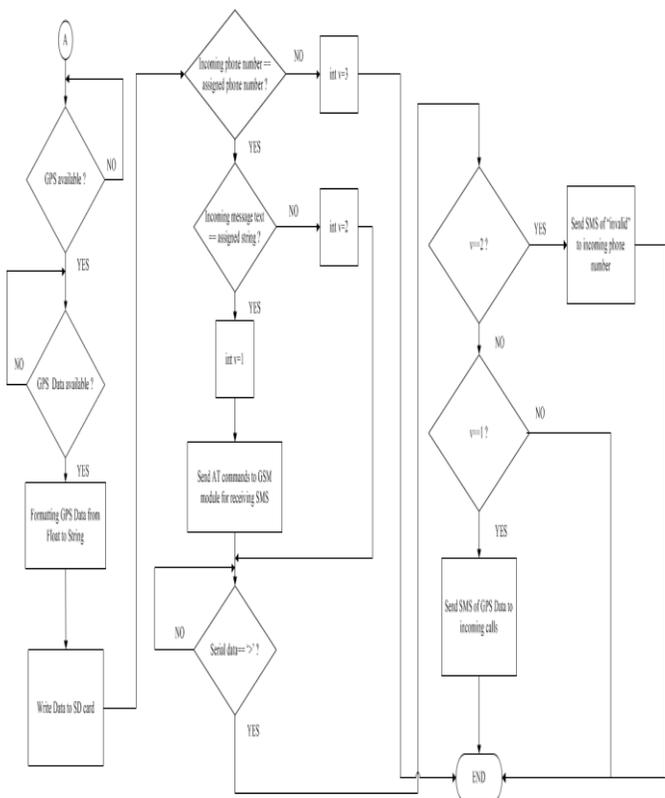
Whenever the obstacle is detected, according to the data, the distances of the two 45 degrees sensors are compared whether less than or equal to the 30 cm limit. If the condition does not satisfy, those two distances will be compared each other in order to turn to the direction with the larger distance. If the distance2 is larger than distance3, the robot will turn left. Otherwise, it will turn right. But when the condition meets, the distances of the two 180 degrees sensors are compared whether less than or equal to the 20 cm limit. If the condition does not satisfy, whether turning left or right is decided by the same routine as it does in the 45 degrees sensors. If all distances from the sensors are less than or equal to the assigned limits, at first, the robot will stop immediately and then, go backward until it finds its path without obstacle. After every condition, the system will update the data of the distance ranging.



(a)

First of all, phone numbers of user's guardian or family members are assigned in the program. Also a particular message is assigned as string type to compare with incoming message text. As long as initializing SD module has not done yet, the program keeps on checking whether initializing is done or not. After that, to initialize GSM module, it is needed to send AT commands to it. If done, we need to figure out GSM's availability. If it is available, the data from serial is checked whether equal to "OK" or not. If not, the AT commands are sent again since GSM is not working. When "OK" is return, incoming SMS is read. Then, incoming phone number and message text are separately saved as string. After that, checking GPS satellite and data availability is needed to be done. That data is formatted into string type when the data is received. After that, the formatted data is saved into SD card in order to show the traveled path. Next, the resemblance of the incoming and assigned phone number is verified. If it is not the same, integer variable is set as value 3. In the case of resemblance, incoming and assigned message texts are checked equal again. If no difference is found, variable value is set as 1. If not, it is set as 2.

After that, AT commands are sent to GSM for sending SMS. Then, it is needed to check until “>” is included in data.



(b)

Fig 5. Flow Chart For Location Detection

Finally, sending whether the location information or “invalid” to incoming phone number is decided according to the assigned value of above variable.

IV. HARDWARE DESIGN

In figure 6, the ultrasonic sensors are served as the main components for the obstacle detection. The trigger and echo pins of the sensors are connected to the digital output pins of the arduino. The PWM output ports of the arduino are connected to the trigger pins and the echo pins are connected to the digital ports .As long as no obstacle is found, this assistive robot is manually controlled by the user. It sends two inputs which are X-axis and Y-axis from the joystick. They are connected to the analog pins. The sensors and joystick are operated at 5V. The

PWM pins 5 and 6 for inputs 1 and 3 of motor driver shield. For the inputs 2 and 4, the digital ports 34 and 36 are used. 5V is applied to operate motor driver, and then 12V is supplied through the shield to the DC motors.

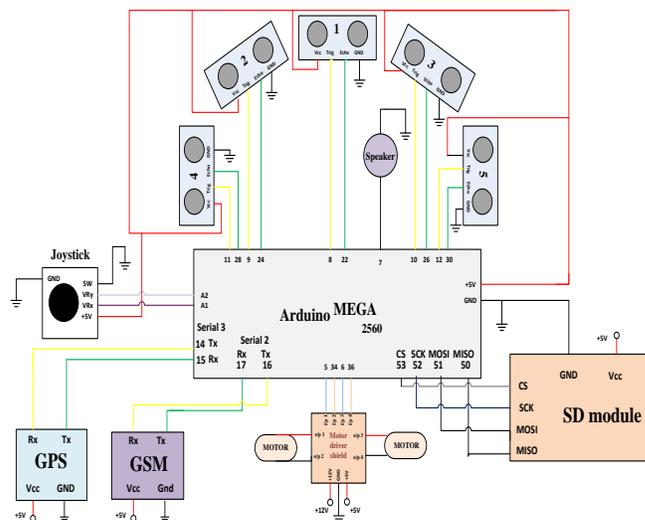


Fig 6. Block Diagram for Combination of Object Detection and Location Detection Systems

As it can be seen in figure 6, the GSM and GPS modules are interfaced to the arduino board with the respective hardware serial ports. Each pair of Tx and Rx pins on both modules are reversely connected to those corresponding hardware serial pins on Mega. Pins of SD card adapter are assigned to the SPI pins of the arduino board. All of these modules are operated at 5V supply.

V. IMPLEMENTATION

In the robot’s housing , there are two layers. The upper layer is equipped with the components of location detection and the another one is with those of object detection.

- [5] <http://jeremyblum.com/category/arduino-tutorials/>
- [6] http://www.youtube.com/view_play_list?p=A567CE235D39FA84
- [7] <http://arduiniiana.org/libraries/tinygps/>
- [8] www.arduino.com

Maternal Mortality in India: An Overview of Social Causes

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Abstract- Reducing maternal mortality has been a constant struggle globally. Although developed regions have shown a steep decline in maternal deaths, developing world continues to contribute inordinately to the total maternal deaths. The Millennium Development Goal (MDG) ‘five’ focused on reducing maternal mortality and achieving universal access to reproductive health care. In lieu of that, India has made extensive efforts to achieve the same, which are visible through the sharp increase in the rate of institutional births (NFHS 4), but the concurrent high incidences of maternal mortality present a contradictory picture of the nation’s progress in improving maternal health. Despite of the boom in the medical and health sector that India has witnessed in the past decades, progress in reducing maternal mortality at the national level is disappointing. With new Sustainable Development Goal (SDG) to reduce maternal mortality ratio to 70 per 100,000 live births by the year 2030, India needs to move beyond the hospital-based approach in addressing the reproductive health issues. The determinants of maternal mortality need to be studied through the lens of social phenomenon to understand its multidimensional nature. The present review, thus, briefly explores the available evidences to determine the causes of maternal mortality operating from proximate to distant level.

Index Terms- Maternal Mortality, Causes, Maternal and Reproductive Health, Social Determinants of Health, India

I. INTRODUCTION

Maternal mortality refers to the “death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the site and duration of pregnancy, from any cause related to or aggravated by the pregnancy or its management but not by accidental or incidental cause” (WHO 1994). It is used as a proxy indicator to assess the country’s maternal and reproductive health status. Maternal mortality can have a serious health effects and psychological costs for the family members especially children. Recent studies have shown significant decline in the incidences of maternal deaths in the developed world, but the estimates from the developing countries are still highly disappointing. According to the WHO, UNICEF, UNFPA and the World Bank, of the total estimated maternal deaths that occurred globally, developing countries accounted for 99% of them (WHO, 2016). In the past decade, India has been able to reduce maternal mortality from 206 to 181 maternal deaths per

100000 live births, but with 17 % (50000 maternal deaths) of all maternal deaths occurring in India, it still is the highest contributor of maternal deaths in the world followed by Nigeria (14%, 40000). In fact, India and Nigeria together account for two third of the global maternal deaths (WHO, 2014). Despite of witnessing an excellent economic growth and a boom in the health sector, India couldn’t percolate down this progress to the reproductive health indicators. Post-partum haemorrhage, hypertensive disorders and sepsis are the most common causes of maternal deaths in India followed by complications of delivery and obstructed labour (Say, 2014; Montgomery, 2014), and it is being emphasised that 80 % of these deaths can be prevented or avoided through institutional deliveries or by providing quality health care to the women (CRR, 2008; WHO, 2010; Hogan, 2010). However, the current high rates of institutional deliveries (table 1) with concurrent high maternal mortality rates in the country indicate that the maternal mortality cannot be addressed only through hospital-based approach and there is an urgent need to look beyond it. In this review, maternal health situation and maternal mortality issue has been looked as a social phenomenon.

II. FINDINGS

1.0 Socio-Economic disparity: The disparity in maternal mortality within a country is visible, but what is even more remarkable is the spread of it among different socio-economic groups (Barros, 2012). Maternal deaths continue to be concentrated among poor women (WHO, 2012). A case control study from rural Rajasthan for instance, shows a 5 times higher risk of maternal mortality among women belonging to the poor household as compared to the women of non-poor households (Gupta, 2010; Jain, 2016). The national health portal also classified the socio-economic conditions of the family as one of the primary reasons for high maternal mortality rate in the country (Jayabalan, 2015). Poverty, along with the rise in cost of health care leads to high out of –pocket expenditure on maternal health services. Although, National Rural Health Mission render most of these services available for free of cost to the marginalized population; transportation and incidental costs associated with hospital delivery prevents many women from accessing these services (Esscher, 2014; Jain, 2016). This phenomenon could be explained by looking at the access to maternal health care services in the country. National level data shows that although the uptake of antenatal care (ANC) and

skilled attendance at birth has increased across the country, the progress has been slow among women belonging to economically disadvantaged segments (Pathak, 2010; RSOC, 2014). A substantial amount of studies in India shows that health seeking behaviour is associated with the household economic status irrespective of the geographic location of the household. A study by Hazarika, 2011, shows wealth as one of the strongest

predictor of using skilled birth attendance. Postnatal care within 48 hours of delivery is almost half in the lowest quintile as compared to highest (23.0 and 48.8 respectively) (RSOC, 2014). Overall, studies have shown that economically weaker stratum of the population in India is disadvantaged in terms of affordability and accessibility of the maternal health services.

Table 1. Trends in Essential Maternal Health Indicators

S.No	Indicators	NFHS 3 (2005-2006)			NFHS 4 (2015-2016)		
		Urban	Rural	Total	Urban	Rural	Total
1	Antenatal care coverage ^{1, 2}	73.8	42.8	50.7	66.4	44.8	51.2
2	Antenatal care coverage (FULL) ³	NA	NA	NA	31.1	16.7	21.0
3	Births attended by skilled health personnel	75.3	39.9	48.8	90.0	78.0	81.4
4	Perinatal mortality rate	36.3	52.6	48.5			
5	Prevalence of low birth weight	19.3	23.3	21.5			
6	Prevalence of anemia in women	51.5	58.2	56.2			
7	Mothers who consumed IFA for 90 days or more when they were pregnant with Their last child (%) ⁴	34.5	18.1	22.3	40.8	25.9	30.3
8	Institutional births	69.4	31.1	40.8	88.7	75.1	78.9
9	Received PNC within 48 hours of discharge/delivery	60.8	28.5	36.8	71.7	58.5	62.4
10	Currently married women who usually participate in household decisions (%)	45.0	33.0	36.7	85.8	83.0	84.0

Grey area – numbers for the indicators are not available

1. NFHS 3- Mothers who had at least 3 antenatal care visits for their last birth (%)
2. NFHS 4- Mothers who had at least 4 antenatal care visits (%)
3. Full antenatal care is at least four antenatal visits, at least one tetanus toxoid (TT) injection and iron folic acid tablets or syrup taken for 100 or more days
4. NFHS 4 - Mothers who consumed IFA for 90 days or more when they were pregnant with their last child (%)

1.1 Antenatal and postnatal care: Antenatal care has been termed as one of the “four pillars” of safe motherhood by the WHO (WHO, 1994; Bergsjø, 2001). High-quality antenatal, intra-natal and postnatal care and emergency obstetric care are the most important ways to reduce the maternal morbidity and mortality (AHS, 2011; Mumbare, 2012; Travasso, 2015). One of the strategies that has been adopted by the Indian government to combat high rates of maternal mortality is to ensure universal access to Antenatal Care (ANC), Emergency Obstetric Care (EmOC) and Skilled Birth Attendance (SBA) (Paxton, 2005; WHO, 2015; Himanshu & Källestål, 2017). An analysis of WHO data of 188 developed and developing countries revealed that maternal mortality is related to the obstetrical care received by the women (McClure, 2007). In India, although the institutional deliveries or birth by skilled attendants has increased many folds as per the NFHS 4, the coverage of full ANC and its components is still very low. ANC full coverage which includes receipt of 3+ ANC, at least one dose of Tetnus Toxoid (TT) and consumption of 100 Iron Folic Acid (IFA) tablets/syrup is only 21 % (Victora et al. 2012; Kumar et al. 2013; NFHS 4). When looked separately, IFA supplements for 90 days, an important intervention for reducing and preventing anemia among pregnant women is as low as 30 % (table 1). Clearly, the utilization of

health services is mainly limited to the hospital-based deliveries. This indicates that majority of pregnant women in the country are still not even getting the basic recommended ANC services (Sinha, 2014).

1.2 Education: The direct link between education and maternal mortality is not well established, however, there is enough research done on the correlation between the two, indicating female literacy to be one of the significant determinants of maternal mortality (Bhalotra, 2013; AHS, 2014). Globally, a WHO survey on maternal and perinatal health in 24 countries showed that women with no education and those between one to six years of education are twice at risk of maternal mortality as compared to women with higher education and the findings were obtained after adjusting for marital status, maternal age and parity (McAlister, 2006; Karlesen et al, 2011). In India, state level analysis of mother’s education level and maternal mortality ratios shows an inverse association (AHS, 2014). This could be attributed to the improved health related practices among women with high literacy levels compared to women with low or no education. For instance, maternal education level and utilization of health services are positively associated irrespective of the socio-economic status of the family (Grown, 2005; Kesterton AJ, 2010; Pillai, 2013; AHS, 2014).

Educated mothers are more likely to seek antenatal care, post-natal care and skilled birth attendants during pregnancy, which reduces the risk of maternal mortality significantly (NFHS 3, 2008; Sanneving, 2013; AHS, 2014). At the state level, four states including Uttar Pradesh, Madhya Pradesh, Bihar and Rajasthan, with significantly low female literacy rates (61%, 59.4%, 49.6% and 56.5 % respectively), together contributes a total of 67 % of MMR in the country as compared to states with high female literacy like Kerala (97.9%), Tamil Nadu (79.4%) (SRS, 2011; NFHS 4, 2016).

1.3 Urban- Rural differences: According to the census 2011, approximately 69 % of the population lives in rural area (RGI, 2011) thus, making India primarily a rural population. The people residing in the rural segments have poor availability, accessibility, affordability of health services when compared to their urban counterpart mainly because of complex socio-economic and cultural structure in the rural area, which challenges the uptake of subsidized services of the government by the vulnerable groups (Kumar, 2013; Montgomery, 2014; Gupta, 2016). The disparity is even more evident among maternal health services. Analysis of three rounds of NFHS survey reveal that rural areas have higher economic inequality in utilization of skilled birth attendance when compared with their urban counter parts (table 1) (Chauhan, 2015). District level analysis of the Annual Health Survey (2010-2013) shows a significant disparity in the usage of maternal and child healthcare services at the districts level in India. Urban residents are way ahead of the marginalized people, concentrated mainly in the rural areas, in the usage of healthcare services (Awasthi, 2016). RSOC (2013-2014) data also shows the continued difference in the uptake of maternal health services among rural and urban parts of the country.

1.4 Nutrition factors and inequity: India scored a 28.5 in the global hunger index, designating the malnutrition problem in the country as serious. According to this, 15.1% of the Indian population is undernourished i.e. calorie deficient (Von, 2016). Among these, the most affected are the vulnerable group of women and children. Stunting among women (height <145cm), resulting from chronic under-nutrition, increases the need for assisted delivery by 60 % compared to women with normal height and it has been linked with obstructed and/or prolonged labour which in turn significantly increases the risk for maternal deaths (Rush, 2000; Black, 2008; UNICEF, 2015).

Micronutrients deficiencies, especially iron deficiency anemia, accounts for 40 per cent of the maternal deaths in India, directly or indirectly (NIPCCD, 2015). Pregnancy increases the risk of maternal anemia (specifically iron deficiency anemia) as there is an increase in maternal iron requirements to support both maternal and fetal needs (Steer, 2000). Severe anemia can lead to heart failure and death from shock (Ronsmans, 2008). It has been estimated that haemoglobin levels of <5 g/dl leads to 8-10 folds increase in maternal mortality. Haemorrhage, one of leading cause of maternal mortality in the developing world, is the consequence of severe anemia among pregnant women. Evidences show that anemia is linked to increased blood loss during delivery and puts women at greater risk of postpartum haemorrhage (Kavle, 2008). 25 % of maternal deaths have been attributed to the postpartum haemorrhage globally, making it as

one of the leading cause of maternal mortality (Say, 2014; MCHIP, 2015).

Gestational hypertension has been found to be prevalent among women with low calcium intake, leads to pre-eclampsia, which is referred as the second leading cause of maternal deaths (19% of total deaths) (Hofmeyr, 2007; Black, 2013). Several other complications during pregnancy have been associated with calcium deficiency leading to maternal as well as fetal adverse outcomes. Many studies have been done so far to ascertain the association of serum calcium level with pre-eclampsia during pregnancy, for instance a study conducted in Bangalore, India, found a significant reduction in the serum calcium level among pre-eclamping pregnant women as compared to normal pregnant women (Ramachandra, 2016), however, the evidences are equivocal (Trumbo, 2007; Gupta, 2016).

Zinc Deficiency, wide spread in the developing country has been associated with long labour, increases the risk for maternal deaths (King, 2000; Jou, 2010). Several studies across the world have shown that zinc supplementation helps in reducing the complications during pregnancy (Chaffee, 2012; UNICEF, 2014). It is estimated that over 80% of pregnant women worldwide have inadequate zinc intake (Hill, 2013).

Vitamin A deficiency has been recognized not only to harm the eyes but to increase maternal mortality. About 800 000 deaths in children and women of reproductive age are attributable to vitamin A deficiency (Ezzati, 2002). Evidence from south Asian countries shows that vitamin A supplementation can lower the risk of maternal mortality by reducing the severity of sepsis. An adequate intake of beta-carotene (vitamin A precursor) may also reduce some maternal health risks related to oxidative stress. These claims are however later challenged in another replication study in Bangladesh, Indonesia and Ghana and in the meta-analysis study where Vitamin A supplementation had no effect on pregnancy related mortality (Black, 2008; Kirkwood, 2010; West, 2011; Lyman, 2012).

Discrimination in the allocation of food at the household level also determines the individual level intake of nutrients by the mother. The intra-household food allocation is determined by social, cultural and environmental factors, especially in the south Asian country like India (Gittelsohn, 2003; Harris-Fry, 2017). Women are often considered of low social status in comparison to men and therefore, they are usually allocated less food and/or less preferred foods (Harris-Fry, 2017). A study conducted in Bangladesh found that 90 % of the women ate last in the household and received the smallest share (Shannon, 2008).

1.5 Maternal age: Early marriage and child bearing are still quite prevalent in India, especially in rural areas; 18% and 47% are married before 15 years and 18 years, respectively (SOWC, 2014). With pregnancy and childbirth complications being the second most prevalent cause of deaths among 15-19 years old globally; it is estimated that 70,000 female teenagers die each year because they are pregnant before they are physically mature enough for successful motherhood (Mayor, 2004, WHO, 2014). In India, with 26.8 % of women marrying before the age of 18 years, teenage pregnancy imposes a huge barrier in reducing the incidences of maternal deaths (NFHS 4). A hospital-based study conducted to evaluate the maternal and foetal outcomes of

teenage pregnancy in Bhopal, India, found that 53.12 % of teenage pregnancies were associated with complications such as abortions, hypertension, and premature rupture of membranes and anemia which increases the risk for maternal deaths (Yasmin, 2014). Physical immaturity and chronic malnutrition and scarce nutrition from mother to foetus increase the biological vulnerability for adverse outcomes among younger mothers (Raj et.al, 2010). Advanced age pregnancy, on the other hand, exposes women to higher risk of pregnancy induced hypertension while age related morbidities may also complicate the pregnancy (Bateman B, 2010; RCOG, 2011; Nair M, 2014).

1.6 Sanitation and hygiene: Poor sanitation and hygiene practices during pregnancy or delivery may lead to adverse pregnancy outcomes. Anemia, one of the leading causes of poor pregnancy outcomes, can be a result of hookworm infection due to poor sanitation practices during pregnancy (Brooker et al, 2008; Cheng JJ, 2012). Sepsis, which accounts for around 11 % of all maternal deaths at the global level and 10-15 % of maternal deaths in developing countries, is the result of poor hand hygiene and contaminated surfaces during delivery (Seale A, 2009; Gravett CA et al. 2012; WHO, UNICEF, 2012; Say, 2014). Waterborne infections during pregnancy have been associated with considerable risk of maternal deaths (Emerson & Purcell, 2004). Unhygienic storage of water has been identified as the major cause of malaria infection due to breeding of mosquitos, which in turn poses elevated risk to pregnant women (Heyman, 2008; Mota et al, 2012). The other mechanism through which inappropriate hygiene practices may lead to adverse pregnancy outcomes, is the life-course effect of repeated childhood infections resulting in childhood stunting, short stature in adulthood and eventually a cephalopelvic disproportion in pregnancy, thus, increasing the risk of obstetric labour (Konje & Ladipo, 2000; Neilson et al. 2003; Toh-Adam et al. 2012). A systematic review on association between poor sanitation and maternal mortality found that women of households with poor sanitation have 3.14 times higher odds of dying than women with better sanitation conditions. Further, women with poor water supply had 1.75 times odds of maternal mortality as compared to those with adequate water supply (Benova, 2014).

1.7 Women empowerment and equity: Low status of women in the family and society has been linked with maternal survival (Jamison, 2006). Studies have shown that care seeking behaviour of women and their social status, economic condition, educational attainments and decision-making powers are linked together (Ahmed, 2010) and that maternal mortality is a sensitive indicator of inequality and social development (WHO, 2016). The key factor to reduce maternal mortality is not just the availability of a well-functioning health care system but also its access to the most vulnerable section of women in the society. Several studies have shown the negative effects of gender inequalities on women's reproductive health practices and outcomes by limiting their access to health services and information and increasing their vulnerability to gender-based violence (Blanc, 2001; Doodoo & Frost, 2008; Stephenson, 2012). At the household levels, gender inequality affects the family size, contraceptive use, age at marriage (Woldemicael 2009; Desai and Andrist, 2010). A study conducted in Varanasi, India, on the dimensions of women autonomy, finds that women with greater freedom of movements have high coverage of ANC services and

are more likely to use safe delivery care (Bloom, 2001). Analysis of the data from the national level surveys also indicates a direct link between women's autonomy and use of prenatal, delivery and postnatal care in the rural India (Mistry, 2009). It is therefore not surprising that the countries sharing the major proportion of maternal mortality at the global level are also the ones with high gender inequality. India ranked at 125 among 155 countries on the gender inequality index, a rank lower than its neighbouring countries (UNDP, 2016). While good governance ensures the availability of these services, women empowerment and gender equality ensures the access to the available services (Dalal, 2012; Hagman, 2013). Gender inequality have far more grave long term effects than just access to the health services as explained by Osmani and Sen in their work on intergenerational consequences of gender inequality. It says that gender inequality in pregnancy leads to fetal deprivation which in turn leads to child under-nutrition among the less affluent population but at the same time, among the affluent, Barker's hypothesis comes into the play thus leading to the double jeopardy (Osmani & Sen, 2003)

1.8 Caste inequality: Caste based inequality has also emerged as an important determinant of availability as well as accessibility of the health services at the community level and plays a key role in maternal health outcomes (Shah, 2006). India, in the realm of its complex social structure, subjects its women to inequality in terms of religion and castes, rendering the outreach of the available health services to certain sections of the society (Shah, 2006). NFHS 3 findings suggest that the coverage of antenatal care was less in Scheduled Castes (SC) (74%) and Scheduled Tribes (ST) (70.6%) compared to other population groups (84.8%). Skilled Birth attendants at birth is also much less in ST (25%) and SC (40.6%) population compared to others (57.8%). The percentage of institutional deliveries was much less in ST (17.7%) and SC (32.9%) compared to other population groups (51%) (Kumar, 2010; NFHS 3). The inequality deepens in the villages and other remote areas of the country. For instance, a cross-sectional study conducted in rural Kerala showed that women from lower castes (SC/ST/Other Backward Class(OBC) have poor health status as compared to the women from upper castes (Mohindra, 2006). Untouchability, a still existent issue in many rural and remote parts of the country, leads to major discrimination in the rendering of health services to the women belonging to the lower castes. An upper caste front line health worker would not provide her services to Dalit (lower caste) women. A report on prevalence of untouchability in India showed that Dalit villages reported denial of visits by health workers (30-40%), entry into private health clinics (20-25%) and in cases of entry, they reported discriminatory treatment in the health centers (10-15%) (Shah, 2006). A caste and gender-based oppression have a cumulative effect on women's health seeking behaviour.

III. CONCLUSION

Despite of all the economic growth in the past decades in India, the maternal mortality rates are still unacceptably high (SRS, 2013; WHO, 2015). National, state and district level surveys of the country presents a grim picture of maternal health status highlighting the underachievement of the government

initiatives taken so far to curb the mortality rates in the country (Vora, 2009). Although, haemorrhage, hypertension and anemia, have been reported to be the primary causes of maternal deaths across the country, other underlying causes like socio-economic disparity, rural-urban differences, education level of women, caste and gender-based inequity etc. are a real hurdle to any attempt made to reduce maternal deaths in the country. Further, there is marked difference in the maternal mortality rates at the state levels, with some states heading towards achieving the set targets while some are still struggling at the initial stage. It is therefore the time to look at the maternal and reproductive health not just as a medical event but rather a social phenomenon, where contextual factors play an equally important role. There is a need to adapt the strategies and policies for maternal mortality reduction specific to the state while simultaneously taking lessons from the well performing states.

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Exploring the current practices of Jaarsumma as indigenous conflict resolution mechanisms: The case of Dambi Dollo Town

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Abstract- This study explored the practices of Jaarsumma as indigenous conflict resolution mechanism at Dambi Dollo town in Western Oromiya. The study was aimed at examining the intensity of practicing indigenous conflict resolution of Oromo - Jaarsummaa. The study particularly, tried to find out communities' applicability on the practical use of jaarsumma, examine to what extent communities practically practice jaarsummaa. To this end, the study employed descriptive survey method, which involves both quantitative and qualitative methods. Accordingly, Dambi Dollo town was selected through availability sampling. Then, 20 elders from 4 sub cities were selected purposefully for the interview and for the focus group discussion. In addition, data were collected from 5 purposefully chosen intellectuals 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 sustainability of jaarsummaa and should be practiced widely in the society so as to preserve as heritage. The results of the study revealed that the jaarsumma conflict resolution mechanism among Dambi Dollo town community is not well practiced nowadays as it is required and very applicable as its importance and as it is required. Although the use of Jaarsumma process as indigenous conflict resolution mechanism has been practiced for centuries, the practice of jaarsumma as a conflict resolution mechanism has not given sufficient attention at the study area. Thus, the study indicated that the community practiced jaarsumma as a conflict resolution mechanism which is very common in Oromo people is not on its right track nowadays. Finally recommendations were drawn based on the above findings.

Index Terms- Jaarsummaa, indigenous, conflict, and resolution

I. INTRODUCTION

Before the emergence of the modern state and its formal justice system, Oromo had customary rules, procedures and institutions through which conflicts were resolved. In different parts of the world where indigenous peoples live and where the indigenous justice systems are given recognition, significant aspects of the societies' affairs are governed by the indigenous justice system and institutions (Badger, 2011; Elechi, 2004).

In the culture of every human society, various traditional mechanisms of conflict resolution have been utilized before and after the introduction of modern legal systems (Macfarlane, 2007). One among these mechanisms is community elders' mediation or jaarsumma.

The Oromo society in Ethiopia has an operational indigenous legal system and provides a good example of an indigenous legal framework. Hamdesa Tuso (2000) explains that social disharmony and disequilibrium is repaired through the *jaarsumma* which is a process of reconciliation and peacemaking. Peacemaking among the Oromo is based upon a delicately intertwined set of processes that are woven into the social fabric and soaked in by all Oromo people throughout their lives from infancy all through old age. The Oromo belief system sets the stage for peacemaking long before conflict ever occurs by putting in place principles by which that society operates.

Oromo people are one of the African communities that use traditional ways of conflict resolution which they call '*Jaarsumma*'- a well-structured system. These people have an extensive and very rich culture and tradition which have been accumulated for centuries and have been handed down from generation to generation as a source of pride of the people. In Oromo life, "peace is a pervasive and sustained concern" (Asmarom, 2000, p.77).

In the culture of every human society, various indigenous mechanisms of conflict resolution have been utilized before and after the introduction of modern legal systems (Macfarlane, 2007). One among these mechanisms is community elders' conciliation (Jaarsummaa) which is very common in Oromo culture.

The community elders' conciliation (Jaarsummaa) is an informal method of conflict resolution whereby elders of a given community willingly or upon the request of disputants mediate parties through *Jaarsummaa*, which has been used across all Oromo clans for centuries. In the Oromo society, as it could be true in other societies as well elders have moral responsibilities to resolve conflict and establish peace in their community (Malan, 1997). They are supposed to resolve any kind of *conflict* that they may come across in their community. They either resolve it on the spot or fix a date, usually weekends or holidays, to mediate the disputants (Asefa, 2001; Lewis, 1988). The elders accomplish such roles through their institution called *Jaarsa Biyyaa* (elders of the community) also called *jaarsa araaraa* (elders of reconciliation). Through *Jaarsummaa*, the Oromo

people have resolved various types of interpersonal or intergroup conflicts including homicide (Araba and Berhanu, 2008; Mamo, 2006; Dejene, 2002).

Conflict may nearly arise in any social setting. It is a phenomenon that is inevitable in all human society due to differences in interests, goals, values and aims among people. Even if it is unavoidable in human society, traditional resolution mechanisms can contribute to the understanding of various norms, cultures and belief systems of a given society. In order to sustain social harmony, the Oromo resolve conflicts without any delay. Among the Oromo, *Jaarsummaa* is an establishment that deals with all kinds of conflicts ranging from simple quarrels to the most serious criminal cases, even homicide.

It is true that *jaarsummaa* is central to Oromo for hormonal life and is of paramount importance that has enabled to maintain social relations in which hatred and envy is not nurtured. Those who quarrel with each other have to make peace and a party that has caused loss or damage to the other would compensate *Jaarsummaa* process as it existed today as a common and shared value among the Oromo Nation. Therefore, *Jaarsummaa*, a traditional mediation by community elders, is a common method of conflict resolution that has been used across all Oromo for centuries. Abera (2000) argues that indigenous conflict resolution institutions of different ethnic groups were the major body of law in Ethiopia for centuries.

In light of this, the purpose of this study is to assess the current practices of *Jaarsummaa* as indigenous conflict resolution mechanisms and possibly attempts to assess the processes of *jaarsummaa* mediating frequently practiced. And finally, conclusions and recommendations would be given on how often *Jaarsummaa* is practiced as indigenous conflict resolution mechanisms should be practiced.

II. OBJECTIVE OF THE STUDY

General Objective

The general objective is to explore the current practices of *Jaarsummaa* as indigenous conflict resolution mechanisms in Dambi Dollo town.

Specific Objectives

- ✚ To assess the current status of *jaarsummaa* as indigenous conflict resolution mechanisms in Dambi Dollo town.
- ✚ To identify the importance of *jaarsummaa* in resolving conflicts
- ✚ To point out the existing opportunities for the practice of *jaarsummaa* as indigenous conflict resolution mechanisms in Dambi Dollo.
- ✚ To explore the processes and procedures followed by *jaarsa biyya* institution.
- ✚ To make out the roles of *Jaarsa arara* in reconciliation between the conflicting parties

Research Design

As the aim of this study is to assess the current practices of *Jaarsummaa* as indigenous conflict resolution mechanisms, descriptive survey type of research was employed to assess how often the study area community practice *Jaarsummaa* as indigenous conflict resolution mechanism and practically use in

the daily life. The design of the research, source of data, sample of the population and sampling techniques, instruments and procedures of data collection, and method of data analysis are stated hereunder. Therefore, the research design was a mixed research design as it used both quantitative and qualitative tools to gather and analyze the data.

The researcher employed interview, focus group discussion and document analysis to gather information from a sample of a population and analyze quantitatively and qualitatively.

Source of Data and Population of the Study

The sources of data were community elders, and expertise at Dambi Dollo town. Accordingly the populations of the study were therefore, 50 elders and 10 expertises from culture and tourism office.

Sample Size and Techniques

Since the target populations of the study were elders from selected sub cities of Dambi Dollo town who were well informed, having lived experiences and expertise from cultural and tourism office who were accumulated knowledge on indigenous conflict resolution mechanisms (*Jaarsummaa*) and having exposures regarding *jaarsummaa*. Dambi Dollo town has four sub cities. Both community elders and expertise were purposefully selected for this research.

Therefore, 50 of the total population of the study were taken as the population of the study. However, from these total study populations, the researcher has taken 50% of the participants and which means 25 of the participants were considered. Of these, 20 of them was community elders, 5 of them were expertise from culture and tourism office.

The respondents were purposefully selected from the total population for the research. Since, the study needs knowledgeable participants on the research topic, the researcher decided to obtain ample information from them who were well informed and who have well experienced in indigenous conflict resolution mechanisms. Thus, purposive sampling technique is a sampling strategy that the researcher selected individuals and sites for study because they can purposefully inform an understanding of the research problem and central phenomenon in the study (Creswell, 2007). For this reason, the researcher determined to use purposive sampling techniques.

Study Population

The researcher decided to choose community elders and expertise from culture and tourism office for two reasons. The first reason is that the researcher believed that community elders have exposures for *jaarsummaa* and well informed about *jaarsummaa* and the expertise too. The second reason is that the researcher didn't come across a study conducted on exploring the current practice of *jaarsummaa* as an indigenous conflict resolution mechanism in the specific research area- Dambi Dollo; therefore, the researcher felt that the study would fill a gap.

III. RESULTS AND DISCUSSION

This study aimed at assessing the extent to which Dambi Dollo town community practice *jaarsummaa* as indigenous conflict resolution mechanism. To gather appropriate data for the study,

interview, and questionnaire and focus group discussion were employed. Accordingly the results and discussions of elders' and expertises' responses, elders' practices of jaarsummaa compared with the focus group discussion were assessed. Finally, the major findings that indicated the practice of jaarsummaa among the community were discussed under this section respectively.

Analysis of Data Obtained through Interview

Elders' responses about the practices of jaarsummaa in the research area.

There were twenty elders who participated in detailed interview. According to the data gathered from them, the very common indigenous mechanism of conflict resolution which is frequently used among the community is *jaarsummaa*. Because *Jaarsummaa* is an indigenous institution for resolving conflicts which is contributed by elders who have well experience of resolving conflicts through jaarsummaa.

According to the data obtained from the participants although jaarsummaa is commonly practiced among the community, most of people are rushed to the court or police immediately after they fall in to conflict for their cases rather than bringing their case to jaarsummaa.

This could be confirmed with the focus group discussion under item I. According to the information from the focus group discussion, nowadays people brought their case to jaarsummaa after the judge or court asked their willingness to resolve their case through jaarsummaa. If the conflict parties agreed up on the judge idea, they nominate the jaarsa biyya while they are in the court or in front the judge. Then after, the jaarsummaa can proceed to see their case.

Regarding the interview questions item I, 'would you briefly explain the current status of jaarsummaa?' Even if jaarsummaa currently exists among the community, its status is neither in the disappearing stage nor function properly in the community. Because, according to the information gathered from key informants, the essence of jaarsummaa is not kept according to its originality. This may be the unnecessary interference of the government structure in the community may lead to the weakening jaarsummaa's acceptance in the community.

In line with this idea, they were asked 'would you list the importance of jaarsummaa conflict resolution mechanism please? All of them reported as cultural approaches to resolving disputes play a vital role in promoting peace and social order in communities. Cultural values and attitudes provide the basis for interaction and the norms by which individuals and communities live. The key purpose of indigenous institutions in conflict resolution is therefore to find appropriate solutions to the existing conflicts – solutions based on the values, norms, complexity and culture of the society, and accordingly of significance to the conflicting parties. Most important elements involved in such mechanisms are the traditions of forgiveness and of respect for elders because of their symbolic authority to enforce decisions and implement compensation.

(DFDI,2004) is strengthened that some of the importance of indigenous conflict resolution, in contrast with the court

litigation or formal way of conflict resolution are given as it has low cost, speed, accessibility, cultural relevance, and responsiveness to the poor people's concerns. Therefore, the chief importance of the jaarsummaa(mediation)are:

The agreement which is that of the parties themselves, the dispute is quickly resolved without great stress and expenditure, the relationship between the parties is preserved, and the confidentiality is maintained.

Generally, the *Jaarsummaa* institution is mainly characterized by the presence of local elders who are selected by virtue of their good reputation, their extensive and good knowledge of custom, precedent and *seera* (law) of the Oromo, their individual talent and experience in dealing with conflict, altruism, their good sense and willingness to give his time to reconcile the disputants and help solve their neighbors problems and restore the peace.

Regarding item 3, 'Have you ever been involved in jaarsummaa conflict resolution mechanism in the surrounding area you are living in'? All of the respondents replied as they involved in jaarsummaa resolving conflict at different levels. This is also confirmed during focus group discussion.

Concerning the procedures of jaarsa biyya, the interviewers asked the question "would you explain the procedures followed by jaarsa biyya institution"? All respondents explained as the procedure of *Jaarsa Biyyaa* institution is established greatly depends on the free will and agreement of the two conflicting parties as it is a voluntary institution. The parties have the right to choose their own *jaarsa* from their close relatives or people who know the parties very well.

(Areba and Berhanu, 2008, p.170) argue that the *Jarsaa Biyyaa* institution is used to resolve conflicts between groups or individuals and it handles various cases. They could be from any members of the communities as long as they have the capacity to analyze the cases at hand carefully with the rest of *Jaarsa biyya/elders*. Thus, anyone involved in the conflict reconciliation (*Jaarsummaa*) process with *Jaarsa biyya* is collectively called *Jaarsa* regardless of the age he is in actual life.

Concerning item 5 "what are the roles of jaarsa araara in jaarsummaa process"? The key informants explained as the term *jaarsa* and *araaraa*, means elder and reconciliation respectively. So, a person who plays the role of mediator at a given *araaraa* (reconciliation) proceedings even at his adulthood can be *jaarsa araaraa* regardless of his age.

Therefore, the elders function as a court with broad and flexible powers to interpret evidence, impose judgments, and manage the process of reconciliation.

Therefore, "nagaa and *araaraa*" (peace and conciliation) has no comparable with other conflict resolution mechanisms among the *Oromo society*. Thus, the indigenous conflict resolution process of *Jaarsummaa* through the mediators of *Jaarsolii Araara* is practiced among the Oromo is commonly known.

**Analysis of Data Obtained through Questionnaire
Expertise’s response to the theoretical practices of jaarsumma in the community**

Items	SA		A		UD		DA		SDA		Total	
	F	%	F	%	F	%	F	%	F	%	F	%
1, Practicing jaarsumma is basically a matter of its applicability in the community.	3		2		-		-		-		5	100
2. In resolving conflict, practicing jaarsumma is the most important aspect to focus on compared to court system.			3		2		-		-		5	100
3. I always realize that jaarsumma has to be given prime consideration in the conflict resolution	3		2		-		-		-		5	100
4, When I involve in jaarsumma, I always use it to help people understand the importance and preserve it for future generation.	5		-		-		-		-		5	100
5. In using jaarsumma, cultural implications which enable communities to use and keep as heritage is very essential.	5		-		-		-		-		5	100

Key: SA= Strongly Agree, A= Agree, UD= Undecided, DA= Disagree SDA= strongly disagree
Note: strongly agree = 5 Agree= 4 Undecided= 3 Disagree= 2 strongly disagree = 1

Indigenous conflict mediators typically possess moral status, seniority, neutrality and respect of the community; they are acceptable to all parties and demonstrate leadership capacity. Resolutions are generally accepted and respected by all concerned parties (USAID, 2005).

In this regard, items were designed to ask if expertise understood the practices of jaarsumma in the community. The above depicts that 3(60%), 2(40%) of the respondents confirmed that they strongly agree, and agree with regard to the claim “practicing jaarsumma is basically a matter of its applicability in the community “respectively.

Likewise, in replying to item Q2, 3(60%), (23.1%), 2(40%) of the respondents respectively stated that they agree, and undecided with the statement that " In resolving conflict, practicing jaarsumma is the most important aspect to focus on compared to court system.”

In relation to this, item 3, the respondents stated that 3(60%), 2(40%) of them strongly agree and agree respectively on the idea of “always realize that jaarsumma has to be given prime consideration in the conflict resolution”

Concerning items 4 and 5, all respondents strongly agree on the points of jaarsumma, which help people understand the importance and preserve it for future generation and the cultural implications of jaarsummaa enable communities to use and keep as heritage is very essential.

The process of conflict resolution has to do with how indigenous structures and systems ensure action in bringing

peace at the individual and community level relationships. In this respect conflict resolution procedures are generated from general cultural life and daily experiences of living. In this context, indigenous refer to the structures and the units of organization in a community and encompasses also the norms, values, and beliefs that guide social interaction (Kendie and Guri, 2006, p. 333)

IV. CONCLUSIONS AND RECOMMENDATIONS

In this chapter, the researcher presents conclusions and recommendations drawn based upon the presentation, analysis and interpretation of data made in chapter four. This study, as mentioned in the previous chapters, was intended to explore the current practices of jaarsumma as indigenous conflict resolution mechanisms. Therefore, to arrive at the whole purposes of the study, three types of data gathering methods (interview, questionnaire and focus group discussion) were used. Thus, the data were gathered through these instruments and were presented, analyzed and interpreted in chapter four. Based on the major findings, the following conclusions and recommendations are forwarded by the researcher.

Conclusions

Conflicts are natural to human beings, but the way of resolving them may either escalate or reduce and ultimately solve them. Because of the inevitability of conflict and due to the

physical, emotional and resource costs that often result from conflicts people have always sought ways of peacefully resolving their differences through different mechanisms. Thus, to effectively resolve conflict and maintain harmonious relationship among them, people throughout history developed different mechanisms and procedures. Among these, jarsumma is one of them among Oromo people.

Jaarsumma can restore the offender back into the community, through consensus, admission of guilt and apology. Jaarsummaa can ensure that the offender, the victim and community are all engaged so that the mutual cohesion is restored, while at the same time the offender has been made to accept guilt.

Although *Jaarsummaa* could be used as an indigenous conflict resolution mechanism in the research area, when it comes to its frequent practices in the community, it seems to be less practiced.

In Oromo people, Jaarsumma plays significant role in conflict resolution and peace building. The community elders method of dispute resolution which focuses on solving problem from the root and rebuilding of broken relationship through jaarsummaa and the elders throughout the process focus on truth and justice as a central elements of conflict resolution that unless justice is done, and truth is revealed or found there can be no lasting resolution for conflicts.

In so doing, the researcher have tried to unfold the fruits of *Jaarsummaa* practiced among the Dambi Dollo community as a single example of Oromo indigenous conflict resolution mechanism process worth attention.

Recommendations

The foundation of *Oromummaa* is built on overshadowing principles that are embedded within Oromo traditions, culture, and language. Thus, based upon the findings and the conclusions drawn from the study, the following recommendations could be made:

- Since, *Jaarsummaa* is used as an alternative indigenous resource in resolving social conflicts; it is advisable to keep its originality and practical applicability in order to develop its shared values of resolving conflicts. As Jaarsumma(mediator) is the peace making body in the society, it is used to resolve all parts of conflicts-interpersonal, intergroup and organizational conflicts. Thus, it provides a value system for giving and receiving forgiveness.
- Jaaarsummaa as indigenous conflict resolution mechanisms, it is helpful to focus on the principles of jaarsummaa which indicates empathy, sharing and cooperation in dealing with common problems which underline the essence of humanity which provide the basis for interaction and the norms by which communities develop a sense of shared destiny between them. So, there

is need to develop a clear legal and policy framework for the application of jaarsummaa as an indigenous conflict resolution mechanism by the community elders.

- Therefore, jaarsummaa, as indigenous conflict resolution mechanism by community elders approach should be seriously preserved as worth full heritage in resolving the conflict in Oromo society. And emphasis should be placed on indigenous conflict resolution mechanism as the first option in resolving conflict. Indigenous conflict resolution mechanism is a social capital, defined as the “capability of social norms and customs to hold members of a group together by effectively setting and facilitating the terms of their relationship... sustainability facilitates collective action for achieving mutually beneficial ends” (Fred-Mensah, 2005,p.1).

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Effects of protein levels in artificial pellet feed on growth and survival rate of black apple snail (*Pila polita*)

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Abstract- The present study was conducted to evaluate the effects of different protein levels in diet on the growth and survival rate of black apple snail (*Pila polita*) in grow-out period. There were 3 replicates in each treatment and snails were fed with protein levels at 15% (P15); 20 (P20); 25 (P25); 30 (P30); 35 (P35). Two month old juveniles with initial body weight, shell height and shell width of (2.52 g; 23.26 mm and 16.42 mm) were reared in the tarpaulin tanks (1 × 1 × 1 m; 40 cm water depth) at the density of 100 ind./tank. After 4 months of rearing period, the average body weight, shell height and shell width of the snail reached highest value in P20 (28.36 g; 54.59 mm; 39.74 mm, respectively) and that was significant difference ($p < 0.05$) compared to the remaining protein contents (P15, P25, P30, P35). The survival rate of snails in P25 (75.3%) was higher than in P15 (74.7%), P20 (74.3%), P30 (73.3%) and P35 (71.7%). However, the survival rate was not significant difference among treatments ($p > 0.05$). Snails in P20 obtained the highest productivity (2.79 kg/m²) and it was significant difference ($p < 0.05$) from P15 (2.52 kg/m²), P25 (2.57 kg/m²), P30 (2.48 kg/m²) and P35 (2.31 kg/m²). The results of this study showed that the growth rate and productivity of black apple snail were highest when feeding diet contained 20% protein. The requirement of protein for the black apple snail in grow-out period was 22.12%.

Index Terms- Black apple snail, growth, protein contents, survival rate

I. INTRODUCTION

Black apple snail (*Pila polita*) culture is a relatively new industry in Vietnam. It usually inhabits shallow ponds, lakes and plains field. This species has attracted a great interest of fish farmers because of its resistance to handling, rapid growth, delicious meat and high market price. Generally, meats of black apple snail, were highly nutritious, owing to its contents of proteins, rich vitamins and minerals (Bich *et al.*, 2003). In Vietnam, several studies were conducted to evaluate the efficiency of using some types of food for black apple snails in nursing (Binh and Thao, 2013; Thao *et al.*, 2013), grow-out period (Dat, 2010; Linh, 2011; Binh *et al.*, 2012; Binh and Thao, 2017b) and initially stimulates reproduction (Binh, 2011; Trieu, 2016).

Protein is the macronutrient whose requirement is prioritized in nutritional studies, because it represents the highest cost in commercial feeds, as well as playing an important role in

growth of shellfish. Inadequate protein in the diet results in a reduction or cessation of growth and a loss of weight due to withdrawal of protein from less vital tissue to maintain the functions of more vital tissue (Wilson, 2002). The minimum amount of dietary protein is needed to supply adequate amino acids and produce maximum growth. However, if too much protein is supplied in the diet, only part of it is used to make new protein, and the remainder will be converted to energy, which results in increased feed costs and increased ammonia nitrogen excretion. Protein requirement studies for shellfish have mainly focused on abalone (Britz and Hecht, 1997; Coote *et al.*, 2000; Gómez-Montes *et al.*, 2003; Green, 2009), babylon (Zhou *et al.*, 2007; Chaitanawisuti *et al.*, 2010; Chaitanawisuti *et al.*, 2011; Diana and Istiyanto, 2016; Chelladurai, 2017), golden apple snail (Mendoza *et al.*, 1999; Ramnarine, 2004) and Thai native apple snail (Thanathip and Dechnarong, 2017). Based on previous studies on abalone, reported protein requirements have ranged from 20 to 44% (Uki *et al.*, 1986; Mai *et al.*, 1995; Britz, 1996; Coote *et al.*, 2000). Similarly to babylon, reported protein requirements have ranged from 25 to 45% (Zhou *et al.*, 2007; Diana and Istiyanto, 2016; Chelladurai, 2017). The optimal dietary protein level for aquatic animals is influenced by the optimal dietary protein-to-energy balance, the essential amino acid compositions and digestibility of the protein, and the amount of non-protein energy sources in the test diet (Wilson, 2002). Some workers have investigated the protein digestibility of diets for *Pila ampullacea*. However, little information is concerning the dietary protein contents for black apple snail (*Pila polita*). From the above issues, it was found that the kind of processed food with appropriate protein content to improve the efficiency of black apple snail grow-out period, while also saving costs and reducing the impact on the water quality in culture environment, the research should be concerned.

II. MATERIALS AND METHODS

Experimental design

The samples of *Pila polita* with initial weight ranging from 2.21 to 3.35 g, shell height from 22.56 to 24.88 mm and shell width from 15.56 to 17.44 mm were nursed at Cao Lanh district, Dong Thap province (10°20'40,6"N; 105°47'04,8"E). Fresh water was pumped from river to the settling tanks (10 m³) for 5 - 7 days and then supplied into the culture tanks.

This experiment included five feeding treatments with different protein levels with three replicates per each as follow: 15% (P15); 20 (P20); 25 (P25); 30 (P30); 35 (P35). *Pila polita*

juvenile were cultured in 1m² (1 × 1 × 1 m; 40 cm water depth) tarpaulin tanks at the density of 100 ind./m² (Binh *et al.*, 2012; Binh and Thao, 2017a). Two feeding trays (diameter of 20 cm) and two nylon bunch substrate (diameter of 50 cm) were laid at

the bottom of each tank. The experiment was conducted for 4 months the ingredients used and proximate composition values of the diets are presented in Table 1.

Table 1: Formulation and proximate composition of experimental diets (% dry matter)

Dietary crude protein levels	P15	P20	P25	P30	P35	P40
Ingredient (%)						
Fish meal ¹	10.10	14.60	19.10	23.60	28.10	32.60
Soybean meal ²	14.66	20.35	26.04	31.71	37.40	43.10
Wheat flour	68.24	58.05	47.86	37.69	27.50	17.30
Soy oil	2.00	2.00	2.00	2.00	2.00	2.00
Vitamine premix ³	1.00	1.00	1.00	1.00	1.00	1.00
Mineral premix ⁴	1.00	1.00	1.00	1.00	1.00	1.00
CMC	3.00	3.00	3.00	3.00	3.00	3.00
Proximate composition (%)						
Crude protein	13.97	20.74	23.99	30.09	34.09	39.84
Crude lipid	2.19	2.20	1.95	2.11	2.04	2.64
Crude ash	3.82	5.15	5.52	7.31	8.54	10.41
Crude fibre	0.88	1.13	0.95	1.41	1.67	2.00
Moisture	12.88	13.73	14.52	12.10	14.16	11.02
NFE	66.26	57.05	53.07	46.98	39.50	34.09
Energy (KJ/g)	16.97	16.98	16.92	16.93	16.78	16.64
P/E ratio (mg protein/KJ)	8.84	11.78	14.78	17.72	20.85	24.03
Canxi	0.74	0.94	1.08	1.31	1.68	1.73

Parameters: Protein, lipid, ash, fibre, moisture, NFE-Nitrogen free extract and canxi analyzed by Quality Assurance and Testing Center Can Tho; ¹ Fish mea Kien Giang (Viet Nam); ² Soybean meal (Argentina); ^{3,4} Vitamine premix and mineral premix: Vitamin A, 2.000.000 IU; Vitamin D, 400.000 IU; Vitamin E, 6g; Vitamin B1, 800mg; Vitamin B2, 800mg; Vitamin B12, 2mg; Calcium D. Panthotenate, 2g; Folic acid, 160mg; Vitamin C, 15g; Cholin Chloride, 100g; Ferous (Fe²⁺), 1g; Zinc (Zn²⁺), 3g; Manganese (Mn²⁺), 2g; Copper (Cu²⁺), 100mg; Iodine (I), 20mg; Cobalt (Co²⁺), 10mg.

Snails were fed twice a day (at 7:00 AM and 6:00 PM) with the quantity of 2 - 4% of snail body weight in each tank. Water in the cuture tank is renewed 30 - 40% after a cycle of 7 - 10 days.

Food preparation

Experimental diets are formulated into pellets from ingredients including fish meal, soybean meal, wheat flour, soy oil, vitamine premix, mineral premix and CMC- Carboxymethyl cellulose. Scale raw materials according to the ratio of fish meal, wheat flour, vitamine premix, mineral premix and CMC for the first time and mix well (dry mix), after the cooking, soybean meal wasled to cool down (about 40 - 50 °C) and then mix in dry ingredients together with soy oil. After mixing, the pellets was dried in oven at 60°C in 24 hours and then stored in fridge at 4°C for feeding.

Data collection and sample analysis

Water quality: Daily water temperature was recorded twice a day at 7:00 and 14:00 using a thermometer. The concentration of NH₄⁺/NH₃ (TAN), NO₂⁻, DO, pH and alkalinity was monitored weekly using test-kit (Sera, Germany).

Growth performance and feed utilization: At the beginning and 15 day intervals during the experiment, numbers of snails in each tank was counted for checking the survival rate. Shell height and shell width, body weight of 20 snails/tank was measured and weighed to determine the growth rate. The shell height and shell width were measured with an electronic digital caliper (0.01 mm), snail weight were determined with an electronic scale (0.01 g error).

Weight gain (WG), shell height gain (HG), shell width gain (WG), daily weight gain (DWG), daily height gain (DHG), daily height gain (DWG), specific growth rate in body weight (SGR_w), specific growth rate in shell height (SGR_H), specific growth rate in shell width (SGR_w), feed conversion ratio (FCR), protein efficiency ratio (PER) and survival were calculated using the following equations:

$$\text{Survival rate (\%)} = \frac{\text{Final number of snails}}{\text{Initial number of snails}} \times 100$$

$$\text{Biomass increase rate (BIR, \%)} = \frac{\text{Biomass increase}}{\text{Biomass initial}} \times 100$$

$$\text{Feed conversion rate (FCR)} = \frac{\text{Total feed intake (dry weight)}}{\text{Weight gain (wet weight)}}$$

$$\text{Productivity (P, kg/m}^2\text{)} = \frac{\text{Total final body weight} \times \text{S (survival)}}{\text{S}}$$

$$\text{Protein efficiency ratio (PER)} = \frac{\text{Weight gain}}{\text{Protein intake}}$$

The data on specific growth rate in body weight (SGR_w-%/day) were subjected to the quadratic regression analysis model (Zeitoun *et al.*, 1976; Sales *et al.*, 2003) and the optimal protein requirement of black apple snail was estimated.

Statistical analysis

The data were analyzed for mean values, standard deviation by using Excel software and one way anova analysis followed by

Duncan post hoc test was applied to compare the significant difference of collected parameters among treatments at $p < 0.05$ using SPSS program version 22.0.

III. RESULTS

Water quality parameters

Mean values of environmental parameters were illustrated in Table 2. The average temperature ranged from 24.5°C to 30.5°C during the experiment, with daily fluctuation around

2.3°C (0.5 - 3.9°C). There was no significant difference of temperature among treatments.

pH values and DO were slightly varied during the treatments (7.69 - 7.83; 4.40 - 4.45 mgO₂/L, respectively) and no significant difference ($p > 0.05$) was found. Meanwhile, mean alkalinity values in P20 treatment (65.6 mg CaCO₃/L) was lower and they have differences ($p < 0.05$) compared to P15 and P35 (68.2 mg CaCO₃/L).

Concentrations of TAN and NO₂⁻ in P35 treatment (0.86 mg/L; 0.77 mg/L, respectively) were higher than other treatments ($p < 0.05$).

Table 2: Mean values of environmental parameters during culture period

Parameters		Dietary crude protein levels				
		P15	P20	P25	P30	P35
Temperature (°C)	Morning	26.3±0.4 ^a	26.3±0.3 ^a	26.3±0.4 ^a	26.2±0.4 ^a	26.1±0.4 ^a
	Afternoon	28.6±0.6 ^a	28.5±0.6 ^a	28.7±0.6 ^a	28.5±0.6 ^a	28.6±0.4 ^a
DO (mg O ₂ /L)		4.43±0.01 ^a	4.45±0.07 ^a	4.43±0.10 ^a	4.44±0.04 ^a	4.40±0.01 ^a
pH		7.83±0.06 ^a	7.69±0.04 ^a	7.73±0.05 ^a	7.74±0.03 ^a	7.79±0.01 ^a
NH ₄ ⁺ /NH ₃ -TAN (mg/L)		0.66±0.01 ^a	0.72±0.03 ^{ab}	0.79±0.04 ^c	0.77±0.04 ^{bc}	0.86±0.04 ^d
NO ₂ ⁻ (mg/L)		0.60±0.03 ^a	0.70±0.03 ^b	0.72±0.01 ^b	0.76±0.02 ^c	0.77±0.01 ^c
Alkalinity (mg CaCO ₃ /L)		68.2±1.0 ^b	65.6±1.5 ^a	66.6±1.1 ^{ab}	67.9±1.1 ^{ab}	68.2±1.7 ^b

The values in the same row with different letters indicating the significant difference ($p < 0.05$)

Growth of black apple snail

The average shell height, shell width and body weight of *Pila polita* fed with formulated diet for four months are shown in Table 3. The snail reached highest value in P20 (28.36 g; 54.59

mm; 39.74 mm, respectively) and that was significant difference ($p < 0.05$) from other protein contents.

Table 3: Average growth rate of black apple snail fed on the different diets

Parameters	Dietary crude protein levels				
	P15	P20	P25	P30	P35
Body weight					
Initial (g)	2.54±0.10 ^a	2.53±0.06 ^a	2.51±0.04 ^a	2.54±0.04 ^a	2.56±0.02 ^a
Final (g)	26.09±0.50 ^{bc}	28.36±0.34 ^d	26.78±0.32 ^c	25.75±0.23 ^b	23.48±0.43 ^a
WG (g)	23.55±0.53 ^{bc}	25.84±0.39 ^d	24.26±0.27 ^c	23.21±0.27 ^b	20.92±0.45 ^a
DWG (g/day)	0.20±0.00 ^b	0.22±0.00 ^d	0.20±0.00 ^c	0.19±0.00 ^b	0.17±0.00 ^a
SGR _w (%/day)	1.94±0.04 ^b	2.01±0.03 ^c	1.97±0.01 ^c	1.93±0.02 ^b	1.85±0.02 ^a
Shell height					
Initial (mm)	23.15±0.11 ^a	23.29±0.17 ^a	23.26±0.35 ^a	23.25±0.08 ^a	23.33±0.04 ^a
Final (mm)	52.84±0.83 ^b	54.59±0.78 ^c	53.46±0.48 ^b	52.65±0.30 ^b	50.63±0.20 ^a
HG (mm)	29.69±0.93 ^{bc}	31.30±0.63 ^c	30.20±0.80 ^{bc}	29.40±0.28 ^b	27.30±0.20 ^a
DLG (mm/day)	0.25±0.01 ^b	0.26±0.01 ^c	0.25±0.01 ^b	0.25±0.00 ^b	0.23±0.00 ^a
SGR _L (%/day)	0.69±0.02 ^{bc}	0.71±0.01 ^c	0.69±0.02 ^{bc}	0.68±0.00 ^b	0.65±0.00 ^a
Shell width					
Initial (mm)	16.35±0.31 ^a	16.41±0.12 ^a	16.38±0.24 ^a	16.52±0.16 ^a	16.46±0.23 ^a
Final (mm)	38.27±0.21 ^{bc}	39.74±0.66 ^d	38.81±0.50 ^c	37.88±0.19 ^b	36.15±0.22 ^a
WG (mm)	21.92±0.47 ^{bc}	23.33±0.78 ^d	22.43±0.66 ^{cd}	21.36±0.35 ^b	19.69±0.37 ^a
DWG (mm/day)	0.18±0.00 ^{bc}	0.19±0.01 ^d	0.19±0.01 ^{cd}	0.18±0.00 ^b	0.16±0.00 ^a
SGR _w (%/day)	0.71±0.02 ^{bc}	0.74±0.02 ^c	0.72±0.02 ^{bc}	0.69±0.01 ^b	0.66±0.01 ^a

The values in the same row with different letters indicating the significant difference ($p < 0.05$)

The results revealed that snails fed on treatment P20 have significantly higher performance in terms of daily height gain

and specific growth rate in shell height (0.26 mm/day and 0.71 %/day), while treatment P35 (0.23 mm/day and 0.65 %/day)

recorded the least (Table 3) and significant difference among these treatments ($p < 0.05$). Similarly, there were significant ($p < 0.05$) differences in daily width gain (WG) and specific growth rate in shell width (SGR_W). The highest increase in WG and SGR_W were recorded when snails were fed on P20 and the least was recorded in P35.

The specific growth rate of body weight (SGR_W, %/day) of snails was fitted into quadratic models (Fig. 1). The best fit for the estimation of optimal protein level could be described as $Y = -0.0009x^2 + 0.0395x + 1.5606$ ($R^2 = 0.9408$). The trend of growth showed that maximum SGR_W (1.99 %/day) corresponding to the about of 22.12% protein in the diet.

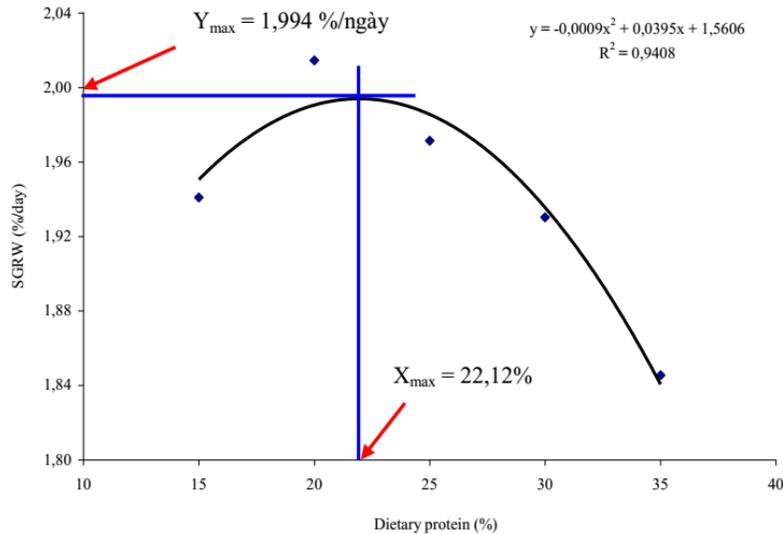


Fig. 1: Relationship between specific growth rate of body weight (SGR_W) and dietary protein levels for black apple snail (*Pila polita*)

Survival rate, biomass increase rate, productivity, feed conversion rate and protein efficiency ratio of black apple snail

different among treatments ($p > 0.05$), within the range of 71.7 - 75.3 %.

Survival rate of snail in all treatments decreased gradually during 4 months of culture (Fig. 2) and was not significantly

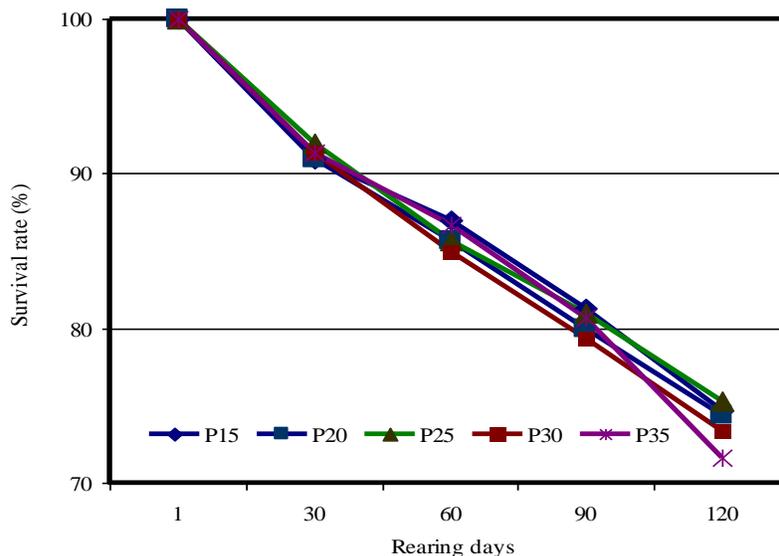


Fig. 2: Survival rate of black apple snail during experiment period

Biomass increase rate and productivity reached highest value in P20 (511%; 2.79 kg/m², respectively) with significant difference ($p < 0.05$) compared to other protein levels, especially P35 (436% and 2.31 kg/m²).

FCR values reached 1.28 - 1.42 whereas treatment P20 presented the lowest FCR values compared to the treatment P35

(Table 4). However, the FCR was not significant difference among treatments ($p > 0.05$). The highest PER was observed in treatment P15 (151%) with significant difference ($p < 0.05$) compared to treatment P20 (127%), P25 (93%), P30 (74%) and P35 (59%).

Table 4: Survival rate (SR), biomass increase (BIR), productivity (P) on the different diets

Parameters	Dietary crude protein level				
	P15	P20	P25	P30	P35
SR (%)	74.7±2.1 ^a	74.3±1.5 ^a	75.3±3.2 ^a	73.3±3.2 ^a	71.7±2.5 ^a
BIR (%)	471±24 ^{abc}	511±21 ^c	493±19 ^{bc}	463±35 ^{ab}	436±12 ^a
P (kg/m ²)	2.52±0.06 ^b	2.79±0.04 ^c	2.57±0.10 ^b	2.48±0.05 ^{ab}	2.31±0.17 ^a
FCR	1.34±0.07 ^a	1.28±0.02 ^a	1.34±0.03 ^a	1.34±0.03 ^a	1.42±0.16 ^a
PER (%)	151±4 ^e	127±2 ^d	93±4 ^c	74±2 ^b	59±5 ^a

The values in the same row with different letters indicating the significant difference ($p < 0.05$)

IV. DISCUSSION

Water quality conditions (NH₄⁺/NH₃⁻-TAN, NO₂⁻, DO, pH and alkalinity) remained within a suitable range for black apple snails throughout the experiment. However, in this experiment, the levels of TAN and NO₂⁻ increased as protein levels increased, which could be explained by the higher protein content of the treatments. The amount of organic matter produced from food and excreta from snails will be transferred to ammonium ions leading to high levels of TAN and NO₂⁻. This result is quite consistent with studies by Thao *et al.* (2013); Binh and Thao (2013) that the levels of TAN and NO₂⁻ concentrations on the treatments fed with pellets (18,0% protein) is always higher than the treatments fed just rice bran (6,4% protein), wheat flour (4,7% protein) or vegetable (3,4% protein).

Determination of optimum dietary protein level which produced the maximum growth of black apple snail was our goal in this study. Studies showed that pelleted foods containing fishmeal, soymeal, vegetable and wheat flour was preferentially consumed and improved the growth rate of black apple snail (Dat, 2010; Linh, 2011; Binh *et al.*, 2012; Binh and Thao, 2017a, b; Thanathip and Dechnarong, 2017). Our results found that weight gain of black apple snail increased with increasing dietary protein level from 15 to 20% and slightly decreased thereafter with further increases in dietary protein. These results are similar to those in other gastropoda species (Uki *et al.*, 1986; Britz, 1996; Coote *et al.*, 2000; Ramnarine, 2004; Lee and Lim, 2005; Diana and Istiyanto, 2016; Nhan and Harry, 2016; Thanathip and Dechnarong, 2017). The best growth and mean protein gain were observed in black apple snail fed 20% protein content.

Our results showed that the growth of juvenile black apple snail increased with increasing dietary protein level from 15 to 20%, and slightly decreased thereafter with further increases in dietary protein. These results are similar to those in other mollusk species (*Pila ampullacea*, *Achatina achatina*, *Pomacea bridgesii*, *Babylonia areolata*). Chaitanawisuti *et al.* (2011) reported that *Babylonia areolata* fed 35 to 36% protein increased weight (1.41 g/day) than 20% protein (0.51 g/day) and 28% protein (1.11 g/day). Similarly, Chelladurai (2017) confirmed that the highest growth at 40% level of protein diet (53.5 g; 69.1 mm) and the lowest was observed at 30% (51.9 g; 59.6 mm). For abalone, Britz and Hecht (1997) found that when *Haliotis midae* fed the diet content 24% protein (10% fat content) increased the body weight (9.2 g) and shell height (39.4 mm) lower than 34% (9.9 g; 40.1 mm, respectively) and 44% (11.9 g; 42.3 mm). Study on freshwater gastropods, Lee and Lim (2005) reported that

mean weight gain of snails *Semisulcospira gottschei* fed the 22% protein diets with 3.3 kcal/g diet was not significantly different from that of snails fed the 32 to 52% protein diets. Mendoza *et al.* (1999) revealed that crude protein affected the growth of the golden apple snail (*Pomacea bridgesii*), when using diets with 20 and 30% protein content, the growth rate was 5.39 %/day and 5.51 %/day. This value decreased when protein content decreasing to 10% (4.02 %/day) or increasing up to 40% (4.82 %/day). In *Pila ampullacea*, Thanathip and Dechnarong (2017) found that the diets had a marked effect on the growth, the average shell height increase and body weight of this snail species fed with 15% protein artificial diet revealed significantly growth (0.12 mm/day and 0.03 g/day) compared to 25% protein artificial diet (0.10 mm/day and 0.02 g/day) and 40% protein artificial diet (0.09 mm/day and 0.02 g/day). The results of this study and previous studies have shown that freshwater gastropods (*Pila ampullacea*, *Achatina achatina* and *Pomacea bridgesii*) require lower protein content than marine species (*Babylonia areolata*, *Haliotis laeugata*). The levels of protein in suitable range will ensure optimum growth. However if the content of this substance was exceeded the body needs, then growth of the snail would be able to decrease (Mendoza *et al.*, 1999; Ani and Ugwuowo, 2011; Chaitanawisuti *et al.*, 2011; Diana and Istiyanto, 2016; Nhan and Harry, 2016; Chelladurai, 2017; Thanathip and Dechnarong, 2017).

Survival rate of black apple snail after 4 cultured months in the range of 71.7 to 75.3% and was not significant difference among treatments ($p > 0.05$). The survival rate of snails in this study was lower than that of the study of Thanathip and Dechnarong (2017) after 4 culture months, survival rates of *Pila ampullacea* fed 15% protein (98.3%) were better than those fed with 40% protein (96.7%) and 25% protein (91.7%). Chelladurai (2017) reported that the highest survival rate of *Babylonia spirata*, feed on diet containing 40% protein (91.0%), whereas the lowest was observed in 30% protein (89.0%).

The biomass increase rate was highest in the 20% protein content and was comparable to that of Thao (2015) with the average biomass increase rate from 494 to 527% (i.e. from 4.94 to 5.27 times to the original biomass). At a protein content of 20%, the growth rate in weight was highest, snail also presented high survival rate so that the BIR was the top ranking compare to other protein levels. Black apple snail productivity obtained after 4 months of culture ranged from 2.31 to 2.79 kg/m², a similar study by Binh and Thao (2017a, b), with a density of 150 ind./m², the highest productivity obtained (3.37 - 3.57 kg/m²) when feeding with pellets (18% protein).

The efficiency of protein rate (PER) of black apple snails decreases as protein levels increase in diet. Study on *Pomacea bridgesii*, Mendoza *et al.* (1999) reported that PER was highest when fed with 10% protein content (11.02%) and tended to decrease when protein content increased to 20% (8.28%) or 30% (4.43%). Similarly, Ugwuowo (2009) obtained PER in *Archachatina marginata* when feeding 16% protein (3.78%) and those values were higher when increasing protein levels in diet from 18% to 22%. Similarly, this study found that PER and FCR of black apple snails decreases as protein levels increase in the diet. Thanathip and Dechnarong (2017) reported that *Pila ampullacea* fed 15 to 25% protein showed FCR (2.08 to 2.28) lower than 40% protein (2.50). Mendoza *et al.* (1999) studied on *Pomacea bridgesii* and FCR was highest when fed with 10% protein content (0.90) and tended to decrease when protein content increased to 20% protein (0.60) and 30% (0.63). In the current study, protein efficiency ratio significantly decreased with increasing dietary protein level. This is probably because more dietary protein is used as energy when high protein diets are fed. In the isoenergetic diets, an increase in the dietary level of non-protein digestible energy increased nitrogen retention by decreasing nitrogen loss (Cho and Kaushik, 1985).

Considering the growth response obtained in the present study, the dietary protein level of about 20% is adequate for rearing *Pila polita* which had a good growth performance, survival and productivity. The estimation for optimum requirement of protein for the black apple snail growth was 22.12%.

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Estimation of lead concentration in individuals around Al-Waziriyah battery factory

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Abstract- The lead in non-workers blood was determined due to the lead toxicity. Adjacent to the factory exposed in the accumulator production. Method of direct determination of lead Atomic Absorption Spectrophotometry (AAS) . This provide a sensitive and specific method to determine the lead concentration in blood. The procedure precipitated the proteins with trichloroacetic acid (TCA) then the lead extracted with ammonium pyrrolidine dithiocarbonate (APDC) into isobutylmethylketone. The results of Children showed that (10.5%) of them had exceeded the presence of lead 200 µg/100ml while (70.5%) were between 100 – 190 µg/100ml. Adult results showed that (17.5%) of them had exceeded the presence of lead 400 µg/100ml, while (28%) were between 300 – 390 µg/100ml, otherwise (37%) of adults were recorded 200 – 290 µg/100ml of blood, and the rest (17.5%) are less than 190 µg/100ml.

Index Terms- Lead Poisoning, Lead Toxicity, Al-Waziriyah,

I. INTRODUCTION

This study focusing on lead poisoning in people live around Factory manufacturing liquid

batteries. Lead is a toxic heavy metal, found in nature in a non-pure manner, linked to other materials such as cadmium ⁽¹⁾. Lead found in the human body and animals due to direct and indirect exposure. It is widely used in industries. It is used in the manufacture of pesticides, batteries, rubber, dyes, fuel. This poisoning of lead is mainly found among people working in chemical factories, such as liquid battery or oil refineries, where large volumes of lead vapor are found in the air ⁽²⁾.

The risk of the lead element in the fact is a non-processed materials cannot be discharged by human, yet the exploitation of human has had the greatest impact in terms of its impact on public health and through two factors: the **First:** - Transmission with environmental components of air, water, soil and food. And the **Second:** - Through various industrial activities such as using 40% of lead as pure metal, 25% of it in the form of alloys

and 35% in chemical compounds. Lead is also used in medical fields in the form of a lotion called lead sugar ⁽³⁾.

Large amounts of inhaled lead are absorbed through the air by the respiratory system. These particles enter the bronchial ramifications and pulmonary vesicles. Small atoms of lead vapor, usually absorbed by Blood in the lung and deposited in the bone marrow, with only 30-40% of the lead absorbed by the respiratory tract and then absorbed into the blood ⁽⁴⁾. It's also absorbed through the gastrointestinal tract by a small amount of about 5-15% of the amount of lead taken from food. Its absorption rate is about 10% of the total content in the food. The lead is absorbed from the intestinal cavity into the mucous layer and then into the bloodstream. ⁽⁵⁾. The increase in the absorbed ratio is up to be 50% when the drinking water containing lead ions, The absorption of lead is affected by the presence of other elements such as calcium, phosphorus, iron, copper and zinc in the food. It is also affected by the age, general health and physical condition of the exposed individual. ⁽⁶⁾. Absorption increases to 50% in the case of fasting, because the stomach is empty or in the case of iron deficiency and calcium; The respiratory and digestive system is more efficient in delivering lead into the body ⁽¹¹⁾.

Lead compounds such as (tetraethyl lead) are rapidly absorbed into the mucous membranes and the skin when they are properly touched and decomposed into the bloodstream and distributed throughout the body. ⁽⁷⁾. Inorganic lead compounds are not absorbed by the healthy skin but are absorbed into the body by the digestive, Intervenes through wounds and scratches in the skin, while water-soluble lead compounds absorb lead (lead acetate). 85-90% of the lead compounds that do not dissolve in the water are eliminated by highlighting. The rest (10-15%) is absorbed and transferred to the liver and then partially back to the intestines then the Yellow bile is another means of release. It is also believed that Lead is mistaken by body as calcium due to charge similarity $2+$ ⁽²¹⁾.

Other issue is Effectiveness of Enzymes. The different tissues of the body contain enzymes that perform specific functions. The content of these tissues and organs of a specific enzyme varies from one tissue to another. The concentrations of these enzymes are higher than their serum. Therefore, any damage or harm that occurs in these tissues and organs leads to the deposition of the components of the tissue and increase of these enzymes in the serum. ⁽⁸⁾.The amount of increase shows how important to estimate the level of effectiveness of enzymes in the case of various diseases and poisoning cases, including the case of

lead contamination by measuring the concentration of enzyme In the blood we can identify the damaged organ or tissue ⁽⁹⁾.

Lead reactions, effects and pathogenic conditions

The risk of lead in its tendency to accumulate and aggregation in the bones, where it expels calcium, causing anemia. It reduces the age of red blood cells, and it can lead to permanent damage in the brain leading to severe convulsions that may lead to death. ⁽¹²⁾. Occupational exposure is a common method of lead poisoning in adults. The rapid passage of lead to the placenta, it may enter the fetus and then interfere with the normal formation. It may also come out dissolved in breast milk and increase its level leading to low scientific awareness, slow learning, headache, anemia, and in some cases lead to death. ⁽¹⁴⁾.

As lead affects women, it also affects men where it leads to infertility. ⁽¹⁵⁾. The body get rid of lead sometimes through some vital functions such as urination or through discharge and small amounts of it through sweating, but if the body did not get rid of lead these vital functions, it will lead to the problems mentioned earlier ⁽¹⁶⁾.

Lead has no specific function or usefulness to the human body, but its rates were safe and normal in the human body before pollution and industrial revolution in the 1980s and 1990s, where rates were close to zero. ⁽¹⁰⁾. The blood lead level as

0.05mg / L as acceptable according to the Centers for Disease Control (CDC) and the World Health Organization (WHO). The researchers showed that the level of lead ranged between 10ppm and 42 ppm ⁽¹¹⁾. Lead concentration is higher than 14mg / dl, it affects the growth of cells. And If the ratio is higher than 39mg / dl, it affects the formation of hemoglobin and the nervous system, causing fatigue, memory loss and other problems. The researcher found that the majority of urban children (45.5%) had a blood lead level of 19mg / dl with average 15.9% , while 34.5% had less than 9mg / dl with rate 6.4)). (50% had less than 9mg / dl) and the remaining 50% had levels below 15-44mg / dl. No one had a lead level higher than 45mg / dl ⁽²¹⁾ .

There is a relationship between the concentration of lead with the concentration of sugar in the blood where the relationship is positive, as the higher the concentration of lead the higher proportion of sugar and this is because: Lead is a heavy and dangerous elements of most organs of the body and its tissues, leads to a defect in the secretion of insulin ⁽²²⁾. Some countries have developed a diet for those who are exposed to lead more than others, and developed a mechanism for the use of lead mixed with gasoline to reduce the impact of lead on the body and its vital functions in exposed people. There is also another proposal for high sugar in the

exposed lead in the laboratory, which is due to the high concentration of lead in the blood works to decrease the function of kidney (kidney failure that leads to high blood sugar) and here in turn leads to give the opportunity of kidney damage ⁽²³⁾.

Concentration	No of Children	Percentage
0 – 90	8	19 %
100 – 190	30	70,5 %
200 - 290	4	10,5 %

Can we Prevent lead poisoning in adults and children?

If a person lives in or near the area containing bullets, he can reduce the risk of exposure to children by washing hands after playing outside, before eating, sleeping. Also wiping the ground with a damp swab, furniture, window sills and other surfaces exposed to dust. Keep children away from playing near the main roads or bridges. Feeding children rich meals with iron, calcium, magnesium, vitamin C and vitamin A. Good nutrition prevents the child from absorbing the lead and opening the tap for at least a minute before drinking. ⁽²⁴⁾.

II. METHODOLOGY

The Estimation were included the houses around Al-Waziriyah Batteries Factory at Baghdad the capital city of Iraq. During the study, 88 blood samples were collected from exposed and non-

pollutant persons from October 2016 to February 2017 from different sites, samples were collected for each house with the permission of homeowner was obtained. Each sample was collected in labeled plastic cup and stored in zip-lock bag. The Concentration of Lead in blood were estimated using Atomic Absorption Spectrometry ⁽⁸⁾.

III. RESULTS

Table (1) Children (1 – 12 y) Results of Lead Concentration in Blood mg/ 100 ml

Children suffer from the symptoms of anemia, especially those who have a high concentration of lead in the blood, where (Bayoumi) said that about 90% of the total absorbed lead builds up in the bones and this naturally affects the production of red blood cells. ⁽²⁵⁾. lead also affects the enzymes necessary in The pathogenesis of hemoglobin, including Aminolevulinic acid dehydrates, is called Prophobilinogen, which stimulates the formation of iron as anemia causes hemoglobinemia. ⁽²⁶⁾.

He pointed out that the symptoms of chronic lead poisoning appear in children with mental sagging, mental retardation and inability to concentrate with weakness in memory. Afifi pointed to the possibility of deafness, loss of speech, kidney failure, and brain damage. ⁽²⁷⁾.

The Researcher (Gomaa) points out that the most affected individuals are children in the growth stage.

Lead replaces calcium and stores lead phosphates, damaging the peripheral and central nervous system. ⁽⁹⁾. In another study by Goodrum at 2009, children between the ages of 3 and 36 months were more sensitive to lead than adults due to incomplete integration of the blood-brain barrier. Which leads to a long period of non-growth of the nervous system. ⁽²⁸⁾.

Table 2 Adults (21 – 47 y) Results of Lead Concentration in Blood mg/ 100 ml

Concentration	No of Adults	Percentage
100 – 190	8	17,5 %
200 – 290	17	37 %
300 - 390	13	28 %
400 – 490	8	17,5 %

The loss of appetite, circulation and vomiting, which sometimes ends in coma, can be explained by the fact that lead acts as an inhibitor of enzymes in the brain such as Tetrahydrobioterin synthetase and Acetyl Choline Esterase (50-80 mg / 100 cm³) If the lead concentration was equal to 40 mg / 100 cm³, the previous symptoms did not appear and were confined to the central nervous system .

Lead is the result of life changes due to its interaction with calcium, sodium and magnesium. The risk of lead reaction with calcium lies in the fact that the latter is involved in the functions of neurotransmitters. The risk of lead in this case is

that it replaces calcium at the ends of the neurotransmitters. al, 1997)

IV. CONCLUSIONS

The present study shows that the battery factory effect on public health Adults and Children. Further studies are needed to clarify the role of lead and the causing of health problems for both Children or Adults.

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Molecular Evidence of *Cacao swollen shoot virus* Acquisition and Retention by *Planococcus citri* (Risso) and *Pseudococcus longispinus* (Targioni-Tozzetti) and *Pseudococcus viburni* (Signoret) Mealybugs (Hemiptera: Pseudococcidae)

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Abstract- *Cacao swollen shoot virus* (CSSV) remains a significant viral pathogen endemic in West African cacao-growing countries. Eradication of affected trees (complete removal) and resistance breeding in existing cacao (*Theobroma cacao* L.) germplasm have not yielded the expected results in terms of controlling the spread of CSSV. CSSV is reported to be vectored by at least 16 species of mealybugs (Hemiptera: Pseudococcidae), but there have been no molecular evidences to validate these reports. Inconsistent reports exist on CSSV transmission which were based on visual assessments of CSSV infection which are highly subjective, especially on asymptomatic cacao. The validation of the transmission efficiency of CSSV by mealybugs are arguable. In this study, the presence of CSSV in three mealybug species, *Planococcus citri* (Risso), *Pseudococcus longispinus* (Targioni Tozzetti) and *Pseudococcus viburni* (Signoret), was monitored via PCR after a 72-h virus acquisition access period (AAP) on symptomatic *T. cacao* (var. Amelonado) seedlings 'infected' with New Juaben, a severe strain of CSSV. *Solanum tuberosum* sprouts were then fed to the mealybugs over a six-day period. Sequenced PCR products of the destructively sampled and CSSV-screened individual mealybug species provided a molecular evidence of CSSV acquisition. qPCR results gave another evidence that CSSV retention is highly variable between and within mealybug species. This is the first molecular evidence highlighting a non-West African mealybug species, *Ps. viburni*, as a capable CSSV vector. Apparently, these results could validate the efficacy of non-malvaceous species as barrier crops and in screening for resistance to CSSV vectors in *T. cacao*.

Index Terms- *Cacao swollen shoot virus*, cacao mealybugs, *Pseudococcus viburni*, Amelonado

I. INTRODUCTION

Mealybugs (Pseudococcidae: Hemiptera) are natural vectors of the *Cacao swollen shoot virus* (CSSV) in cacao (*Theobroma cacao* L.) (1-3). Mechanical transmission of CSSV in cacao is possible by grafting and budding with great difficulty (4-10). Field observations for CSSV infection in cacao are subjective; prone to misdiagnosis e.g. plant nutrient deficiencies (12). The relative efficiency of CSSV acquisition and infection rates of vector mealybugs have solely been determined by the number of symptomatic plants (13). Such reports may also have been underestimating transmission events due to failures to detect latent CSSV infections in cacao. The only well documented evidence of mealybug-virus-plant relationship Roivainen (14) had no molecular-based evidence to substantiate the results from earlier studies (15, 16). Roivainen (17) reported that first instar nymphs of *Formicococcus njalensis* were still capable of transmitting CSSV, an assumed non-persistent stylet-borne plant virus, after ecdysis. Results from Roivainen's findings lacked molecular validation to ascertain the integrity and persistence of CSSV in the source plants, 'viruliferous' moulted mealybug, the exuviae and unmoulted mealybugs. In an attempt to understand the mealybug-CSSV-cacao interactions, the feeding activities of the vector mealybugs before CSSV acquisition (preliminary feeding or starvation), during (acquisition access period i.e. AAP) and after CSSV acquisition (inoculation access period i.e. IAP) (18) have significant roles to play in defining these interactions (Figure 4.1). Strickland (19) presented the first detailed account of mealybug species occurring on cacao in West Africa. The initial search for the vectors of CSSV led to the identification of two mealybug species, *Fo. njalensis* Laing and *Fe. virgata* Ckll., an aphid (*Toxoptera coffeae* Nietner) and a psyllid (*Mesohomotoma tessmanii* Aulm) as vectors of CSSV 1A strain (9). In a subsequent confirmation study, *Pl. citri* was first pointed out by Box (2) to transmit the CSSV 1C and 1D strains (20) of which Posnette (21) further confirmed the status of *Pl. citri* as a known vector of CSSV after the successful transmission of additional CSSV strains.

Inconsistent results (2) showed that none of the non-mealybug vectors were capable of transmitting CSSV in subsequently repeated studies. *Pl. citri* is a highly polyphagous mealybug species; with conflicting reports on its origin as reviewed by Franco, Suma (22), it has a wider global distribution (23). Previous studies have shown that *Ps. longispinus*, native to Australia (22), was not among the dominant mealybug species found on cacao (19, 24-27). However, *Ps. longispinus* was enlisted as a vector mealybug species of CSSV following an extensive CSSV transmission study by Posnette (28) involving 17 groups ('strains') of *Theobroma virus I* (i.e. CSSV) from Ghana (8), Nigeria (7) and Cote d'Ivoire (2); this study used 10 species of mealybugs in addition to the already mentioned three species, *Fo. njalensis*, *Fe. virgata* and *Pl. citri*. The third mealybug species used in the present study is *Ps. viburni*. Though it is not native to the afro-tropical cacao-growing areas of West Africa (29), it is a polyphagous Nearctic (22, 30) species which has been reported on grapevine in South Africa (31, 32). *Ps. viburni* has not been found on cacao anywhere, neither has it been used in any demonstration study as a vector of CSSV. This study aimed at providing findings on molecular-based evidence relating to CSSV acquisition and retention within three mealybug species, two previously classified as 'CSSV-vectors' (*Pl. citri* and *Ps. longispinus*) and a 'non-CSSV vector' *Ps. viburni*, using PCR and qPCR analyses. The objectives of the study were to establish (1) the capacity (if any) for acquisition of CSSV by these species, fed on CSSV-infected cacao and (2) the retention time of CSSV in the viruliferous mealybug species fed on a non-malvaceous non-CSSV host species (*S. tuberosum*).

II. MATERIALS AND METHODS

A. CSSV-infected and CSSV-free cacao plants

Whole plants and/or leaves of young (3 – 4 months old) CSSV-infected and CSSV-free cacao seedlings (var. Amelonado) were used as source and test plants, respectively. These CSSV-infected plants were raised from CSSV-infected seeds obtained from the Cacao Research Institute, Ghana (CRIG). These were sown in compost (75%) - vermiculite (25%) mix in lightweight standard seed trays (34.4 cm x 21.4 cm x 5.2 cm) (Fig. 1A). The growing medium was adequately wetted and maintained inside seedbed tunnels (25 ± 2°C, 60 - 65% RH) with automated watering and heating systems. Two weeks after germination, successfully emerged individual seedlings were carefully transplanted into plastic pots (14 cm x 12 cm) (Fig. 1B). Water-based fertilizer supplement, Sangral 3:1:1 (William Sinclair Holdings Plc, Lincoln, UK) were supplied at intervals of four weeks. The CSSV-free cacao seedlings were obtained from the International Cacao Quarantine Centre, Reading (ICQC).

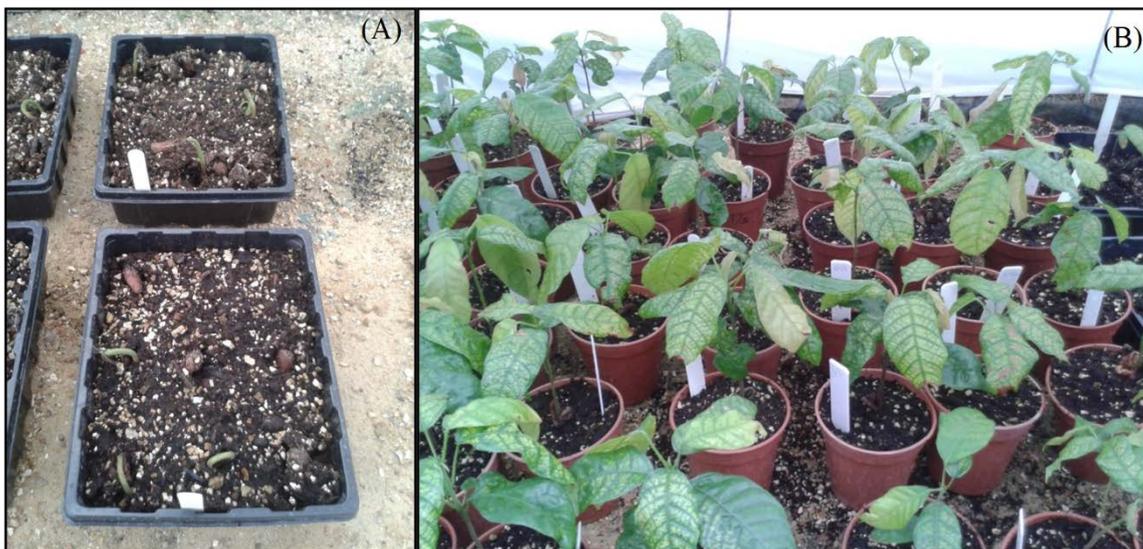


Figure 1: CSSV inoculated cacao seeds at (A) 7 and (B) 30 days after sowing in individual plastic pots.

B. Mealybugs culture

Two mealybug species often found in West African cacao, *Pl. citri* and *Ps. longispinus*, were used for the study. The mealybug species, *Ps. viburni*, which has not been reported on cacao in the field, was included as a control for comparative purposes. Clean potato (*Solanum tuberosum* L.) tubers (average size, 6 cm x 4 cm) were purchased from the local grocery in Reading, UK. Potato tubers with ≥3 nodes ('eyes') were selected and kept in dark conditions to induce sprouting. After sprouting the potato tubers for 1-2 weeks, about 3-5 tubers were placed in a plastic lunch box (30 cm x 10 cm x 10 cm). The boxes were lined on the inside with paper towels. The lid was cut open (7 cm x 5 cm) in the middle and sealed with a breathable paper to ensure adequate ventilation. Colonies of female mealybugs and groups of egg sacs previously collected were then placed directly on each of the sprouts for mass rearing. The mealybug cultures in each box were retained in screen cages (40 cm x 40 cm x 70 cm) inside growth chambers (Sanyo 600G3/TTL, Sanyo Gallenkamp Plc, Loughborough, UK) at 25 ± 2°C, 50 - 55% RH, 14:10 - L:D. Second instar (females) (Fig. 2A) of these three mealybug species were all obtained from cultures maintained in the mealybug husbandry.

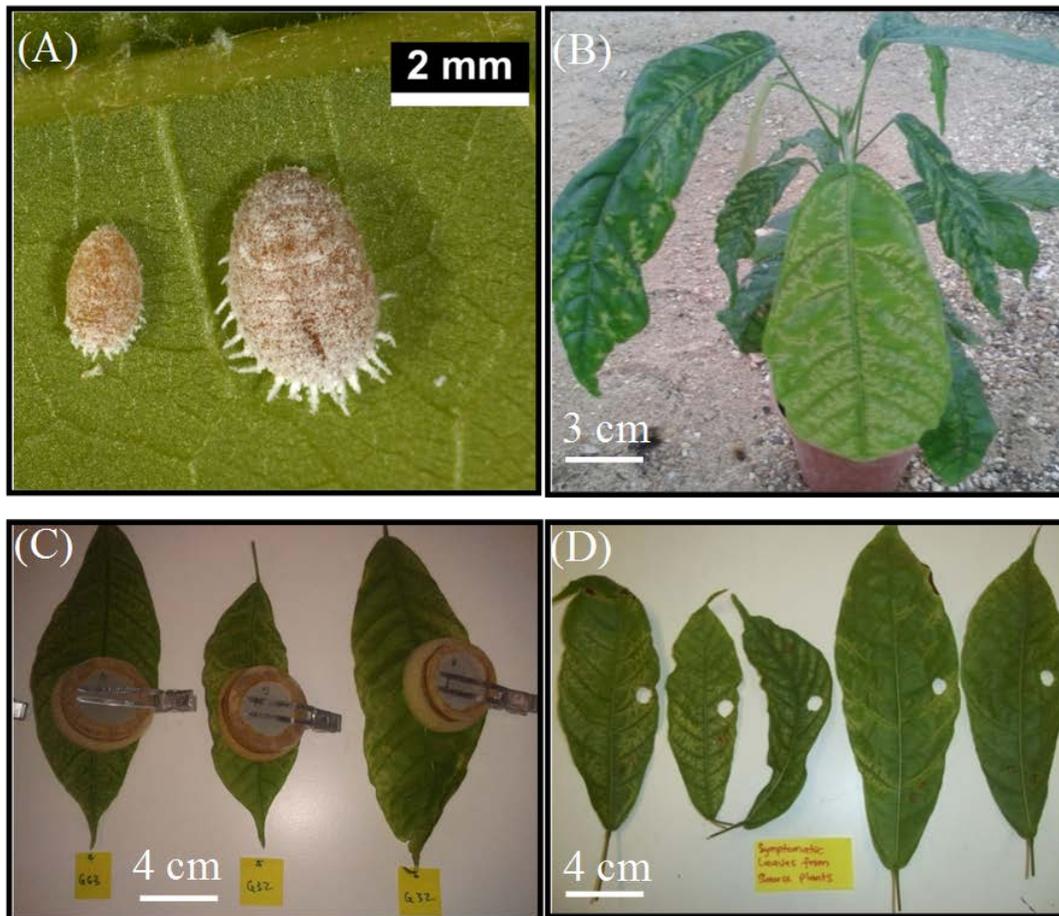


Figure 2: Mealybugs and CSSV acquisition feeding: (A) 2nd instar (left) and adult female (right) of *Pl. citri* mealybug on cacao leaf (background) (B) CSSV infected cacao seedling (C) trap-and-clip system (D) disc sampled symptomatic leaf.

C. *CSSV acquisition by mealybugs species fed on CSSV-infected cacao plants*

Groups of newly moulted 2nd instar CSSV-free female mealybugs were first collected and starved for 24 h. These were loaded into a trap cage made up of an open-end transparent Perspex (acrylic) glass cylinder (h = 0.7 cm, \varnothing = 3 cm). One end of the cylinder was completely sealed off with a fine mesh (0.025 mm) which served as a platform for loading the mealybugs into the trap with 10 mealybugs in each trap. The open end of each mealybug-loaded trap was gently positioned placed over the abaxial side of a CSSV-infected cacao seedling, held in position with lightweight aluminium spring clips. The trap was tapped gently on the mesh fitted end, to dislodge the mealybugs onto the cacao leaf surface. The entire experimental setup, in four replications for the three species, was maintained in screen cages inside the growth chamber (Fig. 3). The entrapped mealybugs were allowed in this feeding position on CSSV-infected cacao seedlings for 72 h. The traps were then removed, individual mealybugs were separately collected for DNA extraction and subsequent PCR screening for evidence of CSSV.

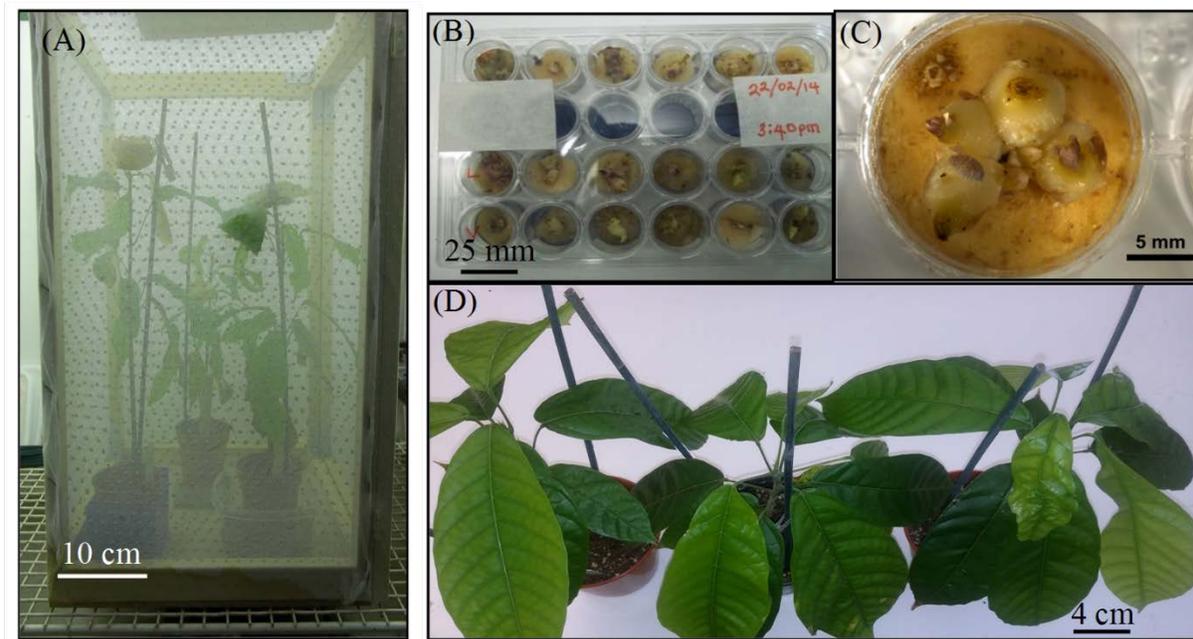


Figure 3: (A) Screen cage with *in situ* CSSV infected seedling carrying mealybugs in clip cages, (B and C) viruliferous mealybugs on cacao-free diet (*Solanum tuberosum* sprouts) and (D) CSSV-free cacao (var. Amelonado) seedlings (test plants).

D. CSSV retention by viruliferous mealybugs fed on potato

Groups of newly moulted 2nd instar mealybugs were collected, starved for 24 h then given a 72-h virus Acquisition Access Period (AAP) on cacao seedlings (var. Amelonado) infected with the New Juaben strain of CSSV. The ‘viruliferous’ mealybug individuals were then transferred to *S. tuberosum* sprouts (a non-CSSV host) (Fig. 3). Thereafter, at daily intervals over a six-day period, individuals were destructively sampled and PCR-screened for CSSV presence prior to qPCR analysis.

E. PCR and qPCR analyses of mealybugs exposed to CSSV-infected cacao

Mealybug DNA samples were first screened with conventional qualitative PCR using primers designed to produce a 500 bp fragment upon detection of a DNA sequence from Open Reading Frame 1 (ORF1) of CSSV isolate ‘New Juaben’. The qPCR analyses were performed using the following primer pair: forward (CSSVORF1Sf): 5’-ACC AAG CAG TTC CGA GAA AAC-3’ and reverse (CSSVORF1Sr): 5’-GGC TCA TTG ACC ACC CAT TG-3’. These primers were designed within this sequence to yield a 130 bp fragment, a size optimised for real-time PCR (qPCR) which was performed on the same mealybug DNA extractions using SensiMixTM SYBR[®] and Fluorescein kits (Bioline) on a QIAGEN Rotor-Gene 6000 thermocycler. Each 25 μ l qPCR reaction consisted of SensiMixTM (12.5 μ l), ORF1 forward and reverse primers (2mM, 2.5 μ l), ddH₂O (5 μ l) and DNA (5 μ l). Master mix solutions comprising SensiMixTM, primers and water were prepared in excess for the 72 x 25 μ l reactions that were conducted for each run of the Rotor-Gene. Mealybug DNA samples were run in duplicate and each run also included a dilution series of the source plant (CSSV-infected) DNA diluted at 10⁻¹, 10⁻² and 10⁻³ (each in duplicate).

III. RESULTS

A. Detection and quantification of CSSV in mealybugs by PCR and qPCR

Primers for the qualitative PCR were designed in the conserved regions of the six published sequences of the CSSV genome, National Centre for Biotechnology Information (NCBI) accession number AJ608931 (11, 33) (Fig. 4A). Fig. 4B shows the gel electrophoretic image of the expected product size for CSSV positive and negative control samples. A portion of the 180 bp fragment sequence used for the qPCR is shown in Figure 5.

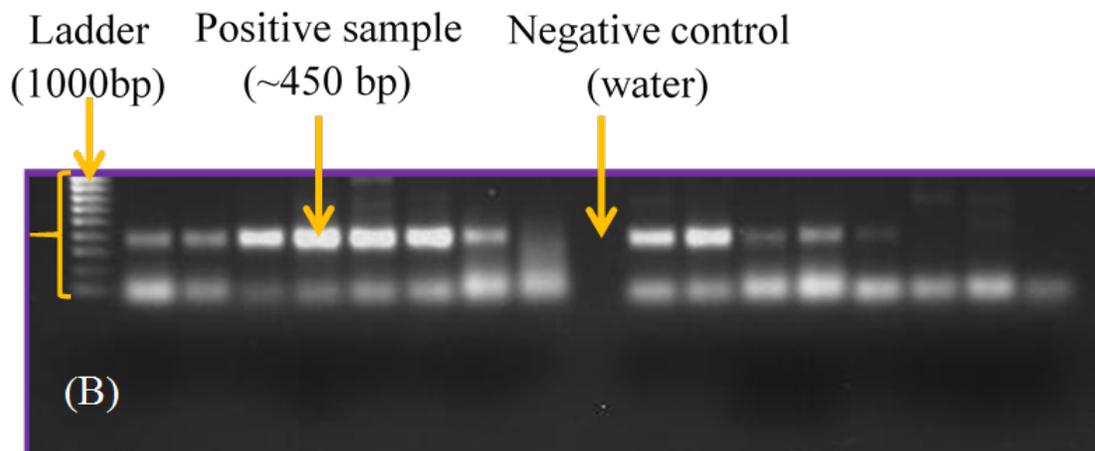
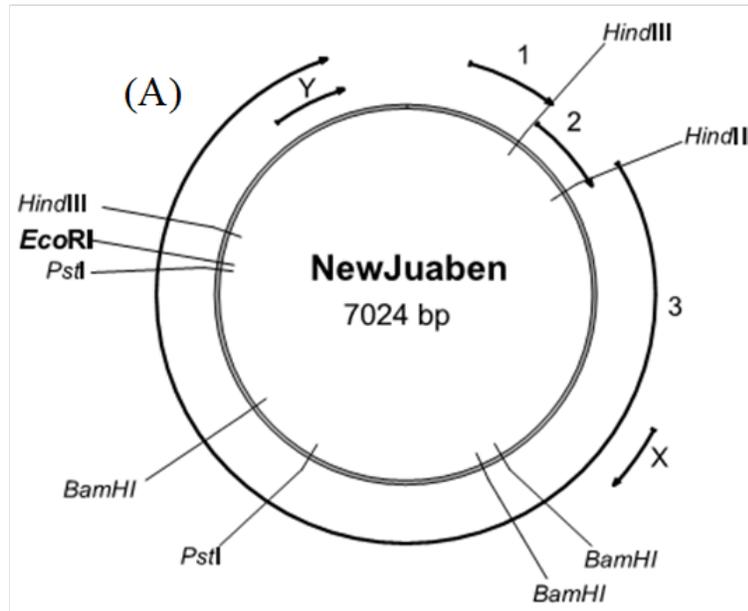


Figure 4: (A) The genome of the New Juaben isolate (11) utilised in the present study, showing sites of the restriction endonucleases, BamHI, EcoRI, HindIII, PstI and the five open reading frames (ORFs) 1, 2, 3, X and Y. (B) An agarose electrophoretic gel image showing expected product size for OR1 primer against CSSV-positive samples and control (DNA template-free) sample.

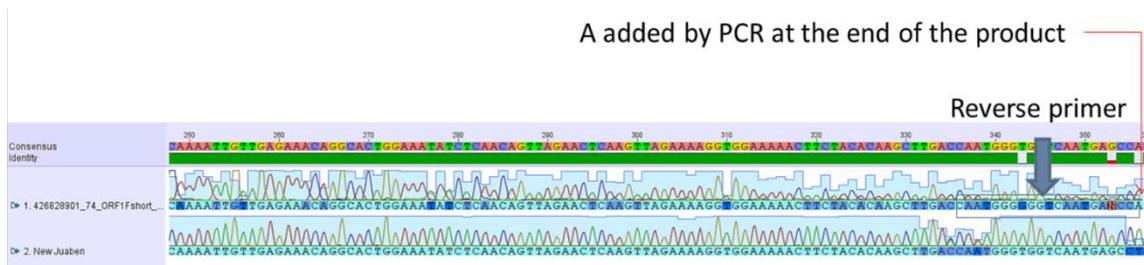


Figure 5: Portion of read from Sanger sequencing of 180 bp fragment produced with ‘CSSVORF1Sf and CSSVORF1Sr primers with *Planococcus citri* sample 74 (144 h post-AAP on cacao-free diet) showing 100% homology with published sequence for the New Juaben strain of CSSV (NCBI accession number AJ608931).

B. Evidence of CSSV acquisition and retention by mealybugs

It was demonstrated that *Ps. viburni* can acquire and retain CSSV in a similar manner to *Pl. citri* and *Ps. longispinus* (Fig. 6). The potential infectivity status of viruliferous mealybugs for all the three species was apparently not lost after feeding on the non-cacao diet as shown by the ORF1 PCR and qPCR screening results. Individuals of all three mealybug species showed evidence of CSSV retention after transfer to a potato tuber diet (in which the virus will not proliferate) (Fig. 6). PCR products (comparable with the positive controls from the CSSV-positive donor cacao) generated from mealybug extractions, when purified and submitted for DNA sequencing (conducted by SourceBioscience, Oxford) were 100% matches with that of the CSSV isolate ‘New Juaben’. Products of a non-target size (e.g. sample 6 in Figure 6 which can be seen to be below the 300 bp size maker) did not produce sequences that matched any badnavirus DNA sequences. Real time PCR analysis of the same samples began with a dilution series of the source CSSV-positive cacao leaf (Fig. 7A). The quantitative analysis worked as expected with duplicated samples amplifying at approximately the same position and the increasingly dilute CSSV samples (10^{-2} and then 10^{-3}) not amplifying until after further cycles of PCR amplification (Fig. 7A). Products from mealybug samples were most frequently generated at levels that fell between those of the 10^{-2} and 10^{-3} dilutions of the source leaf DNA values (Fig. 7B). The qPCR primers were used to generate products from these mealybug samples for sequencing using conventional PCR (because real time PCR products are not directly available for sequencing) and when the resultant sequences of the 130 bp products were assessed they were 100% matches with that of the CSSV isolate ‘New Juaben’. Melt analysis of the real-time PCR products was conducted and only those that showed a melt temperature that did not diverge significantly from that of the CSSV-positive control (*ca.* 80°C) were recorded as positive. There was consistency between the two methods of sample analysis with, for example, sample 74 (a *Pl. citri* individual fed on potato for 144 h) producing the particularly intense band on agarose following conventional PCR (Fig. 6) and also generating the highest real time PCR signal of all the 84 mealybug samples analyzed (Fig. 7C). However, the greater sensitivity of the real-time PCR analysis meant that for each species time point the number of mealybug samples positive for the presence of CSSV DNA was equivalent to or greater than that shown by conventional PCR with all three species exhibiting viral retention six days after leaving their CSSV-infected food supply (Table 1).

Table 1: Retention of CSSV in three mealybug species fed on CSSV+ cacao for 72 h followed by transfer to a potato diet for 0 to 144 h, as detected by conventional and real-time PCR (data in parentheses). n=4

Mealybug species	Duration on potato diet after transfer from CSSV source plant (h)						
	0	24	48	72	96	120	144
<i>Planococcus citri</i>	1/4 (3/4)	2/4 (2/4)	2/4 (4/4)	2/4 (2/4)	1/4 (3/4)	1/4 (3/4)	1/4 (3/4)
<i>Pseudococcus longispinus</i>	1/4 (2/4)	3/4 (4/4)	-/4 (2/4)	1/4 (4/4)	1/4 (4/4)	1/4 (2/4)	-/4 (2/4)
<i>Pseudococcus viburni</i>	1/4 (3/4)	1/4 (3/4)	2/4 (3/4)	1/4 (3/4)	-/4 (3/4)	1/4 (1/4)	1/4 (1/4)

‘-’ = PCR negative

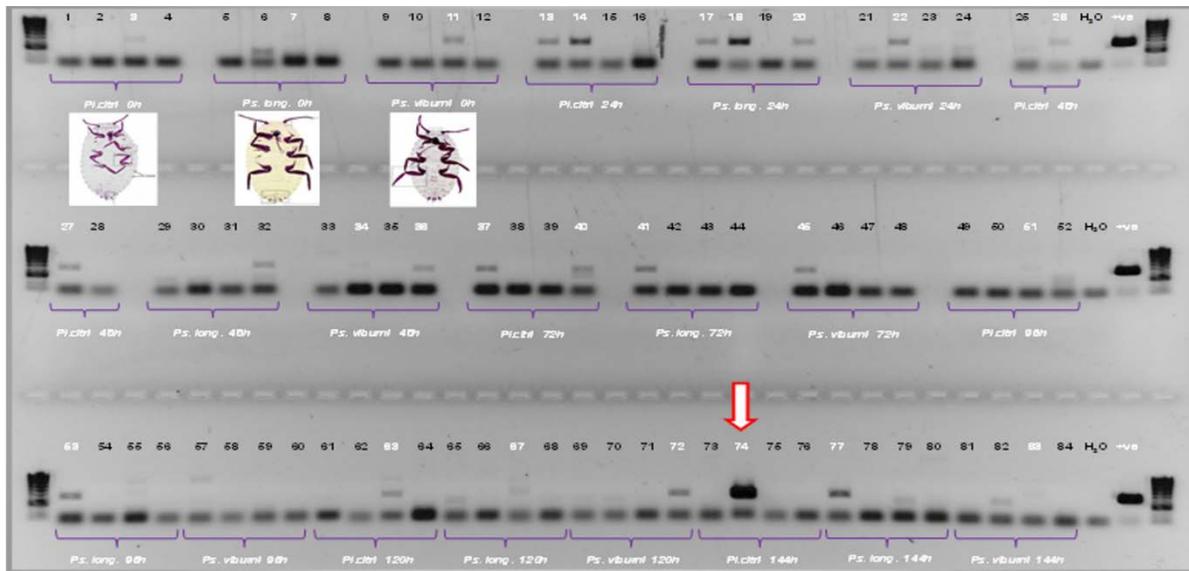


Figure 6: Retention of CSSV by 3 mealybug species fed on virus-infected cacao, then transferred to CSSV-free diet for 0 to 6 days as determined by qualitative PCR (white numbers = CSSV+ mealybugs). Arrow highlights particularly strong product from 144 h *Planococcus citri* individual (sample 74).

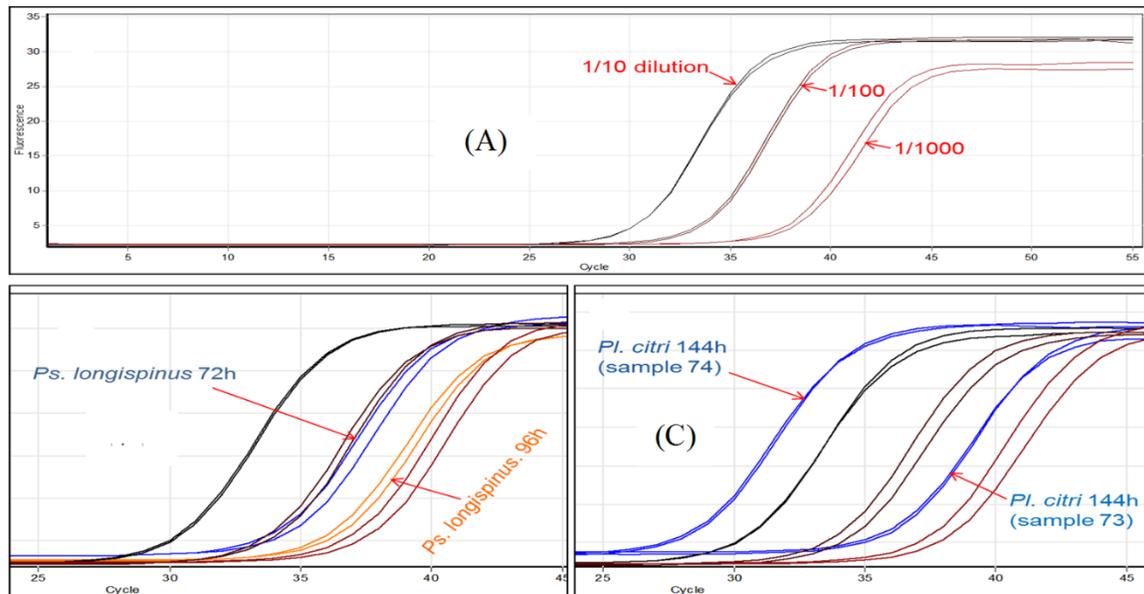


Figure 7: Retention of CSSV by mealybugs as determined by real time PCR. (A) Each run of up to 72 reactions included duplicated reference samples from the CSSV infected source leaf dilutions 10^{-1} , 10^{-2} and 10^{-3} . (B) CSSV levels in these 72 h and 96 h *Pseudococcus longispinus* samples were between those of the 10^{-2} and 10^{-3} leaf dilutions. (C) Sample 74 showed the highest CSSV concentration and samples such as 73 (apparently, virus-free according to the qualitative PCR) showed detectable CSSV via real-time analysis.

C. Screening of cDNA from CSSV-infected cacao

Total genomic DNA and cDNA from leaf samples of CSSV infected seedlings we screened against four CSSV specific primers: ORF1, MP, RNase and RTase (Fig. 8). The result demonstrated that the approach for detecting CSSV presence from the DNA extracted from an infected cacao leaf could work as well with cDNA synthesis from RNA extracted from the exact same CSSV-infected cacao leaf.

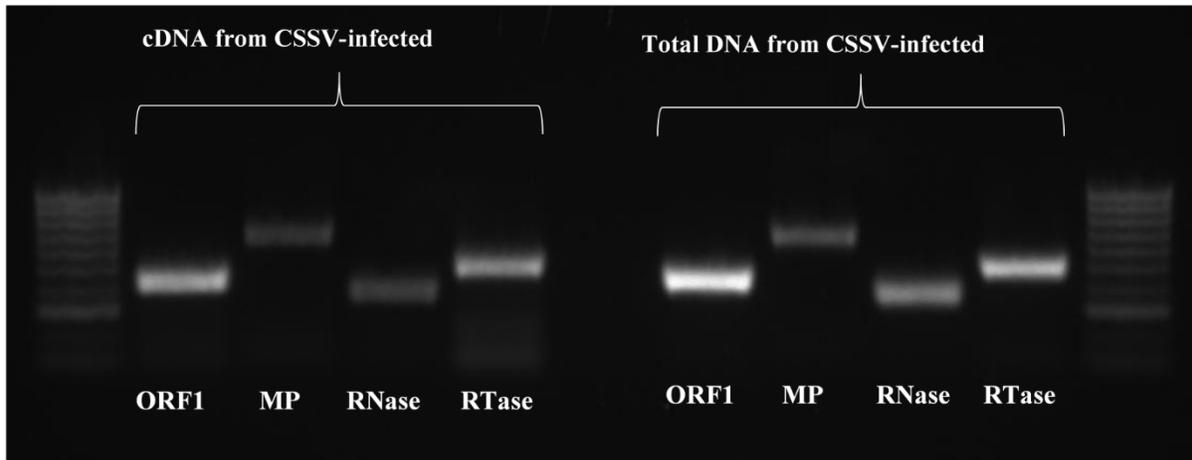


Figure 8: Comparison of CSSV-screened PCR products from total genomic DNA and cDNA of CSSV-infected cacao seedling.

IV. DISCUSSION

The effectiveness of mealybugs as virus vectors is said to be species dependent and varies according to their favoured feeding sites on the cacao plant and with respect to the age of the plant (14) and the determinants of the mode of virus transmission and infection by vectors are retention time, site of retention and internalization of viral particles (virions) by vectors (Andret-Link and Fuchs, 2005). In non-circulative stylet-borne viruses, the virions are dislodged during a sustained feeding duration and it is presumed that on subsequent ingestion, these virions are not reacquired by previously occupied positions on the stylets once they have been released (34). Differences in cacao infection rates, for example, have been observed between the mealybug vectors *Formicococcus njalensis* and *Ferrisia virgata* with distinct stylet dimensions and frequency of phloem penetration being proposed as the cause (35). In previous studies, *Fo. njalensis* and *Pl. citri* were considered to be the most important viral vectors on cacao as, at the time, they were generally the predominant mealybugs on the crop in the Afrotropical region (19, 24, 27, 36, 37) respectively. Persistence of the virus within the vectors is reported to differ between the two species with *Fo. njalensis* showing a gradual decline in infectivity up to 18 h post acquisition feeding while *Pl. citri* transmission rates over a similar period were constant (13). However, of these two species, while *Pl. citri* is usually present in lower numbers in West Africa (38), its greater mobility and ability to infest new cacao trees make it potentially the more important virus vector. Reports have indicated that, in keeping with its classification as a semi-persistent virus, CSSV is retained by its mealybug vectors for only a matter of hours or days after feeding on an infected source plant ceases. Roivainen (17) (reviewed by Roivainen (14)) recorded the longest period of CSSV retention to date when he reported that infectivity persisted in starved nymphs of *Fo. njalensis* until 72 h after virus acquisition. The present study demonstrated that all three mealybug species under test were capable of retaining viral DNA until at least 144 h after virus acquisition and that was in a scenario more analogous to a cacao plantation-border crop i.e. with mealybugs continuing to feed on a non-malvaceous crop. The current work also demonstrated that conventional qualitative PCR can be used to detect CSSV DNA in mealybugs that have fed on virus infected cacao. This approach also indicated that for two of the three test species when mealybugs were switched from CSSV-positive cacao hosts to a potato tuber diet it was still possible to detect CSSV DNA in their bodies six days later. When qPCR was applied to the same samples the superior sensitivity of that screening approach revealed that many of the apparently virus-free mealybugs still contained detectable levels of CSSV DNA. This suggests that the majority of viruliferous juvenile mealybugs retain at least some of their viral load until they next undergo ecdysis (skin shedding) when they lose the lining of the foregut where the virus is thought to be retained. However, it has been established in the present study that *Ps. viburni* has the potential of acting as a vector of CSSV between cacao plants as shown by its ability to acquire and retain the virus. Interestingly it was reported that *Ps. viburni* and *Ps. longispinus* have a similar 16S rRNA sequence of the same primary endosymbiont, '*Candidatus Tremblaya princeps*' (39), a β -proteobacterium present in *Pl. citri* (40-42). These three species also act as vectors of *Grapevine leafroll-associated virus 3* (39, 43) and this could partly explain why *Ps. viburni*, not native to the cacao producing areas of West Africa, is also able to acquire and retain CSSV. The information obtained in the present study on the acquisition and retention of CSSV by mealybugs previously implicated as vectors has now been validated with molecular evidence. This will be useful in planning future transmission studies targeted at other mealybug species with the aim of testing their 'potential' infectivity. Although *Ps. viburni* is not present in the main West African cacao growing countries, its presence in areas relatively close to the cacao growing belts, in Africa (Morocco, Saint Helena, South Africa and Zimbabwe), South America (Brazil, Costa Rica, Guatemala, Jamaica, Mexico, Panama, Peru, Venezuela) and Asia (Indonesia, Philippines, Sri Lanka) (44) and its demonstrated ability to acquire and retain CSSV could jointly have implications for its emergence as an invasive pest on cacao of which its ecological adaptation could be driven by climate change towards the cacao-growing areas.

The influence of climate change on mealybug distribution has been reported on 'potential' invasive species including the pink hibiscus mealybug, *Maconellicoccus hirsutus* (Green) in Chile (45), the cassava mealybug, *Ph. manihoti* Matile-Ferrero in Asia (46) and the cotton mealybug, *Ph. solenopsis* Tinsley (47) in India. Given that the capacity to control climate change effects on agroecology is limited, it may be appropriate to consider measures and management options for *Ps. viburni* invasion in the future, possibly including eradication, containment and integrated pest management strategies. Together with the results from the present work that indicate long viral retention times for *Ps. viburni* and the two known vectors these findings suggest efforts to locally eliminate individual mealybug species (e.g. through the use of a sterile male release approach) may be undermined by the possible subsequent occupation of niches by sympatric mealybug species and/or immigration of species from further afield. The use of predators and parasitoids in the control of mealybugs, for example *Pl. citri*, has met with minimal success partly due to the fact that its origin remains unknown (22, 48) and there is the difficulty to acclimatize its natural enemies (predators and parasitoids) under different temperature requirements to match the mealybug population on susceptible host plant (49). In addition to the expense associated with the rearing and release of mealybugs predators and parasitoids, it was also reported by Mendel, Gross (49) that the augmentation of the release of mealybug parasitoids could not bring about the expected result of reducing the population of *Pl. citri* on *Citrus* spp on the field. With their hydrophobic wax coating (50), defending attendant ant species (51) and herbivory of a crop the fruit of which must be protected from chemical tainting, mealybug CSSV vectors present a challenging target for control by insecticide application. With the use of the most widely employed chemical control (Imidacloprid) becoming increasingly restricted, precise information about the effectiveness of new alternative pesticides becomes a priority. The application of electrical penetration graph (EPG) technique to study insecticide impact on mealybug feeding could be a useful approach to embrace. EPG monitoring of feeding hemipterans provides the most sensitive means of determining the effectiveness of candidate insecticides and can support the more targeted, environmentally sensitive, and economical use of such chemicals. By time course EPG analysis of mealybugs feeding on cacao treated with, for example, soil drench insecticide applications, threshold control concentrations may be accurately determined; this may reduce the occurrence of insecticide resistance which has been reported in mealybugs, for example *Pl. citri* (49).

V. CONCLUSION

Further studies are required to build knowledge on the 'new' mealybug vector and mechanism of CSSV infection. Since it has now been demonstrated in the present study that CSSV can be detected in both total genomic DNA and cDNA synthesised from RNA extracted from CSSV-infected cacao plant, it will then be suitable to use this approach straight away on testing cacao plants (CSSV-free) after CSSV inoculation by viruliferous mealybugs. Subsequently, this could be useful for CSSV screening purposes in breeding for resistance to CSSV and vector mealybugs on different cacao genotypes. Another suggestion will be the use of EPG to monitor and characterise mealybugs feeding on different genotypes of cacao, and the time taken to achieve infection. In addition, the outcome of the combined EPG and systemic pesticide application study on cacao would inform parallel field experiments being set up in West African cacao-growing countries.

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The Role of Mapalus Culture by Minahasa Ethnic in North Sulawesi to the Coronary Heart Disease Incidents

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Abstract- Mapalus is a form of traditional mutual assistance inherited within ancestors in the land of Minahasa. Mapalus has become such a coding for Minahasa ethnic. The implementation of Mapalus has taken place in various aspects ranging from agriculture, social, community, politics, security and health. In the field of health, there has never been a study of the effect of the implementation of Mapalus tradition on the incidence of a disease, especially coronary heart disease (CHD). This study was conducted through qualitative approach. The results obtained that the implementation of Mapalus values is still done by the ethnic communities of Minahasa, and these values affect the incidence of CHD in Minahasa.

Index Terms- Mapalus, Minahasa Ethnic, Coronary Heart Disease

I. INTRODUCTION

Heart and blood vessels disease has been declared since 1995 as the main cause of death in Indonesia, and these are now beginning to threaten the younger generation. Coronary heart disease (CHD) was initially only found in people aged 45 years and older. Based on the recent data in some hospitals, however, the cases of CHD have been found in younger people aged between 27-32 years. This is due to the increased risk factors of lifestyle changes over time and the civilization [1].

In particular, coronary heart disease also becomes a crucial health issue in North Sulawesi. The results of basic health research (Risesdas) by Ministry of Health of Indonesia in 2013 show CHD prevalence was 0.7%; this figure is above the national prevalence of 0.5%, and in addition, this prevalence is the second highest in Indonesia. This trend occurs because risk factors for CHD such as obesity, smoking, diabetes mellitus and hypertension which have a fairly high prevalence [2].

Mapalus itself is one of socio-cultural values in Minahasa society in North Sulawesi, Indonesia. Other social cultural values in this community are such as *Si Tou Timou Tumou Tou* and brotherhood for all. *Mapalus* is the philosophy of *Si Tou Timou Tumou Tou*. *Mapalus* has several important principles, namely the principles of religiosity, kinship, consensus and consensus, common working and unity [3]. *Mapalus* in the field of health, however, is still not much concerned. Several studies have shown that *Mapalus* culture plays contributive role in improving the performance of human resources in the field of health and quality

of hospital services. In addition, *Mapalus* also plays a role in the achievement of Millenium Development Goals (MDGs) particularly goals 4 and 5 concerning with reducing infant and child mortality and improving maternal health [4,5]. These studies indicate that *Mapalus* as one of the local wisdoms of Minahasa community may still be explored more deeply about its role in various fields, including in the field of health, especially in the effort of controlling the spread of disease based on the local wisdom of the community. The purpose of this study is to explore the implementation of cultural values of *Mapalus* in Minahasa community that may affect the public health, especially the incidence of coronary heart disease (CHD).

II. MATERIAL AND METHODS

2.1. Methods

This research was a qualitative research with the rationale to identify the role of *Mapalus* culture in relation with health issues, in particular, factors related to the incidence of coronary heart disease (CHD). Data obtained from the qualitative identification became the indicators used in the question items in the questionnaire related to *Mapalus*.

Non-probability sampling technique was employed in determining the data sources in this study, meaning that through this technique, each member of population did not have equal opportunities to be selected as the research sample. The purposive sampling technique was used in determining the research sample. This technique provided an extent to the researchers to determine the samples based on the researchers' own considerations of the character of the data sources. Cultural observers and researchers and academicians were the respondents involved in this study. Sampling on the data source was snowball technique that the number was growing until the complete answer was found.

Based on the objectives of the data obtained in the qualitative approach, the first selected informant was the cultural researcher from the Cultural Conservation Center of North Sulawesi (informant 1). Result of interview with informant 1 provided some inquiries hence the researchers were suggested contact academics (informant 2) and cultural observers (informant 3). Results of interviews with informants 2, the researchers were advised to conduct in-depth interviews to a cultural observer (informant 3). This informant is the key

informant (keyperson). Informant 3, is a former academic in the field of culture who has done several studies on Minahasa culture especially *Mapalus*. To date, informant 3 is the only person who has the most valid information about *Mapalus* in the area of North Sulawesi. Data analysis was conducted through content analysis model according to Miles and Hubberman. The data obtained were then presented in the form of narration.

III. DISCUSSION

The Minahasa community recognizes a form of cooperation which is commonly called as *Mapalus*. *Mapalus* is a form of traditional mutual assistance to help each other and it has been inherited within ancestors in the land of Minahasa to this date; *Mapalus* is something intended for mutual benefit by and for each member. *Mapalus* is part of *gotong royong* culture, which is common in Indonesian context, meaning selfless cooperation and mutual assistance (unlike helping each other where there are rights and obligations). *Mapalus* commonly is implemented in the area of agriculture, and it was in 1960 became the turning point for *Mapalus* development.

Mapalus was originally started in the area of agriculture. In this case *Mapalus* is done to open and work for the farmland. For this, the activities began with the formation of *Mapalus* group consisting of 10 people, of group members are usually based on kinship and relatives. Furthermore, this group will elect the group leader. The leadership of this group covers the responsibility of organizing *Mapalus* group even in giving advice to punishment such as lashes. The person who became the leader of the *Mapalus* group must first be given a lash by a member of the *Mapalus* group, so that no member *Mapalus* makes any objections in case being punished by the leader later.

Some habits of *Mapalus* activities are waking up very early in the morning around 4 a.m., and it is usually arranged by the group leader. The wake-up arrangements are made using signals such as drums and other instruments. Food and lunch have been prepared by the group at the night before. The trip to the farmland usually takes 1-2 hours (depending on the location of the farmland). Due to the cold weather in the early morning, every member of *Mapalus* will be given a shot of *captikus*, traditional distilled beverage from the enau tree (*Arenga pennata*) containing high alcohol. As the lunch time, the logistics for lunch is firstly arranged by the group leader, and the members eat together by using banana leaves. The common food menu for the lunch is cassava, banana, vegetable and chili sauces.

Philosophically *Mapalus* is local spirit and local wisdom of Minahasan society that has already existed and instilled in the heart of the society. *Mapalus* has three basic types of human personality in its group: 1) **Touching Hearts** (a self-call with sincerity of fundamental and deep conscience), 2) **Teaching Mind** (full of awareness and responsibility to empower the people and groups), and 3) **Transforming Life** (mutual living and welfare of every person and group in the community). In the book *The Mapalus Way*, *Mapalus* is described as a work system that has ethical values such as reciprocal, participatory, solidarity, responsibility, mutual cooperation, good leadership, discipline, transparency, equality, and trust.

Mapalus is a social system that fits well with the various activities namely, economic, social, and even nation-building

activities; as referring the *Mapalus* as the spirit and the foundation of activities, it always succeeds. Like a body, *Mapalus* is the working system of harmonious biological functions among organs of the body from the brain, eyes, mouth, hands, feet, and others. It seems that the human body that seeks to create order and control in matters relating to its own body, as well as *Mapalus*, it strives for stability for social life. *Mapalus* cannot grow to maximum level if it is not in a coherent symbolic system (interconnected). *Mapalus* with its values has become a symbol system that closely adheres to Minahasan people which further becomes the coding of a Minahasa cultural identity.

In other words, *Mapalus* is a symbol of the presence of the Minahasa community which in its social implementation pervades the fields as a work relation, both in the economic, social and religious aspects. Indeed *tau* (people) of Minahasa should be first familiar with the working system in the field of agriculture. *Mapalus* has an active function to collect and involve the role of the community to help each other actively in agriculture such as cultivating and planting, caring, harvesting and even marketing the agricultural products.

As the migration trend of this society, *Mapalus* has begun to shift as well. As it was initially part of the agricultural sector, and then it shifts into the housing sector (building a house together), entering the church, office, community through gathering or mourning. For example regular gathering of *tuama waya* (for male members) and *wewene waya* (for female members), the social gatherings are namely utilizing food and money.

Currently *Mapalus* has experienced a so-called cultural change means that *Mapalus* has been applied to various fields but still with the same spirit and philosophy, such as *Mapalus* of grief, happiness, and mourning. The location where the *Mapalus* is still commonly visible is in the area of Minahasa, while other area that has experienced the cultural changes is in the city of Manado.

3.1 The Development of *Mapalus*

Mapalus has developed in agricultural sector, and it was in 1960 became the turning point for the development of *Mapalus*. This occurred because the migration started from the rural community to urban area such as City of Manado due to job offer in the city area. This made *Mapalus* starts shifting from *mainscaaff* to *schelscaaff* (from village community to urban community).

Due to these changes, the nature of *Mapalus* begins to shift as well. Initially it was part of the agricultural sector shifts into the other sectors namely housing (building a house together), entering the church, office, the role of community through gathering of happiness and mourning, for example regular gathering of *tuama waya* (for male members) and *wewene waya* (for female members); this type of social gathering is like collecting food and money for the community members. The *Mapalus* gathering has shifted into a social pillar with the obligation for the community members to bring food in 2 forms of the events that are *kumawus* and *meekan*.

The development of *Mapalus* began to occur when the migration of the community people to City of Manado, and they are still bringing the local culture from their village; one of the local culture from the village is *Mapalus*. The rationale of

bringing the *Mapalus* culture and it exists is because the situation in the city is hard for the people, so that the attitude of solidarity among the community is needed. It is this solidarity attitude that *forces* the society to establish the pillars of *Mapalus* in the city. This is the beginning of the development of traditional *Mapalus* in a more modern context. Mutual assistance consists of 11 ethos like, reciprocal, participatory, solidarity, responsibility/responsibility, mutual cooperation, good leadership, discipline, transparency, equality and mutual trust, and 5 principles such as love, plurality, social justice, faith, and deliberation. In addition, *Mapalus* also evolves from agriculture to other areas such as social, economic, government, and health. The development of *Mapalus* according to Parengkuan [6] has been divided into several time periods, namely before 1680s, 1680-1860, 1860-1950, 1950-1970 and after 1970. *Mapalus* system in Minahasa before 1680s can be seen in Figure 1.

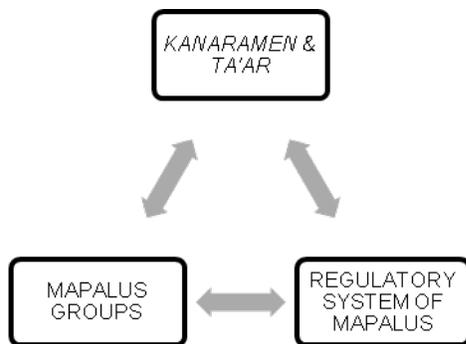


Figure 1. *Mapalus* System before 1680s [6]

Figure 1 describes that the *Mapalus* regulatory system is rooted in *kanaramen* and *ta'ar* that govern the social interaction and also the number of *Mapalus* groups, their leadership, and bound, working conditions, sanctions, and so forth. The system also provides guarantees to *Mapalus* members regarding their consumption rights before, during and after work. This is done in relation to their rights to receive assistance in accordance with the fixed list of names and on the privileges of other members. *Mapalus* groups use a specific regulatory system, constantly directed by *kanaramen* and *ta'ar*, so there are always new regulatory restrictions to improve the system or adapt it to changes [6]. The following Figure describes the *Mapalus* system in the period of 1680-1860.

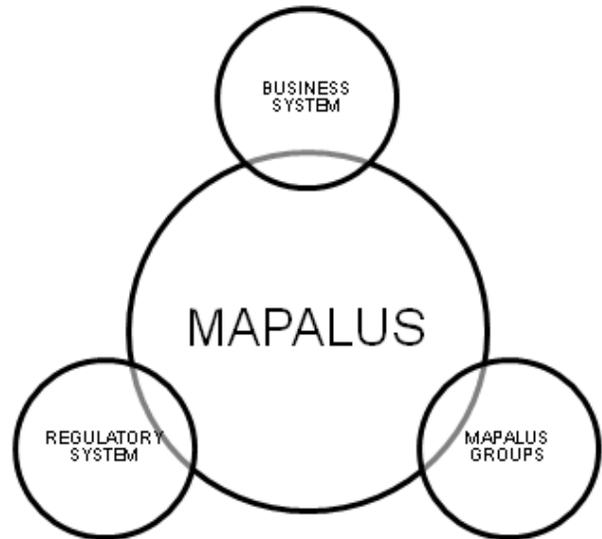


Figure 2. Four elements of *Mapalus* in the period of 1680-1860

In the period 1680-1860, in this *Mapalus* system, the time interval is also needed to ascertain whether *kanaramen* and *ta'ar* will sanction the *Mapalus* regulatory system tailored to the fulfillment of the terms of the agreement. The *kawanua*, especially the *Mapalus* groups, did not encounter any problems due to the flexibility and simplicity of existing norms. The first network was built in the period of 1853-1859. The use of carts, the construction of road networks and market development, together with the use of horses, stimulated cash economic system based on money in Minahasa. The liveliness of the cash economic system in this period greatly affected the system of *Mapalus* after that.

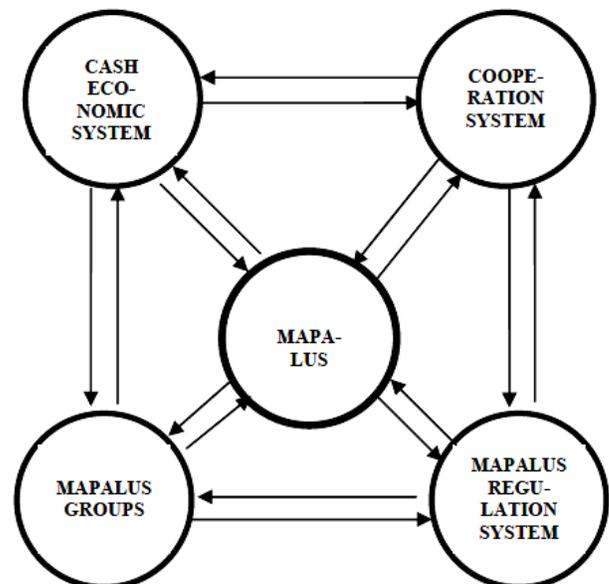


Figure 3. The development of *Mapalus* after 1860s

The figure above shows the development of *Mapalus* after 1860s. In this period, the *Mapalus* system has been developed on

the effects of the economic field, especially on the use of cash economic system. This is done in the payment of community work and services. Minahasan farmers with trade involvement are not the first time to utilize the instrumental *Mapalus*. The colonial government certainly needed a lot of manpower to expand the road network throughout the Minahasa region and connect it with Manado. No tractor or bulldozer reached the hills and filled the valley to get to this network. Through *Basar Law* and *Kadua Law*, the colonial government requested the assistance of the *Tua Law* in mobilizing the community [6]. The easiest way for the *Tua Law* to accommodate this was by utilizing *Mapalus* groups that are always available for work, especially when they were not busy on the plantation. One example of large-scale *Mapalus* mobilization for road construction was in the 19th Century which occurred during the construction of a road connecting Tondano with Airmadidi. Such *Mapalus* labor was part of a government-operated corvee system (*heerendienst*) [6].

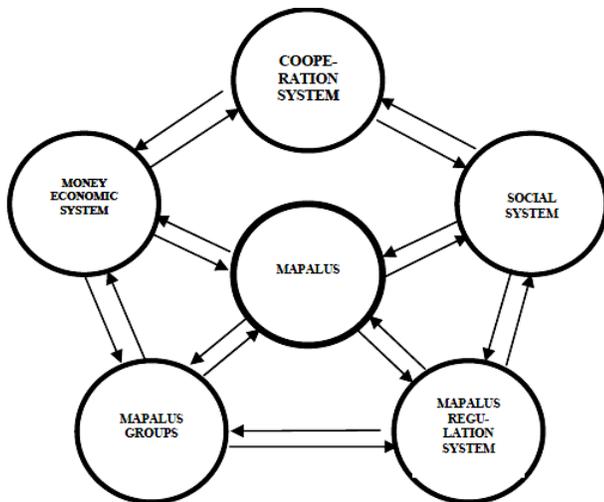


Figure 4. *Mapalus* system after 1950

Mapalus which was originally comprised of only three elements has now multiplied in complexity with the addition of cash economy, cooperation system, and social system. The variations and diversification in the concept and organization of *Mapalus* seem to be linked to increased cash economy and two other non-original elements. The increased availability of employment opportunities for rural-urban migrants has led to fewer workers in the agricultural sector particularly in villages in the area of Minahasa [6].

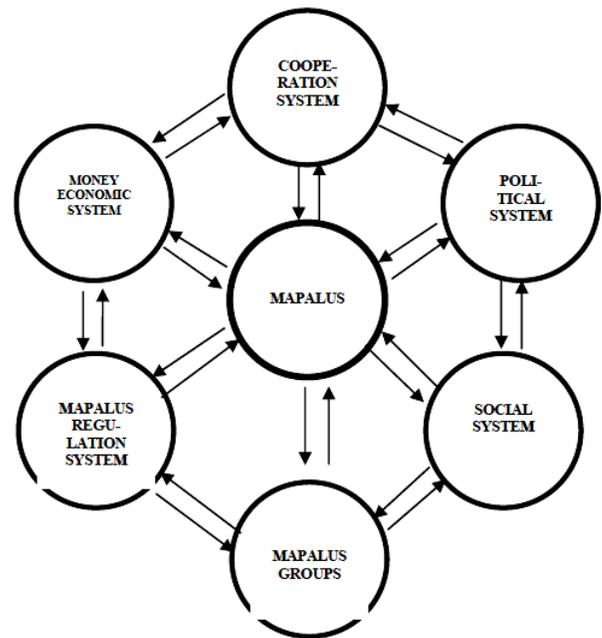


Figure 5. The development of *Mapalus* after 1970

The figure above shows the role of the political system at both national and local levels in exploiting *Mapalus* for national and regional development purposes. The political system was able to effortlessly utilize the *Mapalus* characteristics, and indeed these efforts were warmly welcomed by *Mapalus* groups themselves. This is possible with regard to the concept of *Mapalus* itself as well as the desire of the village community to build a better future for them. When government leaders campaign the slogans “*Mapalus* spirit”, Minahasan society will soon understand and absorb the meaning. The concept of *Mapalus* is always open to innovation, and if channeled effectively, it is capable of mobilizing and directing people to support government programs or be useful for the villagers [6].

3.2 *Mapalus* and Health

The scope of *Mapalus* in particular related to the health sector, it particularly influences the incidence of CHD based on ethos and the principles of *Mapalus*. The results of this interview were then incorporated into question items in the questionnaire for the *Mapalus* variable. *Mapalus* with the mutual aid and cooperation is specified into 11 ethoses like, reciprocal, participatory, solidarity, responsibility, mutual cooperation, good leadership, discipline, transparency, equality and additional 5 principles such as love, plurality, social justice, faith, and deliberation. In addition, *Mapalus* also evolves from agriculture to other aspects such as social, economic, government, and health.

There are some questions stated in the questionnaire in relation with values upon the implementation of *Mapalus* in the daily life of Minahasan ethnic, especially those related to the incidence of CHD based on the ethos and principles of *Mapalus*. The questions are outlined as follows:

1. Do you participate in activities in a community that is a healthy lifestyle such as healthy walking and jogging, community services, public sport activities e.g. gymnastics, and others?

2. Do you participate in community units in the community, for example bringing food in “*Mapalus* food” and other occasion?
3. Are you on time for a medical checkup and taking any medications recommended by the doctor?
4. Do you have enough courage to refuse any invitation from someone who may lead you to unhealthy lifestyle such as smoking, drinking, consuming prohibited foods, and so on?
5. Do you seek to build tolerance between family and neighbors in order to avoid conflict and stress?
6. Do you perform your duties and responsibilities as the member of a community through participating in health promotion efforts such as health counseling conducted by the health service center in the village or community?
7. Do you do any advice given by doctor/nurse because you trust them?
8. Do you strive or work hard in doing medical treatment or prevention of certain disease as suggested by the doctor?
9. Do you work together with a doctor, nurse, or medical staffs in order to control the spread of particular disease during the campaign in a community?
10. Do you tell your actual medical condition honestly to the doctor, nurse, medical staffs, and family members?
11. Do you assume that everyone has the same right to health action and services?
12. Do you help others (due to illness or disaster) with sincerity without asking for replies?
13. Do you assume that diversity is a social capital to be respected?
14. Do you act fairly to everyone?
15. Do you believe that human beings can try to be healthy, but God determines them all at last?
16. Do you consult or take action through consensus in family, community and other context?

According to Umbas [7], *Mapalus* is divided into 11 ethos and 5 principles. Detail elaboration of the ethos and principles is presented in the following Table 1.

Table 1. Ethos and Principles of *Mapalus*

No	Ethos / Principles	Elaboration
1	Participative	The participative ethos or value is manifested by the community in its voluntary initiative to give contribution (actively involved in activities) without any coercion or burden. This is a true call to every citizen because such involvement shows the existence of individual as a community member. In its development, participative ethos has a distinguishable typologies or characters namely passive, informative, incentive, functional,

		interactive, and independent participations.
2	Reciprocal	The reciprocal ethos is also called reciprocity. This is mutual consensus accepted in an unwritten law. The implementation is by the relationship between two cooperating behaviors that are treated and who treat the action work through <i>Mapalus</i> .
3	Discipline	The discipline ethos is another law enforcement section in the organization of <i>Mapalus</i> . Discipline is a process that creates a character that emphasizes learning, education, and appreciation of any commitments that have been agreed upon and have a common goal, not only related to punishment or offense. Discipline in <i>Mapalus</i> is defined as any attitudes through work values that leaders have positive and meticulous behavior, discretion, protect secrecy, focus on problems, consistency, flexibility, educate and advise, constructive and monitoring and evaluation.
4	Leadership	Leadership is part of some elements of <i>Mapalus</i> that become the artistic side in leading the organization. This means it is the leadership that makes a <i>Mapalus</i> system either moves well or not. If it is weak then automatically the entire organ from <i>Mapalus</i> becomes weak. Thus, leadership becomes the reinforcing element of a <i>Mapalus</i> system
5	Solidarity	<i>Mapalus</i> may occur in sudden circumstances, in case when there is a family member dies. For this, a <i>Mapalus</i> system is formed by itself. This can happen because of the high solidarity among members of <i>Mapalus</i> . Spontaneously the grieving family will record and remember the kindness of those who have helped that, at some time later when grief afflicts their families the assisted families will repay what they have got. Thus <i>Mapalus</i> will establish well if the solidarity exists among the community members. Solidarity among fellow members and even fellow human beings in the Minahasan cultural community is quite high. It always appears in the show of joy and sorrow, all the people in droves come to help.
6	Responsibility	The responsibility ethos is closely related to the cooperation agreement

		of <i>Mapalus</i> which binds every individual to be more proactive, not just answering but can also be encouraged and demanded in a moral sense. The accountability of every member of <i>Mapalus</i> relates to unwritten law of <i>Mapalus</i> —but it has strict and executable consequences with customary law such as being ostracized, can no longer be trusted for life, and even the individual may become a stranger and alienated within the community as he or she cannot be trusted anymore.
7	Standard mutual trust	The mutual trust ethos is somewhat difficult to understand by some people because of the bad experience that may have occurred in the work system that enforces the standard (mutual) trust ethos like this. This is related to the decline in the value of trust among the people. Society is more selective in giving trust to others because of previous (bad) experiences that have abused the trust given.
8	Hard work	The hard work ethos is the key idea of <i>Mapalus</i> . Everyone involved must absolutely work hard as individuals as well as in a group of <i>Mapalus</i> . The nature of this hard work has been characterized by Minahasan people for long time. There is no place for the slackers in the <i>Mapalus</i> system
9	Mutual assistance (<i>Gotong royong</i>)	The mutual assistance (<i>gotong royong</i>) ethos is often misunderstood as if <i>Mapalus</i> was just a matter of <i>gotong royong</i> . Indeed it is a thing that became one of the characteristics of <i>Mapalus</i> . It can also be understood as equality among members. This is more pronounced during mass work or community services, where every community member is actively involved and helps each other.
10	Transparency	The transparency ethos or openness is a developing ethos that evolves with the growing of communication and information technology. With the growing of the media in spreading both positive and negative news, the media sometimes exceeds the rules of journalism, causing this information demands for everything to be done openly or transparently. But in <i>Mapalus</i> , transparency is done so that accountability and control

		systems can be guaranteed.
11	Equality	The equality ethos shows that everyone has equal position in the customary and constitutional law of <i>Mapalus</i> . All should submit to any organization's general statute to anyone and any position out of the <i>Mapalus</i> institution they are currently attending. This ethos will establish justice, togetherness, and partnership, and they become united because of the guarantee of the same legal position.
12	Care	The caring principle is one of the principles of <i>Mapalus</i> to take care of others, maning the principle requires the members to help others sincerely (without any expectation in return).
13	Plurality	Pluralism principle is social capital and this is the thing that God has created for people to learn and to accept one another. This is one of the principles of <i>Mapalus</i> in upholding diversity and pluralism.
14	Social Justice	The values of Five Principles of Indonesia (<i>Pancasila</i>) are also integrated in the implementation of <i>Mapalus</i> culture. The principle of social justice in Pancasila is also in line with what found in in <i>Mapalus</i> . All Minahasan people are treated and treat everyone fairly regardless of their race, religion and ethnic.
15	Faith	The principle of faith is also found in <i>Mapalus</i> . This principle makes the Minahasan society believe in the bigger power that governs the life in this world that is God. Faith is private and individual business between man and God. For this, there should not be any mutual arrangement between the followers of the religions or between the same religion (different sects).
16	Consensus	The last principle is the way to make decision which should be discussed and consented within the members. The decision-making process within the family should be made as the result of discussion among family members, and so on. This principle is known as consensus or deliberation.

The scope of *Mapalus* in relation with the medical matter affects the incidence of CHD based on the 16 values absorbed from the ethos and principles of *Mapalus*. The values of *Mapalus* still exist and are inherent within the Minahasa community within generations. The values of *Mapalus* which was originated from the agricultural sector are currently being implemented by

the Minahasan community even though it has shifted along with the social changes of the people, from agriculture to politics, government, social, community, health and others. This shift began to occur when the migration of the people from village to city. The migration has caused the Minahasan people to start adapting to new life without losing the values of *Mapalus* which still remain inherently within the society.

Mapalus, which was originally from cooperation and helping each other to open farmland, from agricultural sector shifted into other sector such as cooperation, mutual assistance, helping in social life such as gathering and community unit, either in offices, religious organizations, social organizations and other society. It is implemented through likes, sickness and sorrow.

Minahasan community is a religious society. It has been proven through frequent thanksgiving ceremonies like birthday celebrations, weddings, new homes, new class, promotions, moving houses, graduating from kindergarten to college, recovering from illness, commemoration, the third night after death, one-week after the family died, 40 days of death, and others. It seems that almost every day in the Minahasa area is thanksgiving and worship day, while Saturday and Sunday are known as social work day (could be attending various thanksgiving events).

Minahasan community is a society with high solidarity. They are happy when their relatives and neighbors are happy, and vice versa. Thus, when there is a thanksgiving event, attending the event becomes a necessity even though attending 2-3 thanksgiving events in one day. Thanksgiving may start at lunchtime and end in the midnight. The activities are usually started with worship, big meals and eating together, singing together, dancing together, discussion, drinking together (mineral water, softdrink and local alcoholic beverage) and others. These are some examples of the implementation of *Mapalus* values in the life of the Minahasa community.

Several studies have shown that there has not been direct research analyzing the role of *Mapalus* for CHD control, but it is an indirect influence. Research that has been done to see the role of *Mapalus* in the socio-economic, behavior and health services can be seen in Table 2.

Table 2. Research on *Mapalus*

No.	Aspects	Results	Researchers
1	Community empowerment	The concept of neighborhood security is conducted through public	Kilis [8]
		The role of <i>Mapalus</i> to empower the community in City of Tomohon	Turang <i>et al</i> [9]
		Participation on the members in <i>Mapalus</i> farmers organization	Ngangi [10]
		The role of	Goni [11]

2	Culture, Language, and Education	<i>Mapalus</i> in improving farmers welfare	
		Community empowerment in <i>Mapalus</i> -based community development	Fensyana [12]
		The application of Emily Durkheim's theory on <i>Mapalus</i> culture in Minahasa	Mamentu [13]
3	Social and Politic	The values of <i>Mapalus</i> culture in the teaching of civic education to improve tolerance	Pangalila [14]
		The role of <i>Mapalus</i> to preserve national culture	Wawointana and Putra [14]
		Democracy in <i>Mapalus</i> organization system in Minahasa	Sendow dan Santoso [16]
4	Health	The implementation of <i>Mapalus</i> in community security	Tandaju [17]
		The influence of <i>Mapalus</i> in improving MDGs achievements through human resources	Ririmasse <i>et al</i> [5]
		The influence of <i>Mapalus</i> culture in human attitude and hospital management	Ririmasse <i>et al</i> [4]

IV. CONCLUSIONS

Mapalus is still implemented in the Minahasa ethnic communities. The implementation can be observed through the sixteen values formulated from the ethos and principles of *Mapalus*. The implementation of *Mapalus* has evolved from agriculture to social, political, economic, security and health aspects by still using the same *Mapalus* essence. The implementation of *Mapalus* that influences the incidence of CHD is likely related to behavioral risk factors such as consuming fatty foods and smoking in *Mapalus* activities such as gathering

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Current Situation of Water Pollution and Human Health in the Republic of Benin

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Abstract- Water is an essential element for humankind, animals, and plants. It is also an important element of the aquatic environment (the natural habitat of multiple species), where its quality plays a determining role in their protection and conservation. Unfortunately, the water quality of natural environments has worsened in the last decades. In Africa and particularly Benin, monitoring the quality of surface water is a very rare activity.

Water pollution in Benin has become a major public concern in recent times because it breeds poor environmental conditions which threaten the health of the people. To determine the effects of water pollution on the people in the Republic of Benin, some studies have been done before and we decided to conduct a review looking at the current situation of water pollution in Benin.

Towards the end of 1998, Benin began to place a high priority on environmental matters, particularly water-related issues. This is reflected in recent environmental policies, legislation, action plans and programs introduced by the Government. In all these programs, environmental monitoring activities, especially water quality aspects, are given strong consideration. With the creation of the General Directorate of Water (DG-Eau) as the central coordinating body for all water matters within the country, Benin has developed a mechanism that will monitor water quality adequately and will keep a record of all relevant environmental variables. New concept Integrated Water Resources Management adopted by the Government of Benin will improve all aspects of water use and conservation within the country if the political will and financial resources for its implementation to be sustained.

Finally, the review shows that the risk of water pollution exists and it is necessary to take measures of water treatment and sanitation to prevent the further degradation of water resources in Benin.

Index Terms- Water pollution, Human Health, IWRM, Benin

I. INTRODUCTION

Water quality around the world constitutes a major concern for populations because not only it is a valuable resource but it is also necessary for our existence [1]. According to FAO, the global demand for fresh water is doubling every 21 years. Water

plays a vital role in the daily activities of humankind. It is an important element of both aquatic environments and the natural habitat of multiple species (fish, batrachians, birds, and mammals) [1].

From an ecological point of view, water is a vital resource for all living organisms, and at the same time, it is a habitat for aquatic organisms. In the early 1970s, it was thought that water quality, under which the efficiency of reproduction of aquatic organisms is highest, must be regarded as good water quality. But urbanization, anthropogenic activities in the floodplain, and other cropping activities affect water quality [2]. Societal activities interact with the environment for the provision of basic needs (food, shelter, and clothing) and in doing so, they contaminate the waters thus making them unhealthy for human consumption [3]. Unfortunately, human activities along river courses are capable of degrading the quality of these rivers.

The quality and quantity of available water supply intakes have positive and negative implications on the health status of communities and societies. Over 500,000 people die daily worldwide to water-borne diseases [4]. It is also estimated that about 4 million children under five years old die annually in developing countries because of water-borne diseases [5]. Worst still 2.3 billion people worldwide have mortality and morbidity associated with water-related ailments [6, 7]. Increased population, geological factors, rapid urbanization, agricultural development, global markets, industrial developments, and poor waste regulation had affected the quality and quantity of Human or aquatic life.

There are two types of water bodies, namely: surface and underground. Surface water includes oceans, seas, rivers, streams, brooks, lakes and flood. Whereas underground water comprises boreholes and wells. The majority of residents worldwide drink underground water without any form of treatment mainly because of ignorance, and perhaps, lack of access to basic methods of water treatment before usage. Such people can easily contract water-borne diseases such as cholera, and in extreme cases, if care is not taken cancerous diseases.

Water is important for the survival of humanity, a vital resource for all living organisms; the source of life and humans uses water for, domestic, agriculture, economic, transportation and recreational use and many other uses. However, water pollution is a serious issue that is happening in numerous countries including Benin. It is about time we recognized the effects of water pollution, identify its root causes, and find ways to correct the situation to stop pollution at its sources. Water pollution not only affects water quality but also threatens human health, economic development, and social prosperity.

Thus, the development of industries, the intensification of agriculture, and domestic activities introduce chemical substances into the water cycle, a significant part of which reaches lakes, rivers, and groundwater [8]. The quality of finite water resources is under threat from industrial, agricultural, and domestic sources of pollution [9]. Thus, during the last 10 years, the quality of water in the natural environment has seriously been degraded [10].

Despite its potentials with 13 billion cubic meters per year and 2 billion cubic meters per year of surface water and groundwater respectively, Benin encounters enormous difficulties in supplying good-quality drinking water [11]. Although Ouémé River is one of the longest and most important in Benin, water supply remains difficult in its catchment area [12]. This situation is accentuated by the use of artificial fertilizers in the cotton zone of the Ouémé Basin, this, directly and indirectly, pollutes the rivers with this basin. [13]. While water supply was the thematic focus of many publications at the global and national level [14, 15, 16, 17], few dealt with water quality. Nowadays, owing to its tremendous significance, the problem of water quality assessment attracts numerous researchers [18]. But according to statistics, 14.7% of the population in Bénin still use rivers, ponds, and swamps as drinking water, even though their water quality remains unknown [19].

The present review paper aims to give some comprehensive ways to improve water resources in Benin based on water pollution problems in Benin, thus based on the effects on health and ecosystems and the control technology.

II. WATER RESOURCES IN BENIN

Benin is located in West Africa and approximately between latitude 6° and 13° North of the Equator, and between longitudes 0 and 4° east of the Greenwich meridian. It is bordered to the north by the Republics of Niger and Burkina Faso, to the south by the Atlantic Ocean, to the east by the Federal Republic of Nigeria and to the west by the Republic of Togo [20]. The population is more than 10 million, spread unevenly over a national territory of 114,763 km² [21]. The largest city and economic capital is Cotonou, which is also the seat of government but the capital of Benin is Porto-Novo [22]. The climate is hot and humid, which affects the quality and quantity of the country's water resources. This results from the influence

of two main rainy and dry seasons per year systems: Annual rainfall in the coastal area averages 1300 mm or about 51 inches. April to late July is the period of the principal rainy season, with a shorter less intense rainy period from late September to November. From December to April is the period of the dry season, with dry wind from the Sahara called the Harmattan, during which a veil of fine dust hangs over the country, the vegetation turns reddish-brown grass dries up and causing the skies to be overcast. Then a short cooler dry season from late July to early September. Humidity and temperatures are high along the tropical coast. Generally, the temperature is between 24 and 31 °C (75.2 and 87.8 °F) [23], although because of the moderating influence of the sea, the mean daily and annual maximum temperatures increase from the coast towards the interior. During the dry season the temperatures are more extreme, ranging between 25 and 31 °C (76 and 87.8 °F). As a tropical nation, Benin is highly dependent on agriculture, with substantial employment and income arising from subsistence farming [24].

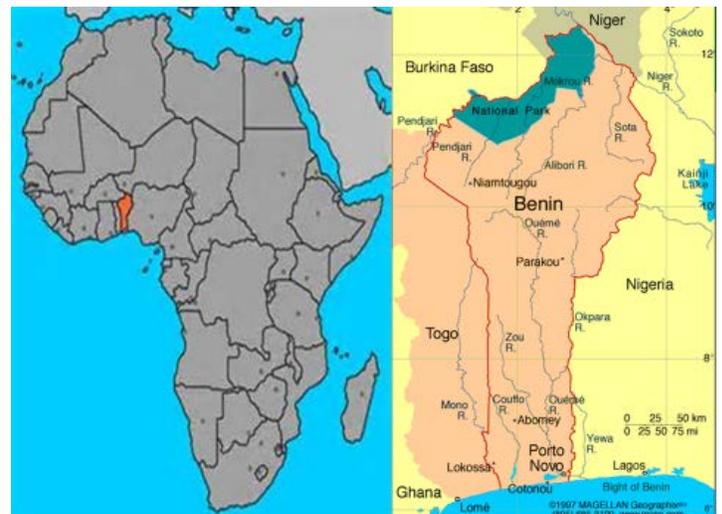


Fig 1: Location map of Benin

In Benin, water use has not been regulated. Furthermore, water management has been sector-based, fragmented and compartmentalized. To change this, the action was taken to initiate Integrated Water Resources Management (IWRM) in the country. A baseline study was done followed by the drafting of an Integrated Water Resources Management (IWRM) action plan. From that experience, the lesson learned is the advocacy for strengthening political will for supporting the process must be seen as a transversal and on-going action throughout the whole Integrated Water Resources Management (IWRM) process.

The country receives an annual average of 700 mm to 1,300 mm of rainfall from North to South. Rainfall can reach 1,400 mm in the South-Eastern part. Benin is drained by a dense hydrographical network made up of seasonal flow rivers. The renewable water resources of the country are estimated at about 15 billion m³ of water per year, including approximately 2 billion

and 13 billion m³ of groundwater and surface water respectively, unequally distributed in space and time.

Nowadays, the country is still at a stage where the catchments and water uses are not controlled and do not fall under any enforced regulation [11].

The country currently uses less than 3% of its renewable water resources, meaning that 97% of the resources are lost through evaporation and spring runoff. According to forecasts established in 2000 (Benin Report, Water Vision 2025) [11], Benin only needs about 40% of its renewable water resources if it is to meet its development needs by 2025, this excluded the non-evaluated needs of the industrial sector. These forecasts, however, do not take into account the impacts of climate change on water resources and the increasingly pressing needs for the populations to adapt.

In addition, the chronic lack of reliable and useful water data and the current mode of GDP calculation make it almost impossible to estimate the real contribution of water to growth and economic development in Benin.

However, the irreplaceable role that water plays in the development of the country was partly taken into account in the 2007-2009 Strategic Document for Growth and Poverty Alleviation (DSCR) as one of the priorities of the Beninese Government [25]. It is true to say that better water resources management is key to growth and economic development in Benin. A draft water law was validated by stakeholders in April 2005 and was submitted to Parliament in July 2007, for its adoption. From a political and legal perspective, the IWRM process enabled Benin to develop a national water policy validated by key stakeholders in January 2008 and adopted by the Government in July 2009. This new water law is the only water-specific regulation which considers the different reforms carried out in the sector in the context of decentralization [26]. It will compensate the obsolete 1987 water law [27].

From an institutional perspective, the water sector in Benin is characterized by multiple decision-making centers, a sector-based coordination, therefore resulting in high economic, social and ecological costs. management framework and a lack of collaboration and dialogue among stakeholders. Management is thus sector-based, fragmented and compartmentalized, with no cross-sectoral

The importance of the availability of high-quality drinking water can be realized by the press release of United Nations Secretary-General on World Water Day 2002. An estimated 2.5 billion people have no access to proper sanitation, 1.1 billion people lack access to safe drinking water, and more than 5 million people die each year from water-related diseases 10 times the number killed in wars, on average, each year. Water is treated all too often as an infinite free good. They are increasingly at risk from pollution and rising demand even where supplies are

sufficient or plentiful. Two-thirds of the world's population is likely to live in countries with moderate or severe water shortages by 2025. Water is an essential element of life. Freshwater comprises 3% of the total water on earth. Only a small percentage (0.01%) of this fresh water is available for human use [28]. Unfortunately, even this small proportion of fresh water is under immense stress due to rapid population growth, urbanization and unsustainable consumption of water in industry and agriculture. According to a United Nations report, the world population is increasing exponentially while the availability of fresh water is declining. Many countries in Africa, Middle East, and South Asia will have serious threats of water shortage in the next two decades. In developing countries, the problem is further aggravated due to the lack of proper management, unavailability of professionals and financial constraint [29].

Water Availability In Benin	Amount (m ³ /person/year)
Renewable freshwater resources per capita (2008)	1,189 ¹
Water withdrawals (2002)	18 ¹
Projected water resources (2015)	948 ²

Table 1: Water availability in Benin

III. OVERVIEW OF WATER POLLUTION PROBLEM

Today the competition for scarce water resources is intense both in Benin and in many places all over the world. Water pollution is a relatively new problem and increases the stress arising as a result of unprecedented population growth, urbanization, and industrialization since the 1990s [30]. Water pollution problems have become increasingly evident, and have led to serious environmental problems as the urbanization process continues. Industrial production without adequate regard for environmental impacts has increased water and air pollution and has led to soil degradation and large-scale global impacts such as acid rain, global warming, and ozone depletion [31]. But, concurrent investment in management of the water environment has been slower.

Furthermore, water resources development and management have been disorganized, and there is a lack of public

¹ UN Food and Agriculture Organization (FAO). FAO Aquastat Database. "Freshwater resources" refers to estimates of runoff into rivers and recharge of groundwater and does not include flows from other countries.

² Note this value was calculated using a straight-line calculation based on average population growth rates (1990-2008) with no adjustment for consumption or technology changes. Data was obtained from World Bank WDI Database (population) and FAO Aquastat Database (water resources).

consciousness for the need for environmental protection and a corresponding lack of legal structures to promote this protection. Water pollution refers to the contamination of freshwater bodies, the only kind of water that humans can drink. It doesn't help that only 2.5 percent of Earth's water is fresh, drinkable water and that most of that are trapped in ice at the poles or deep underground. That leaves about 0.007 percent of Earth's water available for almost seven billion of us to use for drinking, growing food, providing energy, and producing goods.

Water pollution is also defined as the contamination of water bodies such as rivers, oceans, lakes, and groundwater. The water pollution affects living organisms and plants that live in these water bodies and in most cases, all the effect is not only damaging either to individual species and populations but also to the natural biological communities. When pollutants are discharged indirectly or directly into water bodies without adequate treatment to remove harmful constituents, it occurs that water will not be safe for drinking.

In Benin, water pollution occurs in both rural and urban areas. Drinking water from natural sources such as rivers, lakes, and streams in rural areas is usually polluted by organic substances from upstream users who use water for agricultural activities.

When water does not support a human use and either it is impaired by anthropogenic contaminants, like serving as drinking water and undergoes a marked shift in its ability to support its constituent biotic communities, water is referred to as polluted. Algae blooms, storms, and earthquakes are natural phenomena and they are also causing major changes in the ecological status of water and water quality. Water pollution has many causes and characteristics.

For diverse reasons, people are attracted to rivers, lakes, and coastlines. Clean water is a crucial resource for irrigation, transportation, recreation, fishing, drinking, hunting, industry, sheer esthetic enjoyment, and support of biodiversity. Water has been used to dilute pollutants and wash away throughout human history. In recent decades, pollutant inputs have increased and have degraded water quality of many rivers, lakes, and coastal oceans. Degradation of these vital water resources can be measured as the loss of natural systems, their component species, and the amenities that they provide [32, 33]. In the future, water shortages are increasingly common and likely to become more severe [34, 35]. The contamination reduces the supply of water and increases the costs of treating water for use because poor water quality and water shortage are linked. One of the most cost-effective means of increasing water supplies is preventing pollution

IV. SOURCES OF WATER POLLUTION IN BENIN

Water pollution is most often due to human activities [36]. The major ones are the indiscriminate disposal of industrial, municipal and domestic wastes in water channels, rivers, streams, and lakes, etc. [37]. An estimated 2 million tons of sewage and other effluents are discharged into the world's waters every day. In developing countries, the situation is worse where over 90% of raw sewage and 70% of untreated industrial wastes are dumped into surface water sources [38]. In Benin, Water pollution is originated from point sources and non-point sources. Sewage treatment plants, manufacturing and agro-based industries and animal farms have been identified as point sources. According to Environment Quality Report of Benin, the Department of Environmental Protection has recorded many water pollution point sources which comprised mainly from manufacturing industries, animal farms and domestic waste, agricultural runoff, and agro-based industries. Agricultural activities and surface runoffs are mainly diffused as Non-point sources.

Today one of the biggest problems facing Benin is water pollution. It cannot be demonstrated, Nonpoint Pollution Sources and the untreated sewage are the most important sources of this form of pollution in Benin. There are other sources of pollution as the runoff from the agricultural sector as well as non-regulated units that belong to small industry. Nonpoint Pollution Sources are considered as the main reason that Benin's lakes, rivers, and estuaries remain polluted according to Benin's Ministry of Environment, Habitat, and Urbanism. Some of the Nonpoint Pollution Sources can be prevented, but much of it is the result of rain and irrigation systems.

Water runoff from farmland, parking lots, industries, pesticides, sewage and other various contaminants into lakes, rivers, water supplies, and eventually the oceans. All the pollutants have a negative, often devastating, impact on aquatic ecosystems and vegetation. Most of the activities that can create Nonpoint Pollution Source include agriculture, animal grazing, septic systems and household product pollution. The Ministry of Energy and Water reports that those activities of mismanagement of potentially harmful pollutants are the key contributing factors to water pollution.

Cause of Water Pollution



Fig 2: Sources of water pollution

In short sum, the main causes of water pollution are man-made. Without thinking about the effects of environmental damage, some greedy human beings are only concerned about profit.

V. WATER POLLUTION AND HUMAN HEALTH

Water contamination is one of the main causes of health problems in human beings. About 2.3 billion people are suffering from water-related diseases worldwide [39]. In developing countries, more than 2.2 million people die every year due to drinking of unclean water and inadequate sanitation [40]. Water-related infectious and parasitic diseases account for 60% of infant mortality in the world [41].

Researchers have reported connections between water pollution and acute water-borne diseases which include hepatitis, cholera, dysentery, cryptosporidiosis, giardiasis, diarrhea and typhoid [42, 43, 44, 45] and also, the increasingly negative effects of water pollution have put more people at risk of carcinogenic diseases, potentially contributing to cancer villages [46, 47, 48, 49]. Much of what we know about the marginal effects of pollution on health is derived from data reported in developed countries, where pollution levels are relatively low. Compared to developed countries, health risks related to water pollution in developing countries are more serious. About 2.3 billion people in the world are suffering from water-related diseases. Among them, 2.2 billion people live in developing countries [44, 50]. Given the low levels of water pollution in developed countries, these estimates may not be valid in developing countries if there is a nonlinear dose relationship between pollution and health. Moreover, to our best of knowledge, no other study has analyzed the health effects of environmental treatment in Benin.

There are several effects of water pollution in Benin, the most serious being the damage it can do to human health when agricultural pollutants find their way into the local drinking water supply. Certain compounds can cause cancers, and the lesser ailments caused by eating vegetables washed in polluted water and grown with the use of nitrates are dysentery and diarrhea as well as the chance of digesting harmful bacteria which have migrated into the water supply from the farmers' use of animal manure as fertilizer. The effects of using DDT and arsenic-based pesticides and fertilizers are obvious. The general public and agricultural workers are at a great risk when such agricultural pollutants find their way into the human food chain either. Water pollution extensively affects health in humans and aquatic ecosystems. In the long-term, the present level of environmental degradation could create health problems from waterborne diseases for most of this population of Benin. Having to consume unsafe drinking water, many of people are already affected in the country.

POPULATION AND HEALTH STATISTICS

Population (2008)	8.7 million ^(c)
Proportion of population living in urban areas	41%³
Average annual urban/rural population growth rates (1990-2008)	4.3 /2.7%³
Under age 5 mortality rate (2007)	123/1000 live births⁴
Under age 5 mortality rate due to diarrheal disease (2004)	15.6%⁴

Table 2: Benin population and health statistics

Industrial effluents and agricultural pesticides accumulate in aquatic environments also causing harm to aquatic animals and lead to biomagnifications. Ecosystems can be also severely affected or damaged by water pollution. Groundwater can also be contaminated by pesticides and fertilizers causing damage to the reproductive system in the wildlife ecosystem. When agricultural run-off and sewage water, that contains organic materials are discharged into fresh water, causes an increase in the growth of algae, in turn, causing oxygen depletion. Water pollution kills the life that inhabits the water-based ecosystem, disrupting the natural food chain.

³ World Bank. 2009 World Development Indicators (WDI) Database.

⁴ World Health Organization (WHO). World Health Statistics 2009.

VI. WATER POLLUTION CONTROL: MANAGEMENT AND TECHNOLOGY

A *National environmental policy*

i. *Water sector framework*

Benin is revising its national water policy, which includes a strategy for sanitation and hygiene, promotion of Integrated Water Resources Management (IWRM), and creation of a regulatory agency with oversight of water supply and sanitation service provider delivery standards [51]. Responsibility for the water sector lies with the Ministry of Mines, Energy and Hydraulics/Water Resources (MMEE, Ministère des Mines, de l'Énergie et de l'Eau), which initiates, coordinates and regulates water resources activities. Until 2003, responsibility for urban water supply and sanitation was vested in the Benin Water and Electricity Corporation (SBEE). Institutional reform separated the functions of water and electricity supply, and the National Water Company of Benin, (SONEB, Société Nationale des Eaux du Bénin), was established as a semi-autonomous enterprise [51, 52].

SONEB now acts primarily as the public drinking water utility in urban areas. Since December 2003, local councils have been empowered to be the contracting authorities in drinking water supply and distribution, within their respective territories and in accordance with the national policies and regulations [51].

The General Directorate of Water (DG-Eau, Direction Générale de l'Eau) is responsible for overseeing and coordinating drinking water supply in rural areas. At the provincial level, DG-Eau is represented by 11 provincial water divisions. Responsibility is being shifted to the local level, which includes 77 municipalities. In some rural municipalities, user associations play an important role at the local level, though they are generally only involved in the daily management of small facilities, such as hand pumps and piped networks, while DG-Eau plans and implements construction projects [53]. Coordination in the sanitation sub-sector is not as well defined or coordinated as in the drinking water sector [54, 55].

In urban areas, the Directorate of Hygiene and Basic Sanitation which is part of the Ministry of Health (DHAB, Direction Hygiène et Assainissement de Base), shares responsibility for sanitation with SONEB as well as other government directorates [56]. In rural areas, DHAB provides sanitation services to institutions, such as schools, health centers, markets, and government facilities [57, 58].

For economic regulation of the water and sanitation sector, there is no independent agency. The Growth Strategy for National Poverty Reduction, 2007 calls for the establishment of such an authority [59].

ii. *Definition and implementation of an IWRM policy*

In Benin, demographic growth will continue to make access and sharing of water resources difficult in both rural and urban areas where the resources are limited and threatened by human activities. Therefore, it is important to define and implement a policy for Integrated Water Resource Management which should intervene at various levels [60]. As is the intermediary level (quantitative and qualitative knowledge and monitoring of the resource), the institutional level (adapting the Water Act and the other current regulations) is important. But it is very important to take action at local level, to develop the joint capacity to protect and share water resources in a sustainable manner, at the level of the commune, at the local or micro-local level, or even at the level of a rural territory.

B *Water Resources Management*

The government adopted Integrated Water Resources Management (IWRM) in 1998, as a priority approach for sustainable management of its water resources [61]. The decision was a consequence of the findings of a report on Benin's strategy for water resources management. The report, validated in February 1998, recommended the adoption of IWRM to improve water resources management in the country [60].

Despite important actions implemented between 1998 and 2002, the framework for water resources management in Benin was not in favor of good water governance. Following the 2002 World Summit on Sustainable Development (WSSD) resolution for countries to develop and implement national IWRM action plans as a means to achieve the water-related Millennium Development Goals (MDGs), Benin's Government initiated a programme to develop a National IWRM plan. This was part of the Partnership for Africa's Water Development (PAWDII) programme supported by Netherlands Development Cooperation with facilitation by Global Water Partnership.

Under the leadership of Benin government, the Benin Water Partnership mobilized stakeholders from governmental and non-governmental organizations and civil society to define a roadmap and vision of the planning process towards better water resources management.

Following various information and sensitization workshops, and different studies, a drafting committee made up of national experts, supported by national and international consultants, was set up. Thematic workshops were organized to refine the results of water situation analysis studies. The water resources challenges were prioritized using Water Resources Issues Assessment Methodology (WRIAM) and priority was given to the main technical problems in terms of assessing, managing and using water resources at the basin and national level. Weaknesses of the water resources management framework were also assessed and analyzed. The content of the national IWRM action plan was developed. 54 Actions were defined for immediate and

long-term implementation. A draft IWRM action plan was validated by stakeholders during 6 regional workshops. The IWRM action plan was being finalized in March 2010 and was supposed to be followed by implementation.

C Strategies under the National Policy on Environment

Since 1998, Benin's Government has reaffirmed on several occasions its willingness to operate a transition towards IWRM approach, gradually through various reforms and programs established [60]. Initiatives were undertaken by Benin before the beginning of the Partnership for Africa's Water Development programme (PAWDII, 2005-2009) include:

□ Between 1996 and 1997 a study was conducted on a national strategy for water resources management, which was validated by all stakeholders in February 1998. Benin Government then adopted the conclusions of the study, in particular, the recommendation to take integrated approach to water resources management; [60]

□ Developed dialogue with all stakeholder and with Global Water Partnership's (GWP) support [62], of a long-term national Vision for water resources management by 2025, presented at the 2nd World Water Forum (The Hague, March 2000) [11];

□ Organized the 1st National Water Forum in January 2001;

□ Organized in September 2001 Benin Country Water Partnership's (Benin-CWP) statutory General Assembly; [63]

□ Adoption of the first Budget per Objective Programme by the Ministry of Mines, Energy, and Hydraulics (2002-2005), which stressed the need for a formal dialogue framework in order to guarantee equitable and sustainable management of water resources in accordance with established rules; [64]

□ published a situation analysis report on the legal and institutional framework of the water sector in January 2004.

□ Development of a new strategy for drinking water supply sub-sector in rural area (Strategy AEP 2004-2015) which takes into account IWRM principles and decentralization context, through the preparation of mechanisms to transfer competencies and resources to municipalities; [65]

□ established in September 2004 a Technical Permanent Secretariat for Coordination and Promotion of IWRM (STPC-GIRE) within the proposition of an institutional framework to conduct the reforms towards IWRM: the framework for Promotion and Coordination of IWRM (CPC-GIRE), that Secretariat is hosted by STPC-GIRE. The intermediate objective of the IWRM process is to have a national IWRM action plan, supplemented by a portfolio of investments

VII. CONCLUSION AND RECOMMENDATION

The conclusions and observations made in this paper point to prioritize areas for action or attention from public health

authorities, environmental policymakers, and research institutions. One of the priorities should be to increase public health objectives within the current management framework. Within the overall framework established by the national Law of Water and the Law of Water Pollution Prevention, the protection of water quality and enforcement of water quality standards are under the Ministry of Energy and Water jurisdiction. Even with these mechanisms in place, change cannot be implemented without comprehensive, continuous, and systematic research on water pollution and related health effects. In particular, this review suggests the need to focus on the following research areas: 1) the prevalence of algal toxins in surface water bodies and their impacts on health; 2) an evaluation of fertilizer and pesticide contamination in ambient and groundwater bodies, as well as identification of exposure routes (bioaccumulation in aquatic organisms and contamination of drinking water sources); 3) research on additive or synergistic effects on health created by the compounded effect of multiple pollutants; 4) monitoring of drinking water quality in conjunction with monitoring of disease morbidity and mortality; and 5) dissemination of research information to regional and local bureaus (environmental and health) to assist with their decision making.

Regular surveys need to be conducted in various parts of the country to obtain a clear picture of water-linked diseases. The following recommendations are made which may help to control or diminish the problems of deteriorating water quality in Benin.

- There should be continuous monitoring of drinking water throughout the country both in rural and urban locations.
- Local authorities should be provided with facilities for monitoring and purification of drinking water.
- There is a need to shift from an intermittent to a continuous water supply system to avoid the widespread contamination caused by intermittent water supply.
- There should be a renovation of old and rusty pipelines of the water distribution network.
- There should be sufficient distances between sewage and drink water supply lines to avoid cross-contamination.
- There is a need for the existence and implementation of strict laws with no compromise on the quality of public drinking water.
- Public awareness campaigns should be launched to educate the population about the importance of safe drinking water.
- The public should receive guidance to adopt safety measures for stored water inside their houses.
- The farming community needs to be educated well about the safe handling and use of pesticides and proper application of fertilizers to minimize the contribution of agricultural practices to water pollution.

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A Study on Knowledge Management

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I. INTRODUCTION

Knowledge management is a fairly modern concept. It refers to and enterprise that consciously and comprehensively gathers, organizes shares and analyze its knowledge to achieve its goal. It has gained in importance because companies have discovered that people, their skills and knowledge are essential to gain competitive advantage. It has become a major competitive tool for the present day organization. It is acquisition and use of resources to create an environment in which information is accessible to individuals and in which individuals acquire, share and use that information to develop their own knowledge. It is a conscious effort to get the right knowledge to the right person at the right time so that it can be shared and put into action.

II. RELATIONSHIP BETWEEN KNOWLEDGE MANAGEMENT AND HUMAN RESOURCES

HR and Knowledge management are related to one another and their interaction plays an important role in an organization. Emphasis on knowledge, skills, creativity, sharing information, all have an impact on HR's role in knowledge management. In the contemporary business environment, the competitive position of companies among others is influenced by its capability to create new knowledge which in return results in the creation of the competitive advantage.

The different areas of HR which helps in effective knowledge sharing are as follows:

1. **Reward Systems:** The first and most obvious area of HR involvement is knowledge management is reward management. An organization that plans to implement knowledge sharing should recognize and reward the acquisition, sharing and utilization of information. The pay system should also be effectively designed so that it motivates employees to personally improve knowledge management in the organization. An effective reward management system should incorporate both pay and non-pay reward systems. For maximum participation of employees in a knowledge environment, the reward strategy needs to be developed in consultation with those for whom it is intended. The reward system should be so designed that it encourages the sharing of information and expertise. In a knowledge environment, a mixture of short-term and long-term reward is necessary. Short-term rewards can be in the form of bonuses and the long-term rewards in the form of

retirement schemes. Short-term rewards will have an immediate impact and satisfaction to knowledge workers, while long term rewards foster greater commitment to the organization.

2.

Table 1

Wipro Infotech for instance has a 'saint and thief' award concept, under which both the saint (person who contributes the maximum knowledge) and the thief (the one who steals the most from the knowledge repository and deploys them) are rewarded.

3. **Recruitment, Retention and Succession Planning:** Recruitment, retention and succession planning from a Knowledge Management perspective can be looked at as filling knowledge gaps. Knowledge Management can lead to a more flexible recruitment process. Focusing on people to be recruited and knowledge gaps to be bridged rather than job slots to be filled can lead to a more flexible recruitment process. Flexibility here means selecting employees who are more creative and innovative and can adapt themselves to the changing work environment. HR policies and practices should be designed in such a way that they allow individuals to meet their personal aspirations. This is most important to retain good employees. Succession-planning in a knowledge environment is less about filling posts and more about planning to meet future skills and knowledge needs with existing resources.
4. **Training and Development:** HR's involvement and its contribution is perhaps the greatest in training and development. Manager's in a knowledge environment need to foster innovation and creativity and help employees manage their own learning and development. HR should get itself actively involved in the technological developments in the workplace as they can train the employees accordingly. A training methodology can also be used effectively within an organization to develop team-working at all levels. Training is necessary for individuals to work in teams as cooperation and sharing of information brings in benefits for the whole organization.
5. **Knowledge Management and Organization Culture:** Knowledge Management has profound implications for organizational culture, because it is the culture that

helps to bridge the gap between the provision of technology and information and the effective use for the benefit of the organization by individual knowledge workers. A culture conducive to Knowledge Management is likely to value:

- Respect for individuals
- Creativity and innovation
- Trust and cooperation
- Sharing of ideas and information
- Effective systems and procedures
- Continuous learning and development

In a knowledge-based economy, managers become more of facilitators rather than controllers. They will have the support of HR in making this transition. HR will assume a more flexible role as a result of changing roles of business.

III. ELEMENTS OF INTELLECTUAL CAPITAL

Intellectual capital involves three elements. They are as follows:

- Human Capital
 - Structural Capital
 - Customer Capital
1. **Human Capital:** Human capital refers to the employees' capabilities, skills and expertise. Human capital is the accumulated capabilities of individuals working towards organizational goals. Some of the key functions tied to human capital management are drawn from the traditional practices of human resource management. They include:
 - Building an inventory of employee competencies.
 - Scanning the environment and determining competencies which need to be developed to meet strategic objectives.
 - Developing a system to deliver the needed knowledge, skill.
 - Developing an evaluation and reward system which is tied to the acquisition and application of competency that is in line with organizational strategic objectives.
 2. **Customer Capital:** Customer capital refers to the extent and intensity of the organization's relationship with customers. Customer capital includes customer loyalty, goodwill and supplier relations. Various techniques and analysis tools have been developed to understand the value of customers and their perceptions better. Quality profiles are developed with the help of customer questionnaires to identify what quality really means to the customer; benchmarking each competitor on every aspect of quality; developing overall quality performance measures, all based on the customers definition of quality which decides their purchase. Consumer value maps illustrate how a customer decides from among competing suppliers and products. They contain information on which companies might be expected to gain market share.
 3. **Structural Capital:** Structural capital refers to the organizations' capabilities to meet market requirements.

Unlike human capital, structural capital can be formally captured and embedded. Also referred to as the organizational capital, it includes capabilities developed to meet market requirements such as patents. While it is impossible to have an all encompassing framework for managing the organizational(structural) capital of the firm, value chain analysis gives a systematic approach to the subject. Value chain analysis is to identify the elements of organizational processes and activities and link them to the creation of value. Processes are structured and measured sets of activities that are designed to produce a specific output for a particular customer or market. To identify the firm's value creating processes, the way in which knowledge is created, transformed and utilized a model is first established using process analysis and the activities within each process are subsequently analyzed. The end product of the Knowledge Management process can be then valued as (i) a patent, a consulting process, or a trademark; (ii) an improvement in organizational efficiency that can be measured by cost savings, profits, revenues growth, return on investment etc.; (iii) improved capabilities of the firm, measured by individual and team-based indicators of performance.

IV. IMPORTANCE OF INTELLECTUAL CAPITAL

Intellectual capital of a company includes employee expertise, unique organizational systems and intellectual property. Simply put, intellectual capital is knowledge. While intellectual property means trademarks, patents and copyrights, intellectual capital is the collective knowledge in the organization. The knowledge a company's employees have about its products and services and about its organizational systems and intellectual property make up its intellectual capital. Managing intellectual capital requires corporate executives to measure performance with more strategic initiatives such as capturing knowledge in expert systems and quantifying its value to the company.

Table 2

KM – The TCS Way

Tata Consultancy Services introduced KM as a concept in 1995. The management initiated the process of defining the framework in 1996 and a dedicated KM team called “Corporate GroupWare” was formed in 1998. After a preliminary study, this group launched the KM pilot in mid of 1999.

The KM implementation team is a matrix of several groups; the steering committee, corporate GroupWare Implementers, branch champions, application owners and the infrastructure support group.

Today, KM in TCS covers nearly every component of operation, from quality assurance to HR management. The offices are linked through dedicated communication links across its 50 offices in India, clustered in about eight regions. The communication network is connected in a two tier architecture. Backbone nodes are connected through 2 Mbps/64 Kbps links, while the intra-city nodes are connected through a minimum of 64 Kbps links. Overseas offices are connected through the net and the Lotus Notes Domino servers.

The knowledge repository resides on the corporate and branch servers. As a TCS employee, one can access the knowledge repository through the TCS intranet, with a browser front end or a Notes Client. Once an employee is into the intranet, he could branch off to the knowledge domain he is interested in areas such as processes, line of business/line of technology and projects.

Adapted from KavithaKaur, ‘Give and Take.’ Computers-Today, January 16-31,2000.

V. MANAGING INTELLECTUAL CAPITAL

The growing demand for knowledge-based products and services has changed the structure of the global economy. The role of knowledge in achieving competitive advantage has gained in importance. It is important for companies to manage intellectual capital effectively.

1. **Promoting Knowledge Sharing:** It is the stage of disseminating and sharing of knowledge in an organization. Collaborative work environments help in sharing knowledge effectively. Collaborative problems solving, teamwork and brain storming sessions help disseminate knowledge. Technological support makes knowledge sharing and utilization effective. For example knowledge sharing at the World Bank is done with the help of knowledge sharing coordinators, such as knowledge, managers, coordinators, and advisors and a small coordination unit- the Knowledge Sharing Group. The Knowledge Sharing Group meets at least

once in a month to ensure that programs, systems, and human resources create an environment conducive to knowledge sharing and learning.

2. **Implementing Technological Systems:** The role of technology has broadened the reach of knowledge acquisition and transfer. Its primary role in Knowledge Management is that of storing and transferring knowledge. The World Wide Web and the Internet have increased the power of technology in organizations. The reasons for growing importance of the Internet are:

- The Internet is cost effective than leased networks.
- Using the Internet companies can connect to any place, anywhere. This is especially for companies that operate in a number of countries.
- Resources and databases that are distributed can be connected in a cost effective and reliable manner which can help customize to regional preferences.

Technological components that tie together the Knowledge Management system of a firm can be divided into:

- Knowledge flow Meta Component
 - Information Mapping Meta Component
 - Information source Meta Component
 - Information and Knowledge Exchange Meta Component
 - Intelligent Agent/Network Mining Meta Map
- **Knowledge Flow Meta Component:** It includes components that enable the flow of information in the organization. GroupWare, Intranets and extranets help knowledge flow through an organization. Organizations use techniques such as brainstorming sessions, problem solving, idea generation etc. for knowledge sharing. GroupWare supports such a collaborative work environment. Groupware is a class of software that helps employees to connect to local area network to organize their activities. It is also called work group productivity software. Typically, groupware supports the following operations:

- (i) Scheduling meetings and allocating resources
- (ii) E-mail
- (iii) Password protection for documents
- (iv) Telephone newsletters
- (v) File distribution

Intranets and extranets are useful for providing internal and external information to a firm. Companies need to find effective ways to distribute information. Intranets are useful in improving the overall knowledge flow in the organization. Extranets help companies tap information from their allies and the knowledge-based resources of their partners.

- **Information Mapping Meta Component:** It maps the path of the origins and destinations influencing information. It deals with context, information distribution channels and external network paths that form the information-mapping component. Document management is an important aspect of the information mapping meta component. In general document

management, is the automated control of electronic documents right from creating to archiving. Electronic documents can include any kind of digital object bitmap images, HTML files, SGML, PDF, graphics, spreadsheets, and word-processed documents. Document management allows organizations to exert control over the production, storage, management, and distribution of electronic documents leading to greater efficiency in the ability to reuse information. It consists of converting information into a easily transferable and searchable format.

- **Information Source Meta Component:** It consists of components that provide information to the Knowledge Management system. These include distributed search and retrieval mechanisms, multimedia content and project management tools. A good example of a project management tool is the Microsoft Project that provides organizations with tools for storing and organizing data. Project management tools help users link the resources they use to the project management data.
- **Information and Knowledge Exchange Meta Component:** It consists of tools that allow people and systems to exchange, share and transfer explicit and tacit knowledge. The sub components of knowledge exchange meta component are messaging integrators, Internet conferencing systems, video conferencing, etc.
- **Intelligent Agent Mining Meta Component:** It includes sub components such as search engines, content mining and automatic indexing. This component allows synchronous and asynchronous searches to be performed. Synchronous means occurring at regular intervals. Most communication between computers and devices is asynchronous it can occur at any time and at irregular intervals. However, communication within a computer, is usually synchronous and is governed by the microprocessor clock. Meta information provides insights into the kind of information users, types of data and information being accessed and information repositories accessed most frequently. A Knowledge Management system can be implemented effectively if it is leveraged with existing technology tools and information resources. Knowledge servers can be used to integrate significant data spread across the enterprise. Knowledge servers help in smooth integration of knowledge across multiple enterprises.

VI. MEASURING THE INTELLECTUAL CAPITAL

It is important for any organization to choose the right kind of techniques for measuring intellectual capital. A wrong choice can lead to incorrect performance results. Right metrics can help evaluate the performance of an organization. Organizations need to focus on metrics that can help evaluate the past, present and future performance of a company. Most metrics usually focus only on past performance and ignore the strategic view point of an organization. The following are some of the traditional and the present day techniques of measuring intellectual capital.

- Benchmarking

- Balanced Scorecard
 - Skandia's IC Index
1. **Benchmarking:** It is the process of identifying the things companies do the best. It means setting standards for performance. Benchmarking can bring about an improvement in the overall productivity, service quality, customer satisfaction, distribution, etc. The benchmarking process can be useful for self comparisons. M.J. Spendolini has suggested a five step process for benchmarking which include:
 - (i) Determining what to benchmark, whether it is the Knowledge processes or products and the scope of benchmarks and identifying reasons for benchmarking.
 - (ii) Identifying a benchmarking team, customers involved and the allocated budget.
 - (iii) Analyzing benchmarking targets and partners.
 - (iv) Collecting and analyzing the data relevant metrics for benchmarking, and finally;
 - (v) Getting the required feedback and incorporating changes.

Table 3

Bench marking practices in top companies

1. **Intel:** Intel can be lauded for its scientific, "fact based" approach to recruiting and HR. Their workforce planning model has some excellent design features. Their culture of constructive confrontation also helps to drive an incredible rate of continual change.
2. **Wal-Mart:** When it comes to high-volume recruiting, nobody does it better. Wal-Mart's TV ads highlighting their great-place-to-work status are a bold approach to proactively defending their strong employment brand.
3. **Google:** Google's ratio of recruiters to employees is mind-boggling. They also excel at candidate assessment and recruiting women engineers.
4. **Dell:** Dell excels at top management, and is one of the best at attracting great managers by widely publicizing their great management practices and approaches. They have a great management identification program and an astonishing revenue per employee that some calculate at nearly \$1 million.
5. **Microsoft:** Giving GE a run for their money as best in talent management is Microsoft. They excel at workforce planning, redeployment, utilizing analytics, and leveraging the internet. They are also truly world class when it comes to the effective use of contingent workers. Microsoft was also ranked #57 on Fortune Magazine's 2005 100 Best Companies to work for in America.

<https://www.eredia.com/ere/the-top-25-benchmark-firms-in-recruiting-and-talent-management/>

2. **Balanced Scorecard:** This method supplements traditional financial measures with three additional perspective customers, internal business processes, and learning and growth perspectives. This method originally developed by Robert Kaplan and David Norton of the Harvard Business School.
3. **Skandia's IC Index:** Skandia, a Swedish company has used a technique called the Intellectual Capital(IC) Index to try and track the flow of intellectual capital over time. Skandia first developed its IC report internally in 1985, and in 1994 became the first company to issue an IC addendum accompanying its traditional financial report to shareholders. It aims to provide managers with an indicator of change, and external analysts with a quantitative measure of company performance. The IC-Index has several distinct features as it takes into account performance in the past. The chief architect behind Skandia's initiatives, Leif Edvinsson developed a dynamic and holistic IC reporting model called the navigator which had five areas of focus: financial, customer, process, renewable and development and human capital. According to Skandia's model, the hidden factors of human and structural capital when added together, form intellectual capital.

VII. ROLE OF THE KNOWLEDGE MANAGER

A Knowledge Management initiative requires a leader who can implement a successful Knowledge Management program in the organization. Here comes the role of the Chief Knowledge Officer(CKO) who can make Knowledge Management an integral part of daily work. The main functions of CKO are as follows:

- Promoting KM: The CKO should educate the employees about the advantages of the KM system and how it can be useful in sharing knowledge. To motivate employees, knowledge objectives should be linked to individual objectives like compensation and rewards. The top management should be educated about the importance of Knowledge Management. The participation of the management will make knowledge management successful.

Knowledge Management systems must be built to support business processes that affect the bottom line of the organization. One of the important tasks of a CKO is to convince employees and the top management about the value of Knowledge Management. The Management should be convinced about the financial implications that KM can have on an organization, whereas employees will have to be convinced that KM will not be an added burden to them. Management and employees have to be brought together for successful implementation of the Knowledge Management program. The CKO should also collaborate with core group that includes IT and human resource departments. In order to implement a KM program successfully, a CKO has to build successful organizational and technical

capabilities. On the organizational front the tasks of the CKO are:

- Identify knowledge gaps and assess how they can be bridged.
- Build an organizational culture for knowledge sharing that involves all employees in the process of knowledge sharing.
- Create appropriate measurement criteria to evaluate the Knowledge Management programs in the organization. These measurement standards also help in rewarding employees who share the best practices.
- Familiarize employees with the best practices in Knowledge Management and how they can increase their productivity.
- Educate employees about the KM systems and protocols.
- Remove socio-cultural barriers that inhibit the sharing of knowledge, so that knowledge can be transferred, used and distributed effectively.
- Improve the level of existing knowledge by identifying areas of performance and areas that need improvement.

The technological initiatives that a CKO should take up include:

- Build enterprise-wide channels for communication.
- Develop an effective Intranet through which employees can share knowledge.
- Encourage teamwork and a collaborative work environment that can help in collaborative problem solving.
- Support employees with technical help and introduce them to technologies like telepresence, telecommuting etc.
- Introduce cross functional tools that can help teams from different functional areas to collaborate.

Apart from technical skills and through knowledge of the technical aspects of KM, a CKO also should be an effective manager who can understand the functioning of the organization. Trust and cooperation from the employees is absolutely essential for successful implementation of a KM system.

VIII. CONCLUSION

With growing importance of intellectual assets managing knowledge effectively has become crucial to organizations. For effective management of intellectual capital there is a need to promote knowledge sharing and implement technological systems. To know whether Knowledge Management systems are performing as per the expected standards, there is a need for metrics. Right metrics can help evaluate the performance of an organization.

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Physiotherapy after Arthroscopic Repair of Supraspinatus Tendinitis

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Abstract- Shoulder joint influences on daily activities along with degenerative changes of structures around it, Painful arm following Supraspinatus tendinitis restricts self care and increases dependency. **Aims & Objectives** of this research was to evaluate the efficacy of exercises therapy post arthroscopic repair of Supraspinatus **Materials & Methodology:** 63 year old female was treated in Chennai with exercise therapy following arthroscopic repair of supraspinatus (Left) from 20.07.2017 to 01.10.2017 with thrice a week frequency **Results:** Pre and post shoulder functional index were recorded and analyzed statistically $P<.001$ **Conclusion:** Exercises play a vital role in post arthroscopic repair of shoulder muscles and follow up is more important

Keywords: Arthroscopy, Tendinopathy, Proprioceptive Techniques, Kinematic Exercises, Shoulder Impingement Syndrome

I. INTRODUCTION

Shoulder dysfunction is the second most common musculoskeletal problem seen in physiotherapy (Vanderwint et al 2007) and affects 16 to 21% of the population (Kujipers et al 2006) and its prevalence in persons of 65 years and older is 34% (Lin et al 2011). The direct cost for the treatment of shoulder dysfunction in the United States exceeds \$7 billion annually (Meislin et al 2005).

1. Patients with clinical signs of subacromial impingement and rotator cuff tendinopathy are common (Oster et al 2005) where shoulder pain and functional restrictions, mostly during overhead activities were recorded (Lewis et al 2001)
2. Physiotherapists often rely solely on clinical signs and symptoms to establish a diagnosis and to determine the focus of treatment (Linsell et al 2000)
3. Diagnosis of shoulder pain is too broad to provide sufficient information to develop specific protocols in daily practice (Green et al 2003)
4. Surgical intervention by arthroscopic, aims to release the contracted tissue to improve movement and relieve pain (Omari & Bunker 2001)
5. People with pain in the neck and shoulder region are often disabled to the point where they cannot live a normal life, as the pain may also influence the persons work capacity, financial and social situation (Ingwersen et al 2015) and shoulder pain is the 3rd most common musculoskeletal

disorder and the lifetime prevalence is estimated between 7 and 10% (Luime et al 2004)

6. Subacromial impingement syndrome which accounts for 33% of shoulder related healthcare (Feleus et al 2007) includes a cluster of symptoms rather than a single pathology, with complaints of arm, neck and shoulder as disorders that include the rotator cuff syndrome, tendonitis of the muscle infraspinatus, supraspinatus subscapularis and bursitis in the shoulder area (Huisetede et al 2007)
7. Patients with subscapularis tendinitis present with shoulder pain with moment and pain during night, limiting their activities of daily living (Mckendry et al 1982)
8. Supraspinatus muscle is of the greatest practical importance in the rotator cuff as it stabilizes the shoulder, externally rotates and helps to abduct the arm by initiating the abduction of the humerus (Ellis & Mahadevan 2010)
9. ST (Supraspinatus Tendinitis) is a common cause of pain in the shoulder (Fu et al 1991) and a disability condition with more prevalence after middle age (Chard et al 1988) as they become degenerated most often as a result of repetitive stress (Sommerich et al 1993) and its treatment involves physical therapy, NSAID, ice treatment (Allen et al 1998)corticoid injections (Lousis Hasan et al 2014) and surgical intervention if there is no improvement after 3-6 months of conservative treatment (AOS 2014), where calcium deposit resection with subacromial decompression performed under arthroscopic method (Starr et al 2001) with an aim for pain relief and increased range of motion (Aclement et al 2012)

Aims & Objectives of this original case presentation was to evaluate physiotherapy post arthroscopic repair of supraspinatus tendinitis

II. MATERIALS & METHODOLOGY

Background information:

H/O

Pain of sudden onset with inability to lift left hand overhead was diagnosed with calcified tendinitis of left shoulder and treated with arthroscopic repair of left Supraspinatus on 16.06.2017

C/O

Pain and difficulty in lifting left hand above head

Normotensive, non diabetic, vegetarian is attending the center since 20.06.2017 for further rehabilitation

O/E

- Capsular tightness
- Anteverted scapula (Left)
- Mild wasting of deltoid, triceps
- Movements of left elbow, wrist and hand full
- Cervical spine has presented with obliterated cervical lordosis and movements less stronger and resisted from mid range
- Active ROM of left shoulder was with restricted medial and lateral rotation

Abduction 0⁰-15⁰ Flexion 0⁰-30⁰, Lateral Rotation - 0⁰-5⁰

Provisional Diagnosis:

Post operative left shoulder stiffness, weakness of shoulder and scapular muscles

Treatment Adopted Includes

- Cervical, scapular and shoulder strengthening exercises
- Mobilization of left shoulder
- Open and closed kinematic exercises to left shoulder
- Irradiation hold relax technique using PNF
- Home programme with rubber bands, hand hold exercise ball

III. RESULTS

Her present conditions as on 01.10.2017

- Pain: has come down on active movements and for daily activities from VAS scale of 8 to 2
- ROM: With mild end range restrictions shoulder movements were full and pain free
- ADL: She has started using the left arm for daily activities such as cooking, dressing, toileting, bathing and other self care means.
- Motor Power of left deltoid, triceps, scapular muscles have adequately improved compared with uninjured side.

The subject’s pain threshold was good, with every session progression was explained, she was continuing home exercises along with therapy by the author, pre and post shoulder function index were recorded and analyzed

Table of Results of pre and post S.F index post arthroscopic repair of supraspinatus tendinitis with exercises using student ‘t’ test

Test	Score		SD	SE	[1] t	[2] P
	Pre	Post				
Shoulder Function Index	57	12	25	15	[3] 3.08	[4] <.001
					[5]	[6] more

IV. DISCUSSION

The key points for presenting this subject with rehabilitation of post operative supraspinatus repair were as below:

- a. Combine various exercise techniques such as open and closed kinematic exercises
- b. Use of physioball to strengthen muscles
- c. Adoption of Proprioceptive techniques to mobilize joints and to improve motor power
- d. Combined strengthening of cervical, shoulder scapular and elbow muscles to promote functional activities
- e. Encourage daily routines from cooking cutting vegetables, dressing, toileting etc as and when with recovery stage

1. Patient should be treated conservatively prior to undergoing surgery as exercise therapy seemed to cause less costs than surgery (Brox etal 1993) and moderate evidence suggests equal effectiveness of physiotherapist led exercise and surgery (Haahr etal 2005)
2. Bang and Deyle etal 2000 have with moderate evidence that manual therapy, home exercises regular rechecking, including adjacent joints in the treatment with significant improvement in pain and functional activities
3. Dickens etal 2005 in a six months study among 85 subjects with shoulder impingement syndrome with (n=45) subjects were treated by physiotherapy including passive manual joint mobilization, home based strengthening exercises for rotator cuff, strapping, advice on posture, while 11 of these 45 subjects refused to under go surgery, where as control group (n=40) subjects who under went surgery with post surgery follow up of six months, subjects treated with physiotherapy had more functional improvements than those treated with surgery
4. Brox etal 1993 among 1252 subjects with SIS were assigned in 3 groups, Group I were treated with subacromian decompression with arthroscopy followed by physiotherapy, 2nd ground had placebo with LASER (Control Group) therapy and the 3rd group were treated with physiotherapy, shoulder functioning at 6 months were same among group I and III
5. Haahr etal 2005, using arthroscopic surgical subacromial decompression among 84 patients versus treated conservatively in a 8 year follow up have recorded similar results on shoulder pain and disability score. Thus moderate to strong evidence that surgery is not effective than physiotherapist led exercises in the shoulder in a 6 months – 8 year follow up as supported by systematic review (MMuscPhty etal 2009)
6. Cheng etal 2011 have reported with level 4 evidence in a 2 year follow up among 309

patients post arthroscopic rotator cuff repair with health related quality of life using SF 36

7. In twenty sessions (10 weeks) of exercises combined with hydro collar application 90% of strength and movements of left shoulder was achieved
8. Pain tolerance and subjects exercise capacity also played a role for this early recovery

V. CONCLUSION

Shoulder joint plays a vital role with daily functional activities, especially geriatric subject following injury, restoration of their abilities to be independent for their daily living, where physiotherapy using various techniques ensures early recovery as evidenced with scientific means in this study findings subject post arthroscopic repair, can be extended on larger sample size with follow up of longer duration.

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The Reciprocity of Home and Identity in V. S. Naipaul's *A House for Mr Biswas*: Postcolonial Dilemma of Deracination

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Abstract- Discussions rotating around the controversial topics of displacement and the subsequent identity crisis as inevitable outcomes of deracination under the pressure of colonial power have recently enjoyed much spotlight. Thus, this paper, relying on Homi Bhabha's concept of *homelessness*, presents an analysis of V. S. Naipaul's West Indian epic, *A House for Mr Biswas*, with the main focus being the way protagonist's, Mohun Biswas', painful struggle for accommodation and wholeness in an unwelcoming context, which is the legacy of his deracinated ancestors, has distorted his identity. Living in the disordered, rootless West Indian society in Trinidad with East Indian origin, uprooted from his motherland, Biswas' desperate fight to attain his own house is symbolic of his desire to develop a unique identity to replace his lost cultural heritage. It will be argued that Biswas' struggle to overcome communal and colonial pressures and give meaning to his existence is representative of a whole generation who has been afflicted with deracination and, consequently, a fractured and incomplete identity and selfhood.

Index Terms- postcolonial identity, homelessness, deracination, inauthenticity, selfhood

I. INTRODUCTION

Postcolonial theory, visualized partially in diasporic literary works, is characterized by cultural and historical dislocation. Diasporic literature is the reflection of cultural and historical crises, place, identity, displacement, fragmentation, internalization and marginalization, memory, homeland, house, and self-identity, with which colonial and racial discourses, as well as anti-colonial thought, have been preoccupied. The *othering* of vast numbers of people by European colonial thought depended upon structuring an army of binary oppositions which accoutered Europeans with every power and right to rape and plunder. Such oppositions are crucial, not only for creating images of non-Europeans as *them* or *other*, but also for constructing a Europeans self as *us*. History has made this illusion of dominance an inseparable constituent of the identity of the oppressor; therefore, many anti-colonial and postcolonial critiques are preoccupied with uncovering the way in which they work in colonial representations. The important issue is this: how has colonial deracination distorted the identity formation of the colonized subjects?

In a world that is growing increasingly complicated and challenging, and stripped of meaning and place for the people of

the Third World, the quest for relevance, for a meaningful, taken-for-granted existence by which the individual can preserve his grasp on reality is often the spur, as well as the subject matter of all literary endeavors, either creative or critical. This study of Naipaul's comic masterpiece, *A House for Mr Biswas*, has been undertaken to reveal the sufferings of an individual in establishing a meaningful existence impeded with the aftermaths of colonial exploitation in Trinidad.

Acknowledged as one of the most controversial postcolonial writers, V. S. Naipaul has remained open to various critiques, most of which concern his treatments of different post and past colonial issues. Much of Naipaul's work deals with individuals who feel estranged from the societies they are supposedly a part of and who are desperately seeking a way 'to belong.' His work continues to draw mixed reviews. Mehmet Taş, in "Alienation, Naipaul, and Mr Biswas", falls back on the ideas of three prominent theoreticians to support his argument about the symbiosis between Mr. Biswas and Naipaul himself, and the autobiographical elements reflected in the novel. Taking Naipaul's *A House for Mr. Biswas* into consideration and relying on Homi Bhabha's notion of "unhomeliness" and Melvin Seeman's five-fold classification of the theme of alienation, and considering Hegelian existentialism for further elucidation on alienation, Taş argues that, while at the first glance Naipaul is likely to be blamed for having no loyalty to his culture, he is one of those postcolonial writers who has been trying to lead the people of once-colonized cultures to "overcome the problems they have been entangled in by narrating and portraying their situation in an objective manner" (115). His main purpose is to bring a counterargument for Naipaul's alleged disloyalty of which he has been many times accused.

Taş believes that the sense of alienation Mohun Biswas experiences, and leaves as a legacy for his son Anand, is the recreation of Naipaul's own sense of homelessness and loneliness. Quoting Naipaul himself, Taş creates a parallel line between Mohun's life-long struggle and Naipaul's peripatetic existence: "When I speak about being an exile or refugee, I am not just using a metaphor; I am speaking literally" (Evans 62). It is clear that even after having lived in England for so many years, he still does not feel the sense of belonging, as he states again in the same interview: "I still had the nervousness in a new place; the rawness of response, still felt myself to be in other man's country, felt my strangeness, my solitude" (63). The degree of similarity is so much that Taş calls the novel autobiographical, representing Naipaul's own experiences and impressions of Trinidad. However, his unique point of argument

is that, Mohun Biswas' lack of identity and its concomitant alienation are the result of existential dilemma and Naipaul's own pessimism rather than any specific colonial experience.

Warner argues that, suffocated under strict traditionalism represented by Hanuman House, Naipaul depicts Mohun in harsh conflict with "rigidity, cultural infallibility, ritual, duty, hierarchy, and all communal life" (119). Mr. Biswas barges into Tulsis' monolith of conventions, prejudices, and conservatism against inevitable change; he disapproves of their policies and practices, challenges their religious beliefs, disregards everybody's acceptance of superior and inferior grindings within the household; "Biswas is actually inharmonious with the Tulsis, because he has strong intellectual interests, vague ambition for greatness, and strives for independence" (120). The very incompatibility originates in, according to Warner, Tulsis' insistence on conformity versus Mr. Biswas' adherence to his individual subjectivity; and the two shall never meet.

II. DILEMMA OF THE CONCEPT OF HOME AND IDENTITY IN POSTCOLONIAL SOCIETY: BHABHA'S UNHOMELINESS

The out-of-placeness that Biswas and the older generation experience in Trinidad can be read in terms of the 'unhomely'. The unhomely is a critique of the locational argument which, in Anindyo Roy's words, "defamiliarizes the space of home as location" (108). Bhabha suggests that it is necessary to [problematize](#) the space of home as location as migrants do not experience a continuous and rational relation to the home. This is because the memory of dislocation disrupts the continuity that home normally offers in Western paradigms. The memory of dislocation or the past is renewed through the act of cultural translation "as a contingent 'in-between' space, that innovates and interrupts the performance of the present. The 'past-present' becomes part of the necessity, not the nostalgia, of living" (Bhabha 7). Home, which is normally seen as providing both the myth of stable being and the quest for wholeness, is disrupted by this discontinuousness of being. (Roy 104)

The diasporic subject crosses territorial and cultural boundaries by living in one home yet imagining another home as he is haunted by repressed histories. The Tulsi family's recreating of India in the space of their home in Trinidad is an example of this unhomeliness. *A House for Mr Biswas* is principally about the "unaccommodated" man who experiences the condition of the unhomely, not homeless but not at home either. The unhomely, according to Bhabha, is about more than finding one's niche. An unhomed person does not have the feeling of belonging since he is in a psychological limbo which generally ends in some psychological disorders and stems from cultural displacement; however, being unhomed does not mean being homeless. As Tyson states; being unhomed "is to feel not at home even in one's own home because you are not at home at yourself; that is, your cultural identity crisis has transformed you into a psychological refuge". (421)

In colonial societies," the crisis of the identity of the colonized often seems to over-ride all other considerations. The social identity of people is rooted in their culture, while in the individual sphere, personal achievement determines the establishment and solidity of identity. In order to experience *wholeness*, it is necessary to fuse individual and social

consciousness. However, the paradox of the modern predicament lies in the fact that owing to the fragmentation of societies, the affinity that was once felt between the two is now broken; either the society doesn't provide the opportunities for the recognition of individual existences, or the individual cannot conform to social norms by copying of which he/she is believed to come to life; in either case, something lags behind.

If the individual struggles against constraining norms which invariably prevent the flourishing of *self*, then he/she might have to retreat into the cocoon of loneliness and live the life of an exile; this is what happens to Mr. Biswas. *A House for Mr. Biswas* delves deeply into the psyche of an individual to reveal the major problematic of the dispossessed, that is the carving of authentic self. Mohun Biswas, the protagonist of the novel, tries to overcome the limitations imposed on him by putting up a relentless struggle against the forces that try to suppress his individuality. Though his struggle is a long traumatic one, he is successful in his claiming of, and negotiation for, space and finally fulfills his dream of having a house. The greatness of the hero lies in his enduring the inconveniences and making the society a house of his own instead of ultimate rejection, or descent into mental breakdown.

III. COLONIAL AND POSTCOLONIAL IDENTITIES: CRISIS AND FRUSTRATED SUBJECTIVITY

Several critics, most notably Homi Bhabha, have emphasized the failure of colonial powers to produce stable and fixed identities, and suggested that "hybridity of identities and ambivalence of colonial discourse describe the dynamics of colonial encounter" (Bhabha 54). Colonization and its inevitable transculturation disintegrated the cultural zone of the target land, and to a great extent the metropolis centre, in an irreversible way. The establishment of a coherent, stable cultural milieu in a colonial context is constantly hindered because of the impossibility, deferral, and difference of authentic identity creation as a result of juxtaposition of culturally incompatible amalgamations.

Identity is rooted in the identification with what one is associated with. It evolves with the time. It is the birth-right of all human beings. But there are some remote area, caste and creeds where still an average person has to strive and struggle for his existence. These social injustice and differences have been pointed out by Naipaul. His literary works are based on a single motive of the quest of self and identity and belongingness. All his works are the outcome of his own individual experience of chaotic world of Trinidad. There has been confluence of two cultures first from South African from where they came for their better enhancement and second from India, the sugar-cane workers, his own ancestral with their Indian Culture. Even the emerging third generation could not get its identity; so, the third generation was extremely chaotic and thwarted.

West Indian selfhood is constituted ambivalently in *A House for Mr Biswas*. As a result of history's intervention, the West Indian subject is positioned in such a way that his identity cannot be completely separate from that of the colonizer; but; neither can it be the same. This is the postcolonial predicament of difference that *A House for Mr Biswas* traces. The following assessment of Griffith: "Naipaul's satire is neither redemptive nor

didactic; its purpose is not to elicit detestation of vice and wrongdoing, but merely to exist as its own content" (77), misses the point. Naipaul exhibits a certain depth of understanding about the colonial diasporic subject in *A House for Mr Biswas* by suggesting that there are no easy paths of redemption or resolution for expatriates.

IV. POSTCOLONIAL TRAUMAS IN THE NOVEL: VOID, INAUTHENTICITY, AND ROOTLESSNESS

The novel shows an impoverished, disorganized Trinidad and, implicitly, criticizes imperialism for having created such a mess in which those of African and Indian descent are struggling in a rootless, hybrid society without the resources to live or make better lives. Looked at in this way, while Naipaul is one of the many writers from the former colonies who have criticized colonialism and who see their lands and people as victims of the Empire, he is not a simple-minded nationalist who believes that "local and cultural assertions, and cries of victimization will provide a solution to the problems left by history" (King 49). Mohun's Trinidad lacks the resources required for authentic independence as Biswas discovers when he attempts to find employment or build his house, recognition, freedom, and awareness can be dangerous, humiliating, and self-defeating. Biswas' situation is that of the colony; his own attempts at independence are limited by the condition of the society into which he is born. "Frustrated self-assertion turns into self-destructive rage; the tempest that temporarily disorders Biswas' mind". (Husten 49)

The organization of the Tulsi family is a microcosm of a slave society. Biswas rebels against Tulsidom because he realizes that in exchange for its protection, it demands the surrender of his identity. In this context, William Walsh says in his book, *Readings in Commonwealth Literature*, that "Biswas is the first of his family to break with the feudal-capitalist hierarchy and forge an individual identity. His instinctive rebelliousness results in his being identified as a troublemaker, who evidently requires subtler but harsh measures of control" (128-9). However, his efforts bear limited fruit. Apart from giving him a fleeting sense of merely having made a point, in actual concrete terms, it is quite ineffectual. His obsession lies more with his need to declare his individuality, his desire to carve a new, untainted identity; so that "his eccentricities take on the dimensions of a rebellion, however pathetically shored up that individualism is with the fragments of modern materialism" (Walsh 131). But finally as the narrator states, it is freedom which recalls Biswas "Thank God I'm not free any more than a rooted tree is free". (487)

Hanuman House is a microcosm of the authoritarian state where power is all important and inescapable. Naipaul seems to suggest that traditional institutions, like extended family, are equally responsible for perpetuating dependence and passivity by suppressing individuality, and are more deterrents to the developments of personality. It is significant that the process of Biswas' development into an integral, authentic, independent individual is directly proportional to the process of disintegration of Hindu social order, and the Hanuman House as its most immediate manifestation and representative. As the inherited order passed away, the self evolves into a new entity which is more viable to the new environment. "Biswas must be shorn of

his cultural identity and completely depersonalized before he can become a truly reliable wholeness; he must reach the zero state of his cultural identity". (Mohan 73)

It is only a matter of time before Hanuman House collapses under dual forces of decadence and modernity. The House which Biswas finds as impregnable and overwhelming disintegrates and is deserted before he is forty. The attempt to regroup at *Shorthills* is a final but futile try to stave off a greater chaos and a more permanent dislocation. Predictably, *Shorthills* also collapses, and then everyone becomes aware of a new and frightening disorder: "The widows were now almost frantic to have their children educated. There was no longer a Hanuman House to protect them; everyone had to fight for himself in a new world, the world Owad and Shekhar had entered, where education was the only protection (436). They are all suddenly exposed and vulnerable. Significantly, the breakdown of family organization "is marked by an almost exodus to the city of Port of Spain" (Deodat 56). The abandonment of the familiar, rural setting is a final surrender to the Creole world of Trinidad. The young must now be trained to survive and succeed in this new world.

V. IMPLANTING ROOTS IN AN UNWELCOMING EARTH: NOT A HOUSE BUT A HOME FOR MR BISWAS

With the disintegration of the Tulsis comes Mohun's gradual, bit by bit integration and approach to solidarity. The breakdown of the coherence and harmony of Hanuman House provides Biswas with the opportunities which he always considered as prerequisite to a simple, integral life. In *Shorthills*, with no Seth to supervise over the affairs, the split-up is complete; the family fails to maintain the façade of unity and organization. Each man is to himself and everyone tries to exploit the resources to his own advantage. Cooperation is replaced by competition, abnegation with survival, and sisterhood with rivalry. The center gone, the family breaks into pieces constituting a new unit longing to establish its place outside the secure walls of Hanuman House. Govind and Tuttle, the son-in-laws, are foremost in plundering:

Then the news of the ravages of Tuttle and Govind was whispered through the house. Tuttle had been selling whole cedar trees; Govind had been selling lorry loads, of orange, and papaws, and avocado pears and limes and grape and cocoa. Even children do not remain secure from the debris of emerging chaos; disunity sets among them; they fought in pure hate. (407-8)

The novel is not about bondage; it is about liberation of Mohun Biswas. At the *Shorthills*, finally he is able to build a house of his own. The house is not a literal objective accommodation, but a symbolic place in the world of placelessness. It is a mark of identity in the world of alienation. It is a symbolic zone of a liberated psyche. "Mohun Biswas moves from the imprisoned zone of Tulsi dome and makes a departure into a new paradise characterizing ontological transmutation" (Raosaheb 63). Mohan feels liberated before the final liberation, his death, which occurs at the age of forty-six. Biswas, as Naipaul suggests, is not an individual but the metaphor of the West Indian culture. Historylessness, pastlessness, fragmentation, colonialism, slavery, cultural dislocations are common to both. Liberation of the West India from the British Empire is like the liberation of Mohun Biswas himself. The West

Indies find a place in the Caribbean milieu. This island gains autonomy politically, socially, and economically through the disintegration of British Empire. Biswas ultimately gets a liberation which was constantly deferred by Tulsidom and exploitation. The old order passes away, new minds are liberated and happy are born. Rebirth of a culture, rejuvenation of the self is established once again. Hence, the novel is called the West Indian epic, telling the story not of an individual but of the entire West Indian society.

Biswas' first attempt at winning his independence is *The Chase* section. The dilapidated old shop parallels Biswas' current psychological state; indeed, all the houses in which he lives symbolically reveal the nature of his development or despair. At *The Chase*, he is afraid to assume, for the first time, the full responsibility of his life. He observes, "how lonely the shop was, and how frightening" (145). Yet, it is he who feels alone and deserted. A nomadic past, characterized by perpetual dependence, makes his first try at independence futile. His six years at *The Chase* produce three children and nothing more, because these were "years so squashed by their own boredom and futility that at the end they could be comprehended in one glance" (182). In comparison, he sees Hanuman House as a "world more real than *The Chase*, and less exposed" (188). He now finds his former prison a sanctuary. This sad but open admission of his continued inadequacy is a necessary step towards integrity and independence.

Having learned from the tenure at *The Chase* how unprepared and vulnerable he is on his own, Biswas opts for a limited independence within Tulsidom, but away from Hanuman House. He accepts the position as a driver on one of Tulsis' states, *Green Vale*. Here, his vision of the house reappears to motivate and strengthen his life. It is necessary to view his total vision of the house before one can deduce the deep urge and the compelling necessity which give it birth:

He had thought deeply about this house, and knew exactly what he wanted. He wanted, in the first place, a real house made of real materials. He didn't want mud for walls, earth for floor, tree branches for rafters, and grass for roof. He wanted wooden walls, all tongue-and-groove. He wanted a galvanized iron roof and a wooden ceiling. He would walk up concrete steps into a small veranda; through doors with colored panes into a small drawing room; from there into a small bedroom, then another small bedroom, and then back into the small veranda. The house would stand on tall concrete pillars so that he would get two floors instead of one, and the way would be left open for future development. (210)

His house must be sensibly ordered, colorful and strong, with scope for future development. In short, it must have all the qualities he so consciously lacks in his real life; however, Biswas does not take into consideration local conditions which would definitely show antagonism to such a declaration of achievement. As his second attempt to rise above circumstance, the *Green Vale* adventure, and jelly-built house, suffers the same abject failure of *The Chase*. The house is far from what Biswas has constantly been daydreaming about; at this point, "Naipaul deliberately correlates the frightening, incomplete house to Biswas' psychological state" (Deodat 78). Biswas feels himself naked, inadequate, exposed, as displaced and lost as "the boy leaning against an earth house that had no reason for being there, under

the dark falling sky, a boy who didn't know where the road went" (190). The full impact of this man's fragmented self and disordered life overshadows all his being. Inanimate objects threaten and terrify his days and nights, and all he sees of his future is a frightening void; a complete nervous breakdown is imminent. Husten discreetly observes that: "Naipaul achieves a brilliant climax when the storm in Biswas' mind erupts in unison with thunder, lightning and an actual deluge which crack both the incomplete house and man" (156). As John Thieme states, in Jungian theory, the house functions as a symbol of wholeness, of the integrated self. Significantly, Biswas' first two attempts at constructing his own house end in failure, symbolizing a person that is not whole yet.

When Biswas finally possesses his own house, ironically it is heavily mortgaged, he is dying, he is estranged from his son but it is still a deep triumph. His ownership of a portion of land is significant because his partial independence breaks the colonial pattern in which his ancestors were dispossessed. Owning a house is important because its material reality gives Biswas presence in the world. Also, the increase in Biswas' material prosperity suggests the novel's concern with the issue of the colonial subject's independence. Biswas does not fully achieve independence; he still remains economically dependent, unable to completely shed his humble origins.

Biswas' houses symbolize personal independence and, thus, an affirmation of human dignity. His struggle and determination to own his own house reflects the need to establish identity and rights as a human being. White indicates that the house becomes "the creative side of Biswas' rebellion, the concrete proof that he is not anonymous, a positive achievement founding on, and justifying, the refusal to capitulate" (116). Rohlehr asserts that the house is Biswas' "personality literalized and symbolized, the private individual whom he must build and maintain against the rest of the world" (191). Everything that Biswas' experiences signify is contained in the various meanings the metaphor of the house accumulates as the novel progresses; for instance, the symbiosis between the condition of the half-built houses and his psychological state.

At last, his battles are over. This cultural orphan, this historyless man has achieved all the success his limited talent and sterile environment will allow. He must now give way to their children and wait their successes: "There was nothing Mr Biswas could do but wait. Wait for Anand. Wait for Savi. Wait for the five years to come an end. Wait. Wait. Wait for death" (586-7). It is a tragic, stunning testimony of life in a rootless, disordered society that "the achievement of a single, real victory drains the blood of the soul" (Deodat 77).

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Leafy Vegetables Waste Leachate Treatment by Using Newly Developed Flat Sheet Membrane

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Abstract— Vegetable waste is one of the types of food waste that can contribute to leachate production. Different characteristics of leachate produce from a different type of waste. Leafy vegetables waste (LVW) has a high tendency to accumulate heavy metal, for example, Cadmium (Cd). Leachate produced from leafy vegetable waste should be treated specifically alone instead of mix with another type of food waste. Treatment of leachate by using conventional method is no longer suitable to comply with the more stringent discharge standards. This study determines and quantifies the amount of leachate produced from different amount leafy vegetables waste. Experimental was conducted to determine the quality of leachate generated by the effect of leafy vegetables waste age from 8 parameters of water quality which are pH, turbidity, colour, suspended solids, COD, BOD, Cd and Nitrate. In this study, a newly fabricated flat sheet membrane had been using to treat leafy vegetable leachate to determine suitability and effectiveness of the membrane in treating leachate. The material used in this study was Polysulfone (PSF), Polyvinylpyrrolidone (PVP) and N, N-dimethylacetamide (DMAC). Formulation of dope used in this study based on the past literature review. Based on weight percentage (wt %) for PSF: DMAC: PVP composition, the formulation was 18:69:13. The suitability and effectiveness of membrane filtration method in the treatment of leafy vegetable leachate were measured by computing the percent removal of the contaminants. From the results obtained, it shows that membrane that had been fabricated was Ultrafiltration (UF) membrane. This membrane is suitable for pre-treatment process, and further treatment is needed to improve the quality of discharged to comply with the standard based on the result of this study.

Index Terms— Leafy vegetable waste, Leachate, PSF, PVP, DMAC

INTRODUCTION

Rapid development keeps increasing the amount of Municipal Solid Waste (MSW). 60% of the MSW is food waste, and it makes up the highest contribution [1]. Food wastes in Malaysia contain high moisture which can lead problem in disposal for example in a landfill site. Leachate is the contaminated liquids that build up in the landfill site, produced during the decomposition or biodegradation process when water seeps through the ground cover and flows out the landfill [2,3,4].

Vegetable waste is one of the types of food waste. Vegetable wastes have a characteristic of a high percentage of water content especially leafy vegetable because it poses a large number of cell saps [5]. Therefore, it will lead to severe adverse impacts on landfill such as nuisance smell and abundant leachate production. Since leafy vegetable has high moisture content and shorter shelf life, it would be the primary production of leachate. Leachate produced from leafy vegetable waste should be treated

alone since it contributes high generation in the production of food waste. The production of leachate from leafy vegetable waste will be treated by using membrane technology since it has been successful in treating leachate produced from MSW. The composition of membrane used in this study is based on the past research. The treatment is known as leafy vegetable waste leachate by using newly developed flat sheet membrane.

EXPERIMENTAL PROCEDURE

A. Production of LVW leachate

The production of LVW leachate is prepared and collected in the laboratory. The process of production starts with the LVW collection. After the collection, it continues with the preparation of leachate reactor as the storage of the leachate. Preparation of LVW in the meantime should be done so that it can be stored directly into the leachate reactor. This is because leafy vegetables have high tendency to damage and to avoid the volume of leachate generated affected it should be stored directly. As the LVW stored in the reactor, it will decompose and form raw leachate. Then, the leachate produced in the reactor is collected once in two days. The raw leachate produced is tested to characterise the quality of the leachate.

B. Fabrication of Flat Sheet Membrane

There are several steps in membrane fabrication process including preparation of the dope solution, casting of the membrane, coagulation bath process and solvent exchange drying process. Each step needs to be done accordingly so that the membrane with the suitable condition could be made. This membrane fabrication had been done at room temperature on Membrane Laboratory, Faculty of Civil Engineering UiTM. The membrane that has been produced from the fabrication process should be characterised based on the membrane pore size produced. Membrane pore size is determined by the experimental method of the rejection polymeric molecules by using Polyethylene Glycol (PEG) which has a range of sizes. In this study, five different of molecular weight cut off has been used to determine the membrane pore size.

C. Treatment of Leachate by Using Flat Sheet Membrane

The sample of leachate is taken from each of the reactors. Chemical and physical parameters were tested on the raw leachate before and after the treatment in Environmental Laboratory. Then, the membrane used to filter the sample of the

leachate. This step is repeated by using another sample of leachate.

RESULT AND DISCUSSION

The first part of the result quantifies the amount of leachate produced from a different amount of leafy vegetable waste. Then, the second part discussed the effect of leafy vegetables waste age on quality of leachate generated. The third part discussed the effective treatment using flat sheet membrane for organic removal in vegetable waste leachate.

D. Effect of Waste Age on Leachate Production

Volume generated from leachate production is depending on the amount of leafy vegetable waste used in this study.

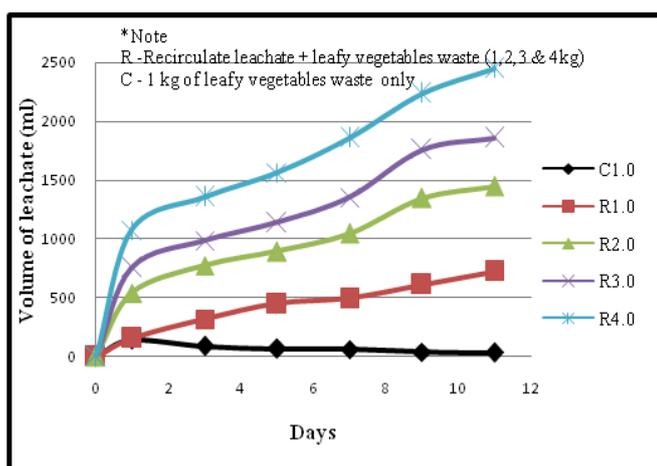


Figure 1: Production of Leachate

Based on Figure 1, it shows that production of leachate is rapidly increased within 11 days of the experiment. Low production of leachate is shown on the first day as the small portions only degradation process occurs. A study state that organic matter is changed into carbon dioxide and water by aerobic decomposition process [6]. Besides that, moisture content in the leafy vegetable waste caused the leachate generated instead of the decomposition process. The increasing production of leachate because in the early stage leafy vegetable waste has a vast amount of biodegradable organic matter.

Amount of waste used in this study affects the generation of leachate production. Maximum production of leachate is sample R4 which has the highest quantity of waste and a maximum period of decomposition of waste compared to another sample. Sample R4 with 4kg of waste on Day 11 produced 2,450 ml of leachate. Since leafy vegetable waste has a characteristic of high water content, it indicates that large quantity of waste will produce a high amount of leachate due to the high water content in the waste [5].

E. Effect of Waste Age on Quality Leachate Production

The leachate generates from decomposition process had been analysed based on water quality parameter. The quality of leachate is highly variable. A parameter that had been analysed were pH, turbidity, colour, SS, BOD5, COD, nitrate and Cd. For physical properties, parameters that had been studied were pH,

colour, turbidity and total suspended solids. pH values for leafy vegetable leachate were varied between 6.14-8.33.

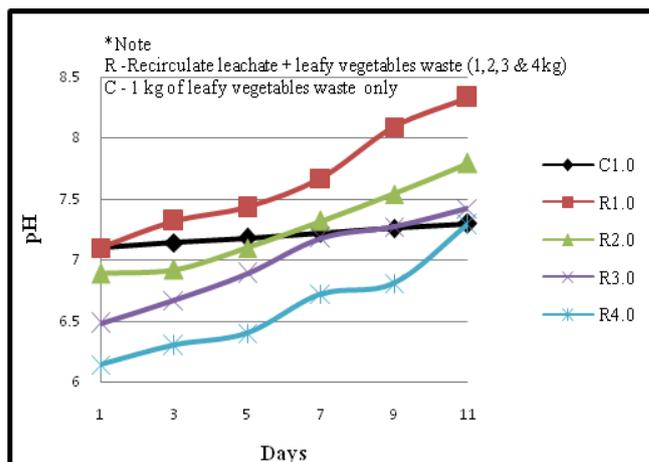
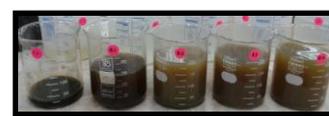


Figure 2: Effect on pH

The first leachate physical property is pH. During first three days, it shows low pH value as it is in the young stage of leachate. Young leachate pH is less than 6.5 which is acidic while old landfill leachate is higher than 7.5 which is alkaline [7]. Besides that, young waste has low pH because when high content of food waste in MSW, the rapid food waste hydrolysis results in the imbalance of anaerobic metabolism in the waste layer and indicate VFA accumulation and a decrease of pH value. pH value for all the sample is increasing based on Figure 2. pH value of the leachate continues to increase as the decomposition process going on. Besides that, this pH value was depending on the age of the leachate been produced.



a) Day 1



b) Day 11

Figure 3: Colour observation on a) day 1 and b) day 11

Next leachate physical property is colour. Based on the results obtained, the leachate colour is turning from light brown to blackish brown. Figure 3 shows the change in colour of leachate for sample C1, R1, R2, R3 and R4 from day 1 and day 11. Physical colour observation of sample leachate on day 1 shows light brown colour while on day 11 it turns to blackish brown colour. Presence of humic substance in landfill leachate, which accounts for most organic components cause changing colour of leachate to dark colour [8].

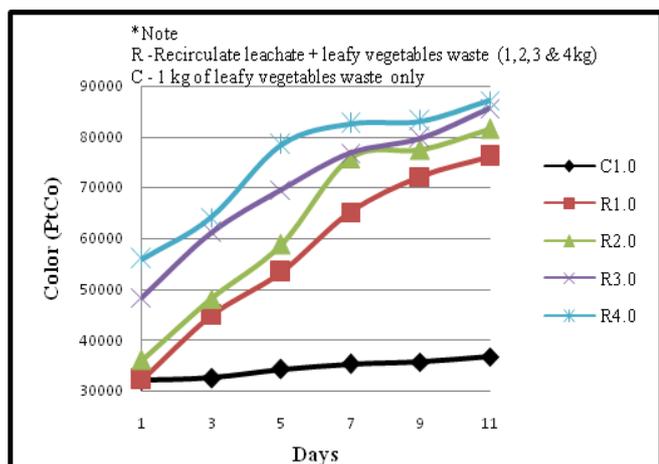


Figure 4: Effect of Colour

Based on Figure 4, R4 has the highest colour of leachate with 87,200 PtCo on day 11. While the lowest value of colour was recorded for C1 on day 1 with a value 32,200 PtCo. Based on Figure 4, it shows that the colour of leachate sample rapidly increases as the amount of waste increase except for the sample C1. The high leachate colour indicates that the leachate contains a high level of an organic substance such as humic and fluvic compounds [7].

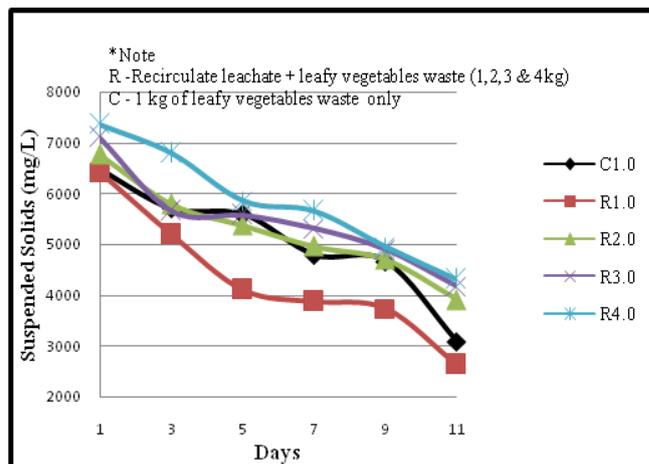


Figure 6: Effect on Suspended solids

The last leachate physical property is suspended solids. The value of suspended solid ranged from 2,650 mg/L to 7,370 mg/L. Based on Figure 6, suspended solid in all sample decrease steeply. All samples gives high result of SS on day 1 which are 6,430 mg/L, 6,500 mg/L, 6,780 mg/L, 7,120 mg/L and 7,370 mg/L for sample C1, R1, R2, R3 and R4 respectively. But in day 11 suspended solid for all sample decrease steeply with the result 2,650 mg/L, 3,100 mg/L, 3,920 mg/L, 4,320 mg/L and 7,370 mg/L for sample C1, R1, R2, R3 and R4 respectively. The high amount of waste reduced the suspended solid in each of the samples. This is because the high amount of waste needs longer time to decompose the waste. In similar to deeper landfill require a longer time for decomposition process [6].

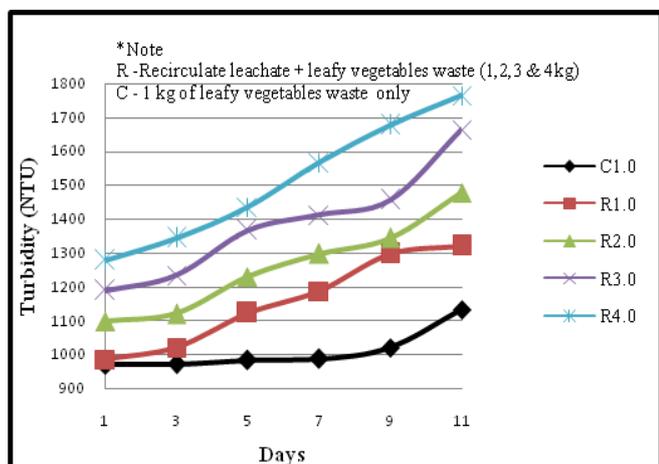


Figure 5: Effect on Turbidity

For the third leachate physical properties is turbidity. From Figure 5 turbidity of all sample leachate increase significantly except for sample C1. Sample R4 shows the highest turbidity with 1765 NTU on day 11 while the lowest turbidity is sample C1 with 970 NTU. High turbidity of leachate due to the landfill age and stabilisation of leachate [9]. Since the production leachate in this study for 11 days, it proved that the highest turbidity is R4 on day 11. High turbidity also affects the amount of waste used as the sample R4 use 4kg of waste. High organic matter in leachate also caused the high in turbidity [10].

As a conclusion for physical properties, colour and turbidity concentration are increasing for all sample for the 11 days of the decomposition process. From the data obtained, it shows that R4 sample with the highest amount of waste that is 4kg generate the highest concentration of colour and turbidity. This is true for the high value of turbidity would affect to value of colour for sample R4. However, these two parameters do not affect suspended solids. The measured suspended solids show decreasing as the time of decomposition process is increasing. Besides, pH value of all sample also increase throughout the decomposition process as well as colour and turbidity concentration, but sample R1 shows the higher value of pH instead of sample R4. The behaviour of control sample shows the most different compared to another sample for all the physical properties.

For chemical properties, the concentration of nitrate and cadmium were measured. Figure 7 shows the effect of different amount leafy vegetables waste to nitrate. Nitrate (NO₃) concentration in this production of leachate was recorded between ranges 1-35 mg/L. During the first day, the results show a low concentration of NO₃ for all samples with concentration 4 mg/L, 5mg/L, 6 mg/L, 7 mg/L and 10 mg/L for sample C1, R1, R2, R3 and R4 respectively. The concentration increases significantly until the fifth day and then decreased gradually until the eleventh day.

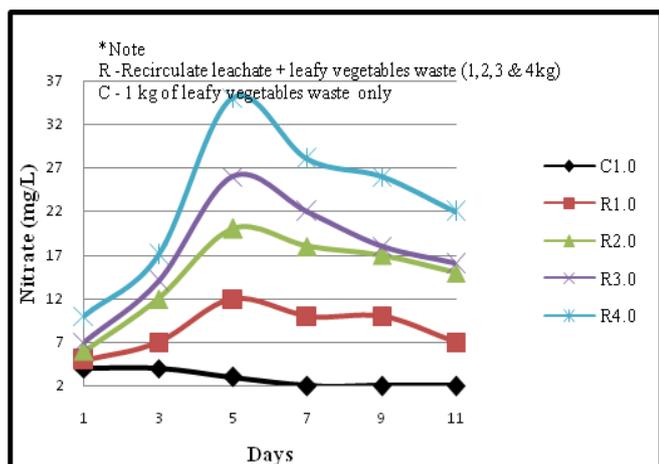


Figure 7: Effect on Nitrate

The highest NO₃ were recorded at sample R4 during the fifth day of leachate production with concentration 35 mg/L while the lowest NO₃ were recorded at sample C1 during the first day with concentration 4 mg/L. Thus, it proved that amount of waste affects the concentration of nitrate as a significant amount of waste gives a high concentration of nitrate. The second of leachate chemical property is Cd. Figure 8 shows the result of different effect amount of leafy vegetable waste to Cd. Cd concentration in this production of leachate was recorded between ranges 520-14,750mg/L. Based on the data recorded, it shows that leafy vegetable waste has very high of Cd concentration. Cd concentration increases significantly until the fifth day and then decreased gradually until the eleventh day.

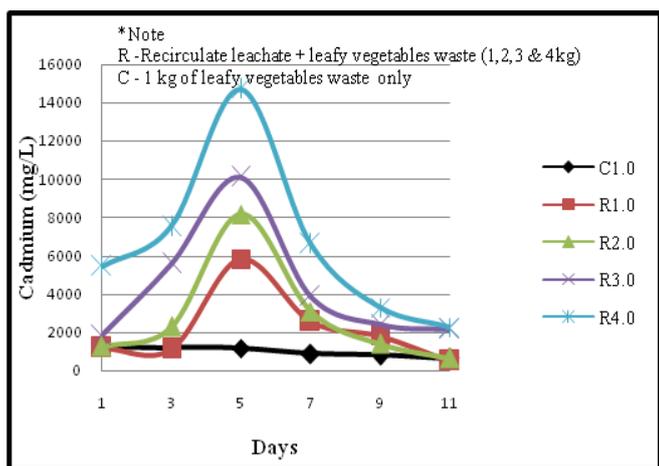


Figure 8: Effect of Cadmium

The maximum concentration of Cd shows in sample R4 during the fifth day with 14,750 mg/L. High concentration of Cd in sample R4 because R4 contains a significant amount of vegetable waste compared to another sample. Leafy vegetable waste has a high accumulation of Cd compared to other heavy metal [11]. Thus, it is proved when sample R4 contain a high concentration of Cd since R4 has a large amount of vegetable waste.

In summary of the chemical properties, the first five days of decomposition process shows the highest concentration of nitrate and Cd, especially for R4 sample. Then during the fifth

day until the eleventh day, both of the chemical properties show a decline in concentration. In contrast, Cd concentration shows steeply decline compared to nitrate gradually decline. This phenomenon happened because of the transformation process of ammonia to nitrite through oxidation process is very slow. It was known that the nitrite is transformed through this process. This also happens to the control sample that is C1.

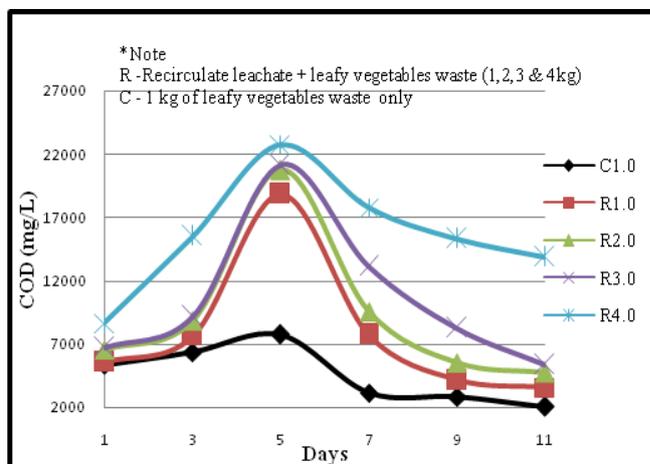


Figure 9: Effect on COD

Based on Figure 9 it shows that the result of COD for the first five days it increases noticeably. During first day, all samples gives low result of COD which are 5,400 mg/L, 5,600 mg/L, 6,600 mg/L, 6,780 mg/L and 8,700 mg/L for C1, R1, R2, R3 and R4 respectively. While the highest COD is on the fifth day for all sample especially sample R4 with 20,800 mg/L. This is because a large amount of waste contains in sample R4. The fifth day shows the highest COD because it indicates that the decomposition process undergoes acid phase [7].

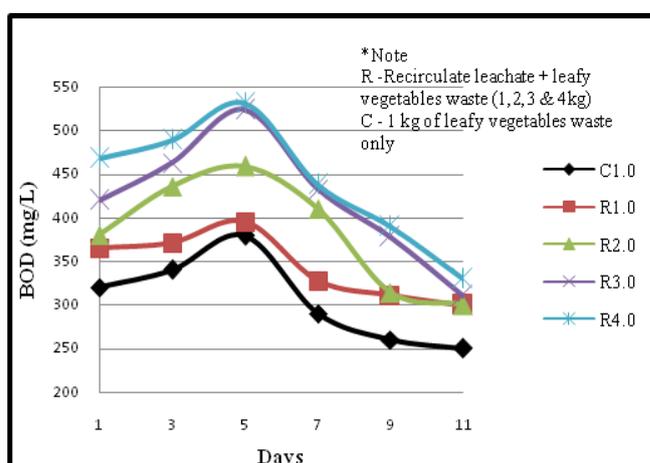


Figure 10: Effect on BOD

BOD measures the amount of oxygen required for microbiological decomposition of organic material in water or wastewater [7]. During first day production of leachate, low concentration of BOD is a show for all the samples based on Figure 10. BOD concentration begins to increase during the fifth day of production leachate for all samples. Based on the Figure 10, during the fifth day, all samples give a high concentration of COD which are 379 mg/L, 395 mg/L, 495 mg/L, 523.8 mg/L

and 530.7 mg/L for C1, R1, R2, R3 and R4 respectively. A research study found out that young leachate will be high in BOD as a result of decomposition of organic waste [12]. The highest BOD is on the fifth day for all samples especially from sample R4 with 530.7 mg/L. BOD behaviour is same as the COD as the vast amount affect the concentration. The concentration of BOD increased with the passing of time till five days. While during the last six days, BOD decreased significantly. A decline in concentrations of BOD referred to the reduction in organic contaminants [12]. Therefore, BOD concentration shows similar behaviour to COD.

Based on the biological properties, sample R4 shows the highest concentration of both COD and BOD. This can be found on the fifth day of the decomposition process. The concentration of COD is higher compared to the concentration of BOD. This is because BOD needs more amount of oxygen for microbiological decomposition. While for C1 sample show differently compared to another sample for both of the biological properties. A sample of C1 of COD and BOD having little changing throughout the decomposition process.

F. Type of Membrane Fabricate

The membrane was classified by the experimental method of rejection polymeric molecules using Polyethylene Glycol (PEG) which has a range of size. By plotting the observed retention for each PEG in the mixture against its molecular weight, a retention curve was obtained. Then, fitting of this curve with the log-normal led to the determination of the MWCO. 90% retention of PEG mixture showed the molecular weight of the membrane which is Ultrafiltration membrane.

G. Treatment of Leafy Vegetables Leachate by Using Membrane

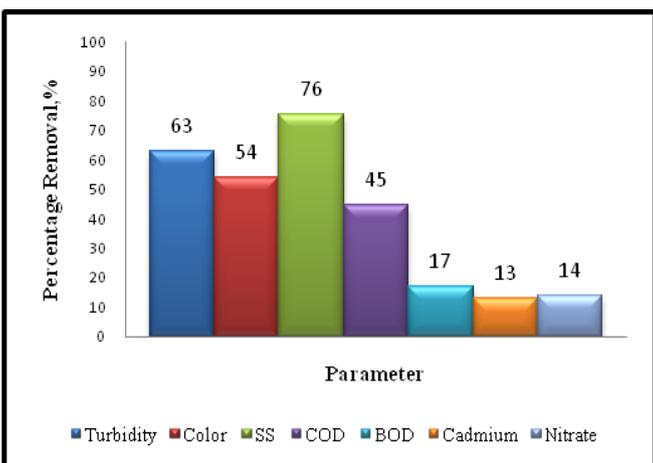


Figure 11: Percentage Removal Efficiency

Figure 11 shows the percentage removal efficiency each of the parameter. After leafy vegetable leachate had been characterized, the most severe of leachate had been treated by using UF flat sheet membrane. Based on the removal efficiency, UF membrane needs to combine with other treatment to achieve the standard requirement. UF is good to have pre-treatment process, especially the wastewater, containing high organic content [13].

Variation of casting dope solution such as concentration, temperature and organic and inorganic additives governed the

sub-layer of the membrane which consists of macrovoids, pores and micropores [14]. Apart from that, polymer concentration which is PSF in a dope solution of the membrane also significantly influence the performance of the membrane and morphology [15]. They also reported that by increasing the polymer concentration, a denser membrane which led to the reduction of flux would be produced.

CONCLUSION

It was found that most of the parameters were not comply with the standard issued by DOE for the leachate discharge. Therefore, the membrane has been introduced to determine the effectiveness of the system to treat leachate. Since membrane that had been fabricated was classified as UF membrane, it only acts as pretreatment for another process of leachate treatment.

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Citrus Fruit Waste Leachate Treatment By Using Newly Developed Flat Sheet Membrane

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Abstract— The increasing of the population has enhanced the generation of waste in Malaysia, a country of which depends on landfill as a method to dispose of solid waste in which the leachate generation will play a major impact to the environment. Leachate can potentially contaminate the nearby surface water, groundwater and soil. In Malaysia, food waste is a major waste composition which can lead to the generation of leachate due to their high moisture content. Citrus fruit wastes classified as one of food waste which become a concern because of its potential to create environmental pollution. Leachate from citrus fruit is acidic, high BOD and COD, high turbidity, total suspended solids and high nutrient such as nitrogen and phosphorus. This characteristic may interfere the effectiveness of wastewater treatment. The method that can be implemented as citrus leachate treatment is membrane process. Membrane process had been proven their effectiveness and had been used in many applications. The previous membrane composition is used, but the suitability of citrus waste is needed to investigate. The MWCO of newly developed flat sheet membrane is determined to study the performance of the membrane in citrus fruit waste leachate treatment.

Index Terms- Citrus Fruit Waste, Leachate, Membrane Process

I. INTRODUCTION

Malaysia is a country which highly depends on landfill as a method to dispose of solid waste. However, due to the generation of leachate which can potentially contaminate nearby surface and groundwater if left untreated, landfills require close environmental monitoring [1]. Leachate can be defined as the aqueous effluent as the results from the percolation of rainwater through waste, a biochemical process in waste's cell and water content from the waste themselves [2]. During the percolation process through the waste, it will also carry along the organic, inorganic, heavy matter, pathogen and other polluted matter. Therefore, leachate has a great environmental concern due to its potential to create pollution. Although there are many different characterisations of solid

waste in Malaysia, the primary constituent is food or organic waste which contributes up 37.43% [3].

Landfills are known as the primary treatment of food waste in all developing countries which estimated to be around 90% of total food waste disposal [4]. However, due to its biodegradability, landfill practice is not considered as a feasible method for food waste treatment and existing of food waste in landfills can result in disease vectors. One of the types of food waste that can contribute to the production of leachate is fruit waste. Due to its nutritious contents such as vitamin and various applications, fruit is consumed widely in the world and hence produce a significant amount of fruit waste mainly the fruit peel which generated from fruit processing industries [5]. Citrus fruit is one of the types of fruit waste that can easily be found in Malaysia. The waste generated from the production of citrus fruits can become a great environmental if they are not correctly being managed [6]. Besides that, the effluent of citrus wastewater has a very high organic load which BOD is 20-1400 mg/l and COD is 100-2000 mg/l [7]. Citrus effluent is high variability of the low value of pH which is usually acidic [7]. Therefore, it is essential to treat the leachate from citrus fruit waste to avoid the environmental problem and their effects on the wastewater treatment.

Numerous approaches had been applied to the leachate treatment. For many years, the conventional biological treatments and classical physicochemical method are considered as the most appropriate technologies for management and manipulation of high strength effluent such as landfill leachate [2]. However, these methods are not sufficient anymore in reducing the negative impact of the landfill leachate on the environment as the continuous hardening of the discharge standard in most of the countries and the ageing of landfill sites with more stabilised leachate. Treatment based on membrane technologies has emerged as the alternative treatment to improve the current methods and to comply with water quality regulation in most countries. Membrane processes are considered as the new treatment of leachate which had been applied including microfiltration, ultrafiltration, nanofiltration and reverse osmosis. These processes widely been used as wastewater treatment.

Ultrafiltration (UF) is effective to remove the macromolecules and the particles. However, it strongly depends on the type of material constituting the membrane [2]. Their study also found that UF membranes have been successfully used in full scale of bioreactor plant and high treatment levels landfill leachate has been achieved in such process. UF and MF are well-developed techniques used for water treatment meanwhile RO is widely used for water purification and desalination [8]. Therefore, since the success of the membrane had been proving in many applications, membrane process could be applied in treating leachate from citrus fruit. However, the performance of membrane process can be affected by several factors. Besides that, the material selection and pore size of the membrane also depends on the application it will be used. Besides, the selection of polymer membrane fabrication technique depends on the choice of polymer and desired structure of the membrane [8]. The material selection and pore size of the membrane are critical to ensuring the effectiveness of the filtration process.

II. EXPERIMENTAL PROCEDURE

There is three primary processes involved in this study as presented in Figure 1 which is conducted in the laboratory. The processes involved are leachate sampling, membrane fabrication and treatment of leachate using a membrane. The first process is the preparation and collection of citrus fruit waste leachate. The citrus fruit waste is being collected and stored until the leachate is produced. Once leachate is produced, it will be collected as for leachate sample. Then, the second process involved developed the flat sheet membrane. Meanwhile, the third process for this study is the treatment of leachate using newly fabricated flat sheet membrane. After that, several water qualities parameters will be monitored before and after the treatment using a membrane. The parameters are pH, turbidity, BOD, COD, nitrogen, phosphorus, suspended solids and colour.

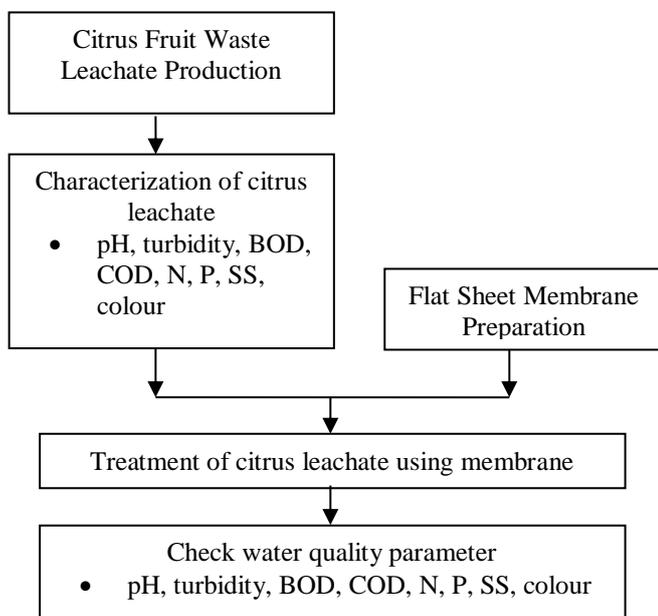


Figure 1: Flowchart of summarised methodology

A. Citrus Fruit Waste Production

The sample of leachate of this study is prepared and collected in the laboratory. The production process of leachate begins with the collection of citrus fruit waste. There are several citrus fruits were considered in this study which are lemon (*Citrus limon*), sweet orange (*Citrus x sinensis*), kaffir lime (*Citrus hystrix*) and lime. The type of citrus fruit waste used this study is discarded citrus fruit such as damaged fruit and were collected from Pekan Besar Klang, Klang and fruit shop. The leachate reactor was also prepared as the media of citrus waste production. Then, the citrus fruit waste is stored, composted and leave to decay to form raw leachate in five plastic reactors with different weight of citrus. The leachate generated is collected every two days, and the characteristics of raw leachate were tested. Meanwhile, Table 1 shows the proportion and experimental condition of leachate sample in this study.

Table 1: Proportion of citrus fruit waste in each container

Sample	Weight of citrus fruit waste (kg)	Experimental Condition
C0	1.0	No recirculation
S1	1.0	Recirculation once every two days
S2	2.0	Recirculation once every two days
S3	3.0	Recirculation once every two days
S4	4.0	Recirculation once every two days

B. Flat Sheet Membrane Fabrication

The techniques used in this study for membrane fabrication is immersion precipitation by using membrane composition of Polysulfone (PSF) 18%, Poly (vinyl-pyrrolidone)-K30 (PVP) 13% and N,N-dimethylacetamide (DMAC) 69%. There are several steps involved in the flat sheet membrane fabrication including the preparation of dope, the membrane casting, the coagulation bath process and the solvent exchange drying process. To fabricate the flat sheet membrane, General Pneumatically Flat Sheet Membrane was used for fabrication of membrane.

C. Treatment of Leachate Using Membrane

The sample of citrus fruit waste leachate will be treated using membrane process. Before being treated with the membrane, the quality of raw leachate will be tested and recorded. Then, the sample will undergo the treatment using membrane separation process. The schematic diagram of the cross-flow filtration for the membrane separation process is as shown in Figure 2. There are several water qualities which are being monitored in this study including pH, turbidity, BOD, COD, Total Nitrogen, Phosphorus and colour

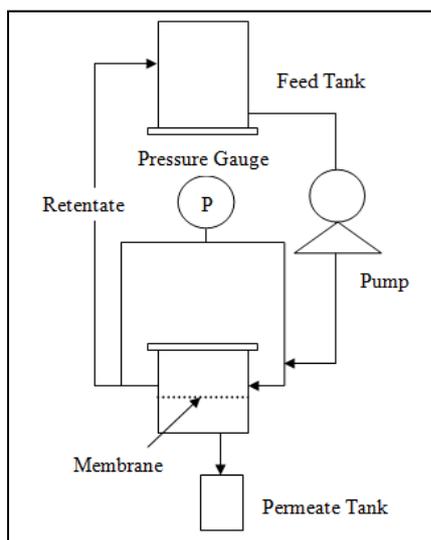


Figure 2: The Schematic Diagram of cross-flow filtration process

III. RESULT AND DISCUSSION

A. Effect of Waste Age on Quantity of Leachate Production

The volume of leachate generated gradually increased until day 5 and then experience a gradual decrease till the day of the 11 as shown in Figure 3. As for the cumulative volume in Figure 4, an S-curve graph was obtained which means that the volume of leachate generated is increasing by the day. The volume of leachate produce is increased because the citrus waste contains high moisture content that enhanced the volume of leachate generated. Besides that, the volume of leachate generated depends on the weight of waste. The higher the weight of waste, the higher the volume of leachate generated.

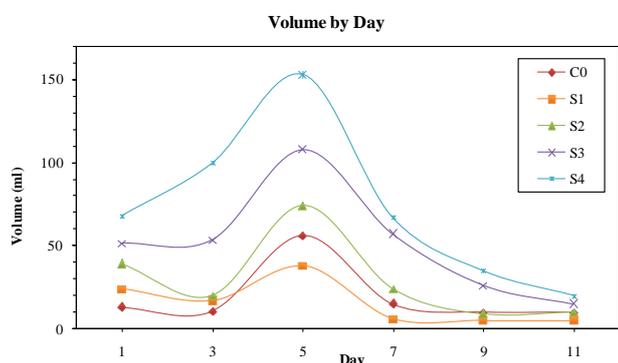


Figure 3: Volume of leachate generated by day

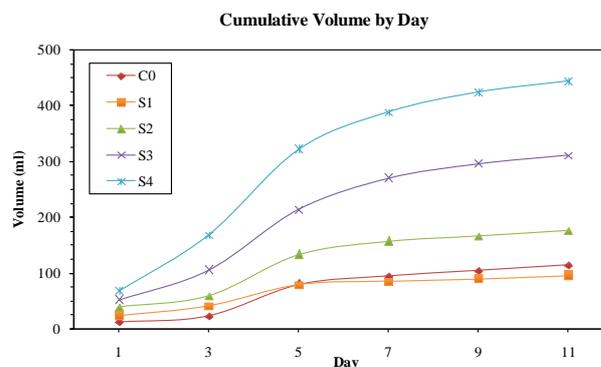


Figure 4: Cumulative volume of leachate generated

B. Effect of Waste Age on Quality Leachate Production - Physical Properties

There are three parameters of leachate quality under physical properties being monitored in this study including turbidity, total suspended solids (TSS) and colour. The turbidity of the leachate was gradually increased until day five which then slowly to decrease until the day eleventh as shown in Figure 5. From the graph, the turbidity of sample 5, S5 is the highest compared to the other samples. The turbidity of leachate is also closely related to the weight of waste. As the weight of waste increase, the values of turbidity also become higher. It is because of the more particles present in the leachate, the more light that will be scattered. Therefore, this condition caused the turbidity and total suspended solids related to each other. However, it is not a direct measurement of total suspended material in the leachate.

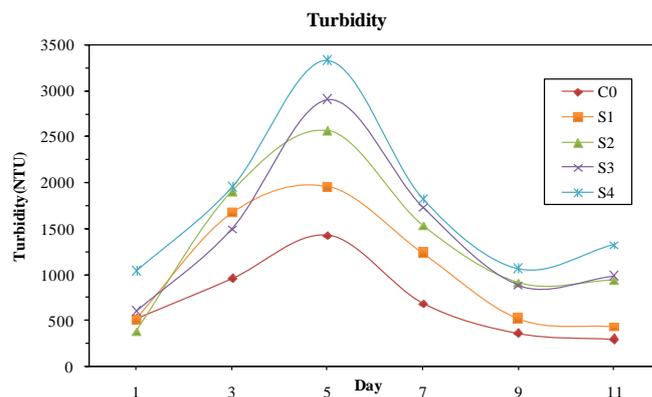


Figure 5: Turbidity of leachate

Total suspended solids (TSS) is one of the important parameter need to be taken into consideration before releasing wastewater into the water body. The allowable limit of TSS for leachate discharge by Department of Environment (DOE) is 50 mg/l for standard A and 100mg/l for standard B.

From Figure 6, the TSS of the leachate was kept increasing even though experience a little fluctuation. The amount TSS at day 11 for C0, S1, S2, S3 and S4 are 4500mg/l, 6000mg/l, 5400mg/l, 1800mg/l and 3000mg/l respectively. The amount of TSS in the citrus leachate is increasing as the waste age increase due to the decay of citrus waste particle enter the leachate and increase of microorganism. Besides that, the TSS was not influenced by the weight of waste since by following the arrangement of increased amount TSS; the highest is S2, followed by S2, C0, S4 and S3.

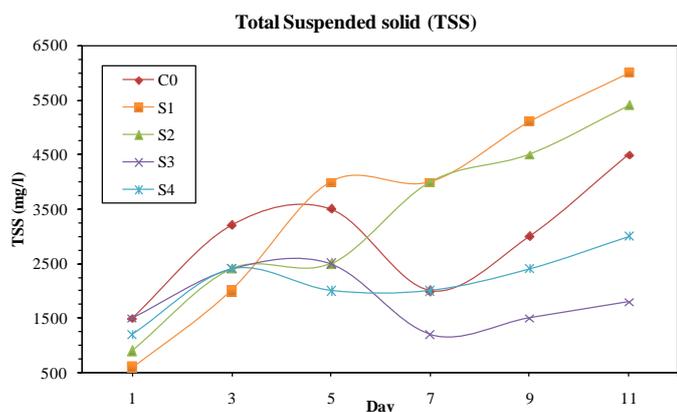


Figure 6: Total suspended solids of leachate

The colour of citrus leachate was found to be orange-brown or light brown. Associated with the leachate is a malodorous smell which is the result of the presence of organic acids, which come from the high concentration of organic matter when decomposed [9]. In their result also mention that the high concentration of colour in landfill leachate is because of the presence of the high organic substance.

Figure 7, shows the result of the colour of citrus leachate recorded for 11 days. The readings of colour for all samples are increased accordingly. In other words, the colour of the leachate is getting darker correspond to the age of leachate. This situation is supported by the study conducted by Bhalla et al. which reported that leachate produced by an old landfill with low biodegradability is classified as stabilized leachate which contains a high level of an organic substance such as humic and fluvic compound. These compounds can be indicated by the colour of leachate.

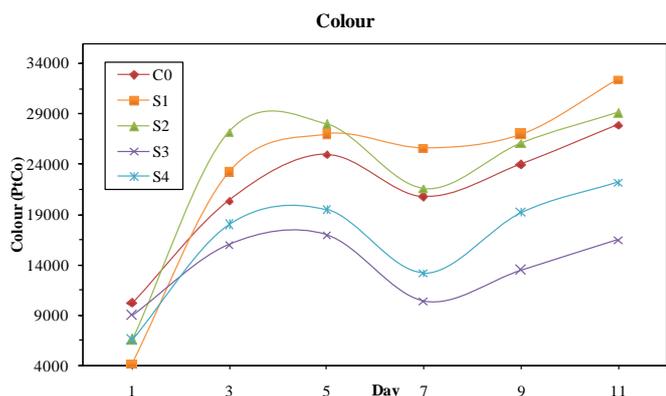


Figure 7: Colour of leachate

C. Effect of Waste Age on Quality Leachate Production - Chemical Properties

There are five parameters of leachate quality under chemical properties being monitored in this study including pH, Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), total nitrogen and phosphorus.

pH is classified as chemical properties which used to specify the acidity or basicity of the leachate. Figure 8, show the pH of 5 different sample of leachate with different weight of waste and experimental condition. The graph shows that the pH of leachate generated was at acidic. For sample 1, 2, 3 and 4, the pH slightly increased and decreased but remains at pH in

between 3.5 to 4 which is acid. However, the control sample, C0 show a gradual increase of pH which from acidic to a neutral. C0 is the leachate sample which is not undergoing the recirculation.

Bhalla et al. stated that leachate is found to have pH between 4.5 and 9. However, the pH of citrus leachate was found to be acidic and almost below 4.5. This is because the natural characteristic of citrus which is acidic. The study by Guzman et al. reported that the pH of citrus wastewater is between 3.6 to 4.5. The pH of stabilised is higher than that of young leachate [9]. Therefore, the pH of leachate is low but increased a bit because as the age of leachate increased, the pH also increased.

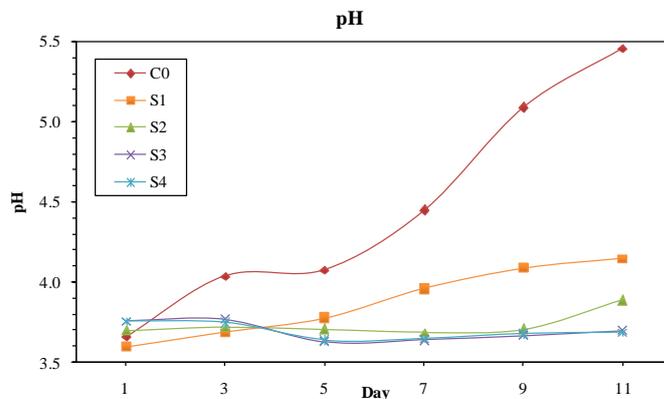


Figure 8: pH of leachate

Biochemical Oxygen Demand (BOD) is a measurement of the biodegradable organic mass of leachate, and that indicates the maturity of the landfill which usually will decrease by time. [9].

Figure 9, shows the BOD obtained in this study. The BOD of five samples for 11 days is slightly fluctuated but increase compared to the first day. The BOD of citrus leachate is high because the leachate is considered as young leachate. According to Bhalla et al., typically the BOD of landfill leachate will decrease concerning time. However, in this study, the leachate is considered young, and BOD is remaining increased by time. During day 11th, the BOD value recorded for sample C0, S1, S2, S3 and S4 are 471 mg/l, 454.2 mg/l, 458.40 mg/l, 470.40 mg/l and 472.80 mg/l respectively which is lower than the BOD of citrus wastewater reported by Guzman et al..

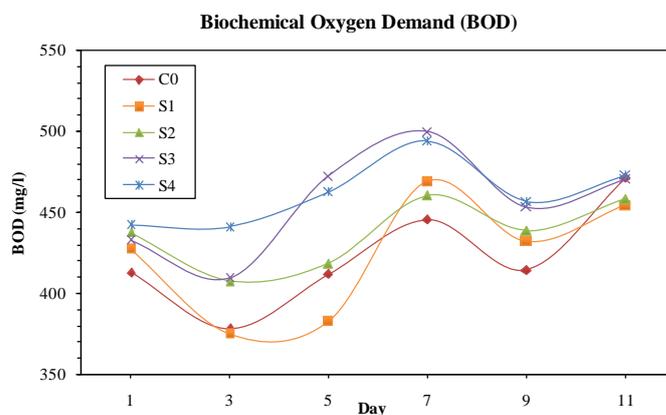


Figure 9: BOD of leachate

Chemical Oxygen Demand (COD) is the amount of oxygen required to completely oxidise the organic waste constituents chemically to inorganic end products [9].

Figure 10, shows the COD value recorded for citrus leachate within 11 days. The value of COD for five samples was high during the first day but gradually decreased for samples C0, S1 and S2 meanwhile, sample S3 and S4 experience a slight decrease but started to increase after day seventh. The COD of citrus leachate is above 25000 mg/l which is supported by the study conducted by Renou et al. [2] reported the COD value of young leachate is above 10000 mg/l. On the other hand, the COD value of citrus wastewater recorded by Guzman et al. (2016) is 10000 mg/l.

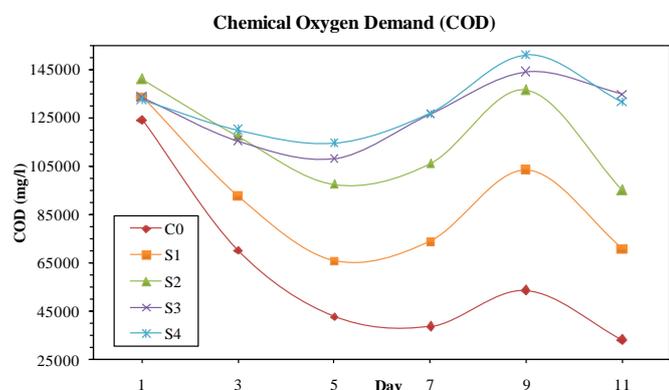


Figure 10: COD of leachate

Figure 11, show the value of total nitrogen found in the five leachate sample during 11 days. It shows that all sample experience the decreasing of TN value started day 3 until day 7. However, the value of TN increased on day 9 and day 11. The amount of nitrogen produced by leachate is corresponding to the weight of citrus waste. The value of TN is ascending from the sample of leachate with lowest weight of waste (1kg) to the highest weight of waste (4kg). From this finding, it shows that as the weight of waste increase, the volume of leachate increase, and the value of nitrogen also increase

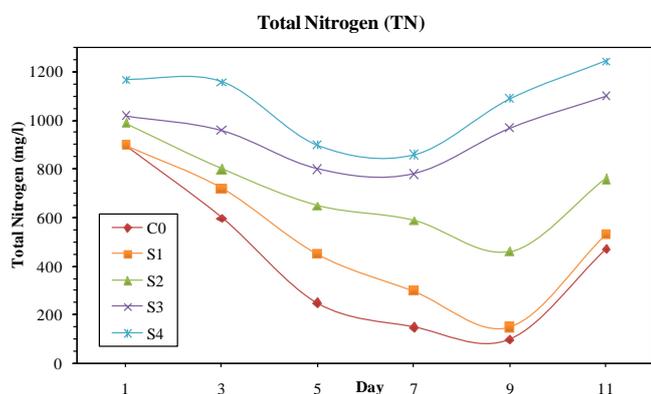


Figure 11: Total nitrogen of leachate

The major form of phosphorus that existed in the leachate was orthophosphate. (PO_4^{3-}). However, besides nitrogen, the presence of excessive amount innocuous nutrient like phosphorus can also upset the balance of aquatic ecosystem through eutrophication [12]

Figure 12, shows the generation of phosphorus in citrus leachate within 11 days. In general, the amount of phosphorus found in the leachate samples is increasing based on the weight of waste. The sample C0 and S1 which have the lowest weight of waste inherent the lowest amount of

phosphorus and followed by S2, S3 and S4 which have 2kg, 3kg and 4kg of waste weight respectively. Hence, from the graph, it can be concluded that the higher the amount of citrus waste, it will increase the potential of increase in the amount of phosphorus in leachate generated.

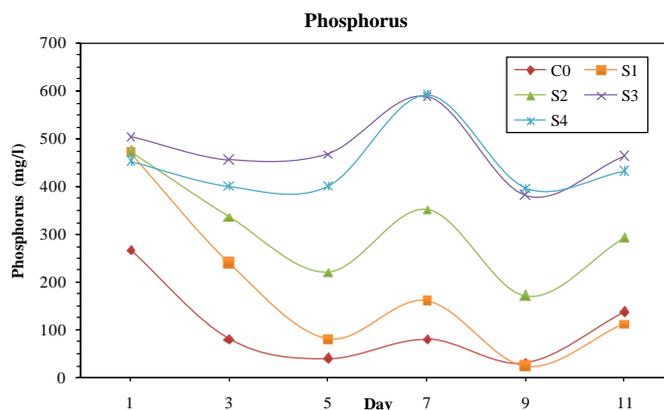


Figure 12: Phosphorus of leachate

D. Membrane Fabrication

The type of membrane fabricate is identified by determining the molecular weight cut-off (MWCO) of the membrane. MWCO is defined as the molecular weight of a solute that was rejected at 90%. MWCO is usually to estimate the pore size and its value can be determined from the rejection of solute of membranes against the stable molecules with various weights [11]. The non-ionized Polyethylene glycols (PEG) with different molecular weight are used to characterise the membrane fabricated in this study. Figure 13, shows a graph of rejection percentage against molecular weight. Based on the graph, the 90% rejection was fall between the molecular weight of 10 000 and 100 000 daltons. Therefore, it can be classified as Ultrafiltration which has the pore size of approximately 0.002 to 0.1 micron and an MWCO of approximately 10 000 to 100 000 daltons.

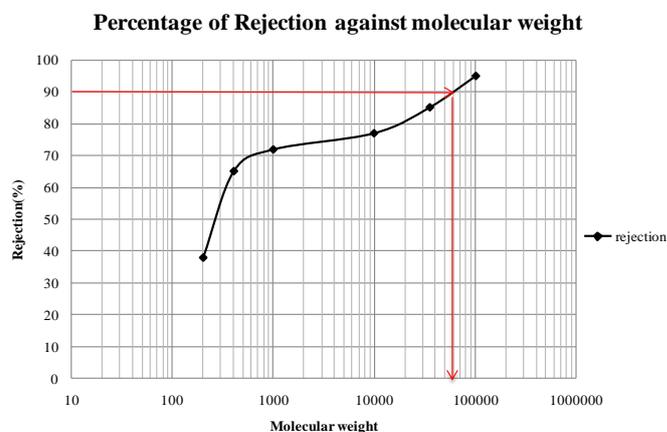


Figure 13: A graph of rejection against molecular weight

A. Treatment of Citrus Waste Leachate using Membrane

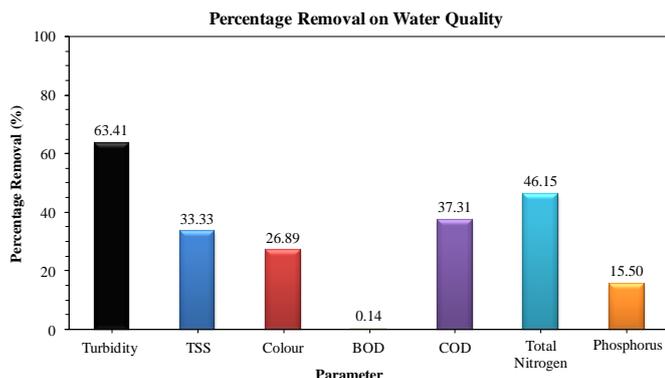


Figure 14: Percentage of removal on water quality parameters

The performance of UF membrane to treat citrus leachate is a study based on some parameters. One of the parameters is turbidity. According to Renou et al., UF is effective to remove macromolecules and particle but depending on the type of material constituent the membrane. UF might prove to be effective as a pre-treatment process for reverse osmosis and can be used to remove the larger molecular weight component of leachate which can cause fouling on reverse osmosis. In this study, UF found to be able to reduce turbidity by 63.41 %.

Another parameter to be analysed in this study is TSS. The percentage of rejection by using UF in TSS is about 33.33%. It is considered low percentage since UF has pore size approximately 0.002 to 0.1 micron which can remove larger suspended solids. However, the low percent of rejection may due to the size of the suspended particle in citrus waste is much lower than the pore size of UF. From Figure 14, the rejection of colour obtained by UF is 26.89%. This is closely related to the total suspended solids rejected by UF membrane. Suspended solids in the citrus leachate contribute to its colour. Since UF only remove about 30% of TSS, it also causes low rejection of colour since smaller size of TSS still contained in the leachate which contributes to the colour.

Besides physical properties, the chemical properties also being monitored as to analyse the performance of UF membrane to treat citrus leachate. From the study, it found that UF membrane has a limited ability to removes the pollutant in the citrus leachate. It can partially remove the contaminant in the citrus leachate. However, UF membrane in this study cannot be used to reduce the BOD since the rejection is very low which is below 1% removal. The value of BOD after treatment is higher than the permissible value which is 424.8 mg/l. The low performance of UF membrane in BOD removal may be due to the properties of the membrane such as porosity and hydrophobicity.

Chemical Oxygen Demand is one of the important factors that need to be treated before water can be released to the water body. Renou et al., reported that the elimination of polluting substance is never complete where the removal of COD is between 10 and 75%. Hence, this the reason explain the rejection of COD in the study is only 37.31%. Therefore, further treatment is needed to achieve the standard limit of discharge by DOE which is 400 mg/l. The percentage of nitrogen removal is the second highest after turbidity which is 46.15%. However, the amount of TN after treatment unable to meet the requirement of standard limit by DOE and consider high which can cause eutrophication

From the Figure 14, the percentage of phosphorus removal is 15.50%. The percentage is lower than the percentage

removal of TN by UF membrane. There is the possibility of the particle size of phosphorus is larger than nitrogen particle. The permissible phosphorus value by DOE is 0.2 mg/l is far from the value of phosphorus even after the treatment which is 169 mg/l.

IV. CONCLUSION

Based on the findings of this study, we can conclude that the weight of citrus waste influences the volume of leachate generated. The volume of leachate will increase but then gradually decreased by time. As higher the weight of waste, the higher the volume of leachate will be generated. The waste age also gives effect to the quality of leachate generated. The quality of leachate various depend on the waste age and also the weight of waste. The quality of citrus leachate has a high potential to pollute the environment because this type of leachate characterised by very high organic loads which are BOD above 400 mg/l and COD above 3000 mg/l. Besides that, citrus leachate has low pH which is acidic. This condition is not favourable because, in conventional treatment, pH must fall between 6.0 to 8.5 to accelerate the biological processes and to ensure the occurrence of sedimentation of the mud.

Other than that, the presence of nutrient which is Nitrogen and Phosphorus in citrus wastewater is considered high. Therefore, immediate treatment is needed since these types of nutrient contributed to the eutrophication. Eutrophication is the situation occurs due to the excessive nutrient such as nitrogen and phosphorus in the water body which can cause a dense growth of plant life and death of animal life resulting from lack of oxygen. The UF membrane fabricated in this study is not enough to reduce the pollutants contains in the citrus leachate. The composition of membrane might be the reasons for the low performance of membrane process. The pore sizes of the membrane also affect its performance. From this study, with pore size of UF membrane is insufficient to treat citrus leachate

As the conclusion, the characteristic of citrus leachate is far exceeding the permissible value of discharge set by DOE. Therefore, it needs to treat due to its potential to pollute the environment. It also found UF membrane insufficient to treat citrus leachate.

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The Baska Mask trial in patients undergoing laparoscopic cholecystectomies

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Abstract- The Baska Mask(Logical health products pty ltd.) is a second generation supraglottic airway device. The debate still exists whether a third generation should be introduced or not. It may be suggested that the Baska classifies itself as a 3rd generation airway device. Our study aims to see the ease of insertion of the device along with other haemodynamic pattern variability and the overall success of the device.(1,2)

Index Terms- Baska Mask, Second generation device, Supraglottic airway

I. INTRODUCTION

Kanag and Meenakshi Baska are the inventors of this mask which was first used in Australia. The innovations in the Baska mask include the following. It has a non inflatable anatomically shaped cuff which prevents tissue damage due to overinflated cuff and also nerve damage. However it is different from other non inflatable cuffs as the central channel continues to run through it. This leads to improvement in the seal reducing leak and making ventilation more efficient, as the air during positive pressure ventilation inflates the cuff and seals the airway.(3,4)

There is an inlet which rests atop the upper oesophagus where the dorsal surface is moulded in such a way that any oropharyngeal contents are directed away from the inlet into the side channels to which suction can be attached and the contents sucked out. An integral bite block is present which makes the airway patent at all times. An extended hand tab is attached to the cuff of the device, which on pulling post insertion gives the airway a better fit and the mask a better seal. It is made of hypoallergenic silicone latex polymer with adequate shore hardness. The mask can be easily inserted in the head neutral position. It comes in four sizes.(2)

II. AIM

My study intends to evaluate the mask in terms of its ease of insertion, success rate and haemodynamic changes in 40 patients undergoing laparoscopic cholecystectomies.

III. MATERIALS AND METHODS

The study is single blinded. 40 patients belonging to ASA grade 1, posted for laparoscopic cholecystectomies were randomised and selected. The inclusion criterion consisted of a BMI ranging between 25 to 35, non urgent surgery, ASA 1 and duration of surgery less than 2 hrs. Exclusion criterion consisted of full stomach patients, non laparoscopic cholecystectomies, refusing to give informed consent, pregnant patient and patients having difficult intubation and surgeries lasting for more than 2 hrs.(2,5)

Preanaesthetic check and patient selection was done at the PAC clinic when the patient was posted for surgery and a review was done the night prior to the surgery. Premedication with diazepam 5mg was given night prior to surgery.

On the day of surgery, the patient was premedicated with IV Ranitidine and IV Metocloperamide. Inj. Fentanyl 2 microgms /kg, Inj Midazolam 2ml, Ing Ondansetron 2 mg and Inj. Glycopyrrolate 0.02mg/kg were given IV. Monitoring included NIBP, SpO₂, eTCO₂, ECG and Heart Rate. Induction of anaesthesia was done by IV propofol 2mg/kg following which bag and mask ventilation with Oxygen and nitrous oxide in 50:50 ratio was done for 3 mins. After inducing, the Baska was inserted and fixed maxilla to maxilla, by a single investigator in all the patients. After failure of first attempt, 2 more attempts were taken failing which, the ET tube was inserted and the case abandoned from the study. The time taken to insert the device was noted and the haemodynamics were monitored every 30 seconds till 5 mins after insertion. The mask was attached to the closed circuit and anaesthesia was delivered using isoflurane with titrated MAC. Oxygen and Nitrous oxide were continued for maintenance. A ryles tube was inserted from the suction port and fixed. After completion of surgery the device was removed after suctioning from the suction port.(6,7,8)

The mask size chosen was based on the patients weight as per manufacturer’s instructions. If upon inserting, the device did not function properly, the depth of insertion was increased, the cuff tab was pulled and the device rotated and then the device was slightly pulled out. All the observations were recorded by an unblinded observer.

IV. RESULTS

The following results were obtained for the study conducted over 60 days. Data was collected and formatted in a tabular form. The statistical analysis was done using SPSS software and a p value of <0.05 was considered significant

Demographics

Age	38.64	P – value : 0.26
BMI	28.78	0.53
Sex M	18	0.55
F	22	0.67

Duration of insertion : Median

Median duration of insertion	6 seconds (p – value : 0.043)
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Number of attempts

Number of attempts		P – value
1	37	0.027
2	3	
3	0	

Heart Rate : Mean (S.D +/-20)

insertion	83.55
1/2 min	82.45
1 min	82.67
2 min	82.30
3 min	81.03
4 min	81.01
5 min	80.6

Systolic Blood Pressure : Mean(S.D +/-20)

insertion	122
1/2min	122
1 min	121
2 min	122
3 min	121
4 min	120
5 min	120

Diastolic Blood Pressure : Mean(S.D +/-20)

insertion	78
½ min	79
1 min	79
2 min	78
3 min	77
4 min	77
5 min	77

MAP : Mean(S.D +/-20)

insertion	90
½ min	90
1 min	91
2 min	91
3 min	91
4 min	92
5 min	92

SpO2 : Median(S.D +/-20)

insertion	100
½ min	100
1 min	100
2 min	100
3 min	100
4 min	100
5 min	100

EtCO2 : Mean(S.D +/-20)

insertion	28
½ min	29
1 min	29
2 min	30
3 min	30
4 min	30
5 min	30

V. DISCUSSION AND ANALYSIS

After completion of the study it was found that the Baska mask functions reasonably well for patients undergoing laparoscopic cholecystectomies in general anaesthesia. The ease of insertion was assessed by the duration of insertion which was 5 seconds. The duration was measured from insertion of the mask to beginning of ventilator. The p value for the same was found to be significant (0.043)

The number of attempts were increasingly singular with only three patients requiring double attempt and none having had the need for a 3rd attempt. The p – value of the same is found to be 0.027.

The haemodynamics remained stable throughout the insertion and the sPO₂ as well as EtCO₂ showed values within the normal range. A mean for all the intervals was taken. The p values for the same were within 1 but not highly significant.

In a nutshell, the Baska is befitting of being a successful supraglottic airway device and if at all a third generation classification may be introduced, it would certainly be inclusive of the same.

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Agriculture Water Footprint: Approaches and Methodologies

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Abstract- Earth as a planet is known as the ‘blue planet’ because of the large capacity of stocks of water but only a small amount is easily available in accessible reserves of groundwater, lakes, rivers and the soil-water store. Water scarcity is becoming a widespread concern in many parts of the world because human usage is putting pressure on these limited water resources. The Agricultural sector is reported to be a major freshwater consumer globally and around 70% of the world’s freshwater withdrawal is for irrigation. This justifies the need to develop standard indicators to evaluate human demand on natural resources. This paper aims to summarize the approaches of water footprinting with focus on the approaches suitable to assess water consumption of agricultural activities.

Index Terms- Water Footprint, Water Scarcity, Agriculture

I. INTRODUCTION

Freshwater is an essential resource requirement for the survival of all living organisms (both plants and animals), including humans in this planet. Earth as a planet is known as the ‘blue planet’ because of the large capacity of water stocks. However, only 2.5% of this capacity stock is fresh water (Oki et al., 2003). Most of that water is stored in glaciers and deep groundwater, and only a small amount is easily available in accessible reserves of groundwater, lakes, rivers and the soil-water store. Because of the great difference in availability, alongside human usage pressures on these limited water resources, water scarcity is becoming a widespread concern in many parts of the world (Oki et al., 2003). The Agricultural sector is reported to be a major freshwater consumer globally and around 70% of the

world’s freshwater withdrawal is for irrigation (Gheewala et al, 2014.). This heavy exploitation of global water resource for food production is degrading global water resource (Bocchiola et al., 2013). Agriculture is a water consuming activity (Rost et al., 2008; Fader et al., 2011), and also most reliant on rainfall as one of its main source of water.

Producing crops under water stress conditions has necessitated the need to undertake analyses on water availability and to characterize water requirements (evapotranspiration losses and water use efficiency) (Lopez and Capetillo, 2015). This justifies the need to develop standard indicators to evaluate human demand on natural resources (Hoekstra et al, 2011).

Based on the concept of virtual water (VW) introduced in London in the mid-1990s (EL-Sadek, 2010), the concept of water footprint (WF) was established. This term can be defined as the total volume of freshwater used during the production and consumption of goods and services, measured at the place where the product was actually produced. Water Footprint (WF) has been established as an important tool to evaluate the contribution of goods and activities to water scarcity (Lopez and Capetillo, 2015). It is an indicator of human appropriation of freshwater resources and measures both the direct and indirect “water use” of consumers and producers (Mekonnen and Hoekstra, 2015). This concept is being used around the world to improve agricultural water management (Lopez and Capetillo, 2015). In Addition to that, Hoekstra *et al.* based on the studies of virtual water (VW) performed by Allan to lay out the concept of water footprint (WF). This term can be defined as the total volume of freshwater used during the production and consumption of goods and services, measured at the place where the product was actually produced.

Lamastra et al, 2014 categorized water footprint into three types namely; blue water footprint, which refers to the consumption of fresh surface water or groundwater that evaporates, it is incorporated in the product, it either does not return to the same catchment area, or it does return but in a different time period; The green water footprint refers to the total rainwater evapotranspiration plus the rainwater incorporated into the harvested crop or wood; and The gray water footprint which indicates the level of pollution of the water, expressed in terms of the freshwater volume required to assimilate the existing load of pollutants below the threshold value or ecotoxicological end-point. Methodologies and approaches have been developed to assess WF. For any well-defined group of consumers or producers, WF can be calculated as the sum of the water used along the full production chain.

a. An Overview of Water Footprint and related Studies

Hoekstra et al., 2011 defined the WF as an aggregate and multidimensional indicator of water use, showing different sorts of water consumption as a function of space and time and differs from the traditional concept of water balance. Water footprint (WF) has been introduced as a method to indicate the amount of water used and impacts of production process on water resources. Thus, it is measured as the total volume of freshwater used to produce a product (Gheewala et al., 2014). Quantification of water footprint is the first step in Water Footprint Analysis (WFA). This process demands the availability of accurate data and methods. WF studies have focused on the different implications of the water demand for industrial, agricultural, and other sectors (Tillotson et al, 2014). These researchers have defined WF and its types differently and so many methodologies have been employed. How to use the WF concept as a tool to solve practical problems in different sectors is still an issue (Tillotson et al, 2014). There is no agreement on robust methodology to have an impact on different

b. Agricultural Water Footprint

Bonamente et al, 2015, defined agriculture footprint as the total volume of surface and ground freshwater consumed for tillage. They included water used for irrigation, water used to dilute and apply treatments,

water issues. Report by UN water 2012, revealed humans are consuming 54% of all of the earth's accessible freshwater (i.e. in rivers, lakes and underground aquifers). The continuous overconsumption and pollution of scarce freshwater resources, exasperates freshwater scarcity and quality issues around the world (Lamastra et al, 2014). This brings us to the term water use. Hoekstra et al., 2011 defined water use as a measure of water volumes consumed (evaporated or incorporated into a product) and/or polluted in the life cycle of a product. More recent studies have neglected to consider important elements especially when calculating water footprint using the Life Cycle Assessment (LCA) methodology. This has brought confusion to the understanding of the water footprint since researchers are defining it to suit their arguments. In the particular case of water resources, a struggle has been triggered among farmers, industries and households: these sectors require more and more water in order to satisfy increasing demands (Lopez and Capetillo, 2015). Wine industry for example, they use a lot of water from agriculture point of view in manufacturing of the final product and packaging. Therefore, for a well-defined group of consumers or producers, WF must be calculated as the sum of the water used along the full production chain (Lopez and Capetillo, 2015).

The number of water footprint studies and publications have increased rapidly in recent years (Hoekstra and Chapagain 2007; Liu and Savenije 2008; Ridoutt and Pfister 2009; Hoekstra et al. 2011; Hoekstra and Mekonnen 2012; Zeng et al. 2012; Chenoweth et al. 2013; Liu et al. 2013; Yang et al. 2013), and consequently, there is a need for a comprehensive review of the numerous tools and metrics developed for quantification and assessment (Tillotson et al., 2014). Therefore, in the next subheading will review the way some researchers assessed and calculated the WF in the Agriculture sector.

and water used to wash the machinery. This shows that the researchers have wide knowledge in the Calculation of WF using LCA methodology and strongly agrees to what Lopez and Capetillo, 2015

proposed; that WF must be calculated as the sum of the water used along the full production chain in the LCA.

Agricultural footprint was calculated as

$WF_{agricblue} = WF_{agricblue, irr} + WF_{agricblue, treat} + WF_{agricblue, wash}$

Water Footprint was established as a multi-dimensional indicator, allowing the geographical and temporal water consumption evaluation by source. Water consumptive use is measured in terms of the water volume consumed including evaporated water and/or polluted per unit of time.

In crop production, an accurate knowledge of crop water requirements during all seasonal stages is called for in order to reach optimal yields. For a specific crop, the crop water requirement mainly depends on the climatic conditions of the zone where the crop is established. Crop water requirements are usually computed from crop evapotranspiration and account for the net water depletion produced by the crop. Once crop evapotranspiration is calculated, it is possible to estimate the green and blue water components contribution to crop growing. Recognizing rainfall as the only source of water for dry land conditions, it is critical to identify the optimum growing period for the crop: when the expected water deficit is minimized.

II. METHODOLOGY

The consumption of goods and services often creates stress on the water resources of production sites. However, the dynamic between use and stress can be entirely different per location. The effect of local consumption on the water resources of other countries can be quantitatively analyzed in two ways. Firstly, one can look at the absolute volume of water imported (the size of the external WF) and the kind of virtual water imported (the quality of the WF). Secondly, one can consider the relative volume of water imported compared to the available resources in exporting countries. Though the size of the external WF can be large, it will exert less pressure in exporting countries if the kind of water used is abundantly available in those countries (e.g. export of rain-fed maize from the USA). Thus, before quantifying the WF of a product, we need to analyze the virtual water content of that

product which distinguishes the kind of water used in the production process.

The virtual water content of a primary crop VWC_c (m^3/t) is calculated as the ratio of the volume of water used for crop production WU_c (m^3/ha), to the volume of crop produced, Y_c (t/ha).

$$VWC_c = \frac{WU_c}{Y_c}$$

The volume of water used for crop production (WU_c , m^3/ha) is composed of two components

$WU_c = WU_{evaporative} + WU_{non-evaporative}$

Where $WU_{evaporative}$ is the volume of water evaporated and $WU_{non-evaporative}$ is the volume of water unavailable for further use as a result of pollution, which is calculated as

$WU_{evaporative} = WU_g + WU_b$

$WU_{non-evaporative} = WU_p$

Building on the concept of Allan's virtual water, 1998, Hoekstra, 2003 introduced the concept of water footprint which has been subsequently developed and refined as a method for quantifying water use by a product, service or nation (Chapagain and Hoekstra, 2008 and Hoekstra et al., 2009). The water footprint represents the sum of all the water used in a supply chain, comprising blue, green and grey water. Blue water is defined as the volume of freshwater abstracted from rivers, lakes and aquifers. The amount of rainwater used by plants is referred to as green water. Finally, grey water accounts for the impact of pollution on water resources and represents the volume of freshwater needed to dilute pollution so that the quality of the water remains above water quality standards set by regulations. This approach has been used for calculating the water footprints of various agricultural products; for example, the water footprint of beef has been estimated at 15,500 L/kg, sugar at 1,500 L/kg, wine at 120 L/glass and bioethanol (from corn) at 110 m^3/GJ (WFN, 2010). It has also been used as a tool for developing corporate water reduction strategies (Ridoutt et al., 2009) and for water-footprint labelling of products (SabMiller and WWF, 2009).

However, there are concerns that this approach could provide misleading results (Ridoutt et al., 2010 and Ridoutt and Pfister, 2009). The main concern relates to the fact that, unlike the carbon footprint, the water footprint represents just the quantity of the water used

without an estimation of the related environmental impacts, such as due to water scarcity. Even the quantification of water use is controversial due to the inclusion of green water (rainwater as moisture in soils), which does not affect availability of blue water and therefore should not be accounted. Recently, some companies have adopted the concept of “net green” water – the difference between the water evaporated from crops and the water that would have evaporated from natural vegetation (SabMiller and WWF, 2009).

Furthermore, water abstraction rather than consumption is often used in quantifying the blue water footprints (Hoekstra and Chapagain, 2008). This could be problematic, especially in the case of industrial water use where only a small part of the abstracted water is actually consumed (e.g. evaporated in cooling towers or embodied in the product) and the remainder is often discharged back to the water bodies (e.g. cooling water or industrial effluents from wastewater treatment plants). With respect to grey water footprint, it is argued that environmental impacts of grey water are more suitably addressed in other impact categories such as eutrophication or toxicity (Milà i Canals et al., 2009). Moreover, in the absence of an agreed method for the quantification of dilution volumes for assimilation, the estimation of grey water footprint is subjective.

a. The Milà i Canals et al. approach

This approach considers water use at the level of a river basin. According to this method, both the source of water and type of use of freshwater should be included in Life Cycle Inventory (LCI) (Milà i Canals et al., 2009). With respect to the source, it follows the Hoekstra et al. approach by classifying water sources as blue and green water. The blue water category is further differentiated into three types: flow (river/lake), fund (aquifer) and stock (fossil). The water use is split into two categories: evaporative and non-evaporative use. The latter is defined as water returned to the freshwater source after its use and available for further use. It is further suggested that the green water and the non-evaporative use of river, lake and aquifer water should be disregarded in Life Cycle Inventory Assessment (LCIA) because their use does not lead to relevant environmental impacts from a resource perspective (i.e. reduced availability of

water for other users and effects on freshwater ecosystem). Instead, it is proposed to assess the land use effects on rainwater availability, which accounts for changes in infiltration and evapotranspiration in the production system relative to a reference land use. It is suggested that for high precipitation areas (rainfall > 600 mm/year), rainwater lost from arable land is 73%, whereas with forest as the reference (potential) land use, this is 67%; therefore, the additional loss due to arable land use is 6% of rainwater (Milà i Canals et al., 2009). For low precipitation areas (rainfall < 600 mm/year), the extra 10% of rainwater is lost due to similar change in land occupation.

b. The Pfister et al. approach

His approach considers water usage on a smaller scale than the Milà i Canals et al.’s method, taking watershed as the area of focus. Unlike the previous mentioned approaches, this method considers only blue water. This method differentiates three categories of water use: in-stream water use, water consumption (where the water is no longer available in the watershed) and water-quality degradation (where the water is still available after use but with diminished quality). The main difference between the Milà i Canals et al. method and this approach is that the water discharged to another watershed is treated here as consumed while the Milà i Canals et al. approach considers the water discharged to any freshwater source as a non-evaporative use. Furthermore, unlike the Milà i Canals et al. approach, this method suggests that the wastewater discharge should be assessed for the loss of the water quality. However, Pfister et al. do not elaborate on how this could be done.

III. SOME OTHER MODELS OF WATER FOOTPRINT.

The section summarizes the approaches of water footprinting with focus on the approaches suitable to assess water consumption of agricultural products. Hoekstra et al. provided a collective method on water footprinting and a specification on how to assess water consumption of agricultural products with the use of CROPWAT model are valuable in case no other data are available. The approach of the CROPWAT model can be used with high regional specification if the necessary parameter to enter in the

model is available. The issue of water quality is addressed by water volume.

But, this approach does not factor water input quality and the concept is criticized for the mixing up of physical water consumption and virtual consumption. There is a method that considers the regional differences in water availability but conducting an impact assessment according to Hoestra et al. will not be easy because of restrictions in data availability.

Pfister et al. provided a comprehensive method to integrate water use into the life cycle assessment method. In the case for agricultural products, the approach of Hoestra et al to use the CROPWAT model is most suitable. Water quality is not explicitly differentiated but an approach outlined how this could be done. Inventory data is however not provided. Mila I Canals et al. for instance, refer to Hoekstra et al. for inventories, no additional specifications or data are provided. For impact assessment they consider regional water availability outlined similar to Hoekstra et al.

IV. CONCLUSION

The methods of water footprint have been applied in so many sectors with still new standardized methods emerging. On inventory level practitioners have a wide choice of methods. In compliance with the Life Cycle Assessment practice, verified primary data is preferable to use. It is very likely that comprehensive water use data will soon find their way into Life Cycle Assessment databases that will then simplify the compilation of inventories just as they do for all other material flows. Modeling water consumption with CROPWAT can be recommended if no other reliable data sources are available.

Life cycle impact assessment of fresh water use proves to be challenging. The method of Pfister et al. is the most suitable method so far that allows a comprehensive impact assessment of freshwater use to be integrated in the common Life cycle assessment approach. Life cycle assessment practitioners who aim to include the environmental effects of fresh water in Life cycle assessment studies are now provided with a tool to do so. For instance, a case study that uses the GaBi software and the approach of Pfister et al. to integrate water consumption into a LCA of cotton is given in Thylmann.

Much work on WF has been done on agricultural

produce including rice, maize and beef. With an increase in the production in electronics and much attention on electronic waste disposal, focus should not be drawn in estimating only their LCA but also their WF.

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Using Naïve Bayes Algorithm in detection of Hate Tweets.

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Abstract- Social Media has become a very powerful tool for information exchange as it allows users to not only consume information but also share and discuss various aspects of their interest. Nevertheless, online social platforms are beset with hateful speech - content that expresses hatred for a person or group of people. Such content can frighten, intimidate, or silence platform users, and some of it can incite other users to commit violence. Furthermore, social media gives users the freedom to express their thoughts in text without following traditional language grammars, thereby making it difficult to mine social media for insights. Despite widespread recognition of the problems posed by social media content, reliable solutions even for detecting hateful speech are lacking. The main goal of this study is to develop a reliable tool for detection of hate tweets. This paper develops an approach for detecting and classifying hateful speech that uses content produced by self-identifying hateful communities from Twitter. Results from experiments showed Naive Bayes classifier achieved significantly better performance than existing methods in hate speech detection algorithms with precision, recall, and accuracy values of 58%, 62%, and 67.47%, respectively.

Index Terms- Hate tweets, Naive Bayes, Text Classification, Sentiment analysis.

I. INTRODUCTION

In recent years, Twitter has become one of the most popular micro-blogging social-media platforms, providing a platform for millions of people to share their daily opinions/thoughts using real-time status updates Conover et al. (2013). Twitter has 270 Million active users and 500 million tweets are sent per day. M.C. Wellons, (2015). Due to high reachability and popularity of social media websites worldwide, organizations also use these websites for planning and mobilizing events for protests and public demonstrations Muthiah et al. (2015).

Twitter is a famous platform for opinion and information sharing and this platform is mostly used before, during and after live events Bollen et al. (2011).

Online spaces are often exploited and misused to spread content that can be degrading, abusive, or otherwise harmful to people. Twitter prohibits users to post violent threats, harassment, and hateful contents. However, there are still tons of users who disobey the rules and use their Twitter account to spread hate speech and negative words.

An important and elusive form of such language is hateful speech: content that expresses hatred of a group in society. Hateful speech has become a major problem for every kind of

online platform where user-generated content appears: from the comment sections of news websites to real-time chat sessions in immersive games. Such content can alienate users and can also support radicalization and incite violence Allan, (2013). It is through such access to Twitter where various users have used the platform to propagate and promote hatred tweets to various target groups and individuals Wilkinson, (1997).

No formal definition of hate speech exists but there is a consensus that it is speech that targets disadvantaged social groups in a manner that is potentially harmful to them Jacobs & Potter 2000; Walker 1994). In Kenya, hate speech has been defined as any form of speech that degrades others and promotes hatred and encourages violence against a group on the basis of a criteria including religion, race, color or ethnicity. It includes speech, publication or broadcast that represents as inherently inferior, or degrades, dehumanizes and demeans a group. (KHRC, 2010).

Importantly, the definition does not include all instances of offensive language because people often use terms that are highly offensive to certain groups but in a qualitatively different manner.

Anything tweeted can reach a huge number and the effects can be extensively great.

We were concerned with the task of detecting; identifying and analyzing the spread of hate speech sentiments in the social site and specifically twitter in Kenya. Sentiment analysis is an area of natural language processing which aims at determination of opinions, attitudes of a writer in the text or their attitude towards specific topics. Sentiment describes an opinion or attitude expressed by an individual, the opinion holder, about an entity, the target. The research field of sentiment analysis has developed algorithms to automatically detect sentiment in text Pang & Lee, (2008). Whilst some identify the objects discussed and the polarity (positive, negative or neutral) of sentiment expressed about them Gamon et al. (2005), other algorithms assign an overall polarity to a text, such as a movie review Pang & Lee, (2004). Three common sentiment analysis approaches are full-text machine learning, lexicon-based methods and linguistic analysis. For standard machine learning e.g., Witten & Frank, (2005), a set of texts annotated for polarity by human coders are used to train an algorithm to detect features that associate with positive, negative and neutral categories. The text features used are typically sets of all words, word pairs and word triples found in the texts. The lexicon approach starts with lists of words that are pre-coded for polarity and sometimes also for strength. It uses their occurrence within texts to predict their polarity. A linguistic analysis, in contrast, exploits the grammatical structure of text to predict its polarity, often in conjunction with a lexicon.

For instance, linguistic algorithms may attempt to identify context, negations, superlatives and idioms as part of the polarity prediction process e.g., Wilson, Wiebe, & Hoffman, (2009). In practice, algorithms often employ multiple methods together with various refinements, such as pre-filtering the features searched for Riloff, Patwardhan, & Wiebe, (2006), and methods to cope with changes in data over time Bifet & Frank, (2010).

This paper presents an approach based on Naïve Bayes to detect hate speech/tweets. The approach involves tweet acquisition and streaming using Tweepy API, pre-processing to remove unwanted parts of speech using n-grams, and tweet classification and evaluation using Naïve Bayes. The collection of tweets was selected so that it contained a variety of words, expressions, emotional signals as well as indicative examples of sarcastic, ironic, metaphorical language. We developed a sentiment analysis classifier that processes tweets in real-time and uses supervised learning techniques to analyze and classify their sentiments.

The rest of this paper is organized as follows: Section 2.0 provides an overview of related work. Section 3.0 describes our approach. In Section 4.0, we present the classifier implementation for real-time sentiment analysis using naïve Bayes and the experimental results and discussion and in Section 5.0 we conclude and highlight the future work.

II. RELATED WORK

Warner and Hirschberg (2012) detected hate speech on the basis of different aspects including religion. They defined hate speech in their work and then gathered data from Yahoo and American Jews Congress (AJC), where Yahoo provided its data from news groups and AJC gave URL marked as offensive websites. They classified data at paragraph level in their first attempt and then used this data set for annotation by asking annotators to manually annotate the data set. They focused on stereotype and thus decided to make language model for stereotypes to mark hate speech. They made an anti-Semitic speech classifier first. They identified 9000 paragraphs matching to their regular expression and then removed those paragraphs that were not offensive. Then further seven categories were chosen to annotate the data. After this annotation for their gold corpus, they used two fold cross validation classifier to find a refined data set.

Motivated by work done in Kwok and Wang, (2013) proposed a method for detecting hatred speech against black over Twitter. They arranged hundreds of tweets to analyze keywords or sentiments indicating hate speeches. To judge the severity of arguments, a questionnaire was floated to students of different races. A training dataset of 24582 tweets was preprocessed to correct spelling variation, remove stop words and eliminate URL etc. In order to classify tweets, NB classifier highlighted racist

and nonracist tweets and prominent feature were identified from those tweets. The classifier showed an accuracy of 86%.

Burnap et al. (2013) developed a rule-based approach to classifying antagonistic content on Twitter and they used associational terms as features. They also included accusation and attributional terms targeted at a person or persons following a socially disruptive event as features, in an effort to capture the context of the term use. Their results demonstrated an improvement on standard learning techniques.

Ting et al. (2013) proposed architecture for discovering hate groups over Facebook with the help of social network and text mining analysis. They extracted features including keywords that are frequently used in groups. Sureka et al. (2012) proposed an approach based upon the data mining and social network analysis for discovering hate promoting videos, users and their hidden communities on YouTube. Chen et al. (2013) presented a framework for identification of extremist videos on YouTube. Author extracted lexical, syntactic and content specific features from user generated data and used various feature based classification techniques in order to classify videos. Agarwal and Sureka proposed a focused crawler (bestfirst search and shark search) based approach for retrieving YouTube user profiles promoting hate and extremism.

Our approach is different from above work because most of available work done on hatred speech is on a single topic or domain depending on the emerging/developing trend on a given period of time. They have tried to focus different subject at time different study like religion, race, ethnicity etc. In this work, we have given an approach to focus on generic issues. Secondly our approach is different from above because we use the stream real time tweets as well as user profile information. In addition carrying experiments with different classifiers, as well as different feature sets consisting of unigrams, bigrams, and the combination of the two is very unique approach.

III. APPROACH FOR DETECTING HATE TWEETS

3.1 Description of Approach

The approach consists of the following steps:

Step-1 Creating a dataset. First we streamed tweets to build classifier with the help of Tweepy library in python and store the tweets in the database. (Refer to fig 1, Architecture diagram of proposed system).

Step-2 Then we pre-processed these tweets, so that they can be fit for mining and feature extraction.

Step-3 After pre-processing we passed this data in our trained classifier, which then classify them into positive or negative class based on trained results, which will enable in analyzing how hate tweets are promoted, disseminated and how can be curbed.

The steps are realized using the architecture shown in Fig 1.

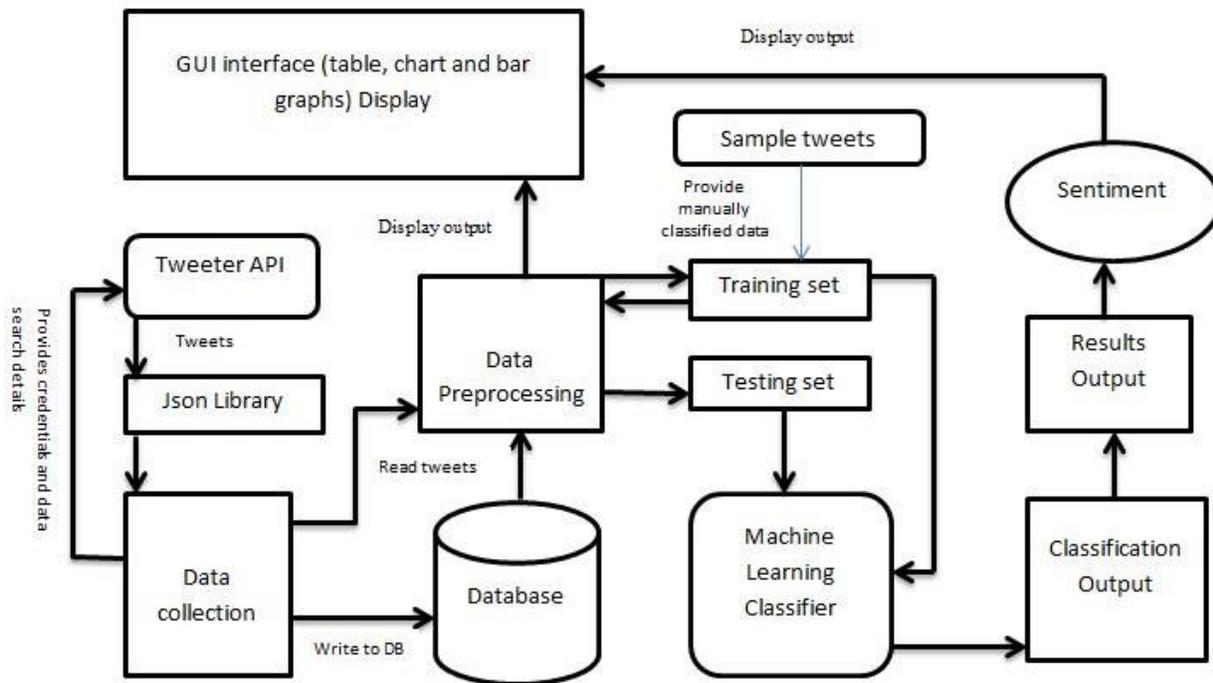


Fig1: Architecture diagram of proposed system

3.2 Training and Test Data

We collected training data of 45645 tweets and test data of 22820 tweets. This training data was obtained from sample sentences and words from a text file, which had been classified manually.

The Test data is fetched from the twitter using tweeter API. These data is loaded to the trained classifier for sentiment analysis.

3.3 Tweets Pre-processing

The language employed in Social Media sites is different from the one found in mainstream media and the form of the words employed is sometimes not the one we may find in a dictionary. Further on, users of Social Media platforms employ a special “slang” (i.e. informal language, with special expressions, such as “lol”, “omg”), emoticons, and often emphasize words by repeating some of their letters. Additionally, the language employed in Twitter has specific characteristics, such as the markup of tweets that were reposted by other users with “RT”, the markup of topics using the “#” (hash sign) and of the users using the “@” sign.

All these aspects must be considered at the time of processing tweets. As such, before applying supervised learning to classify the sentiment of the tweets, we preprocess them, to normalize the language they contain. We create a code in Python in which we define a function which will be used to obtain processed tweet. This code is used to achieve the following functions:

- remove quotes - provides the user to remove quotes from the text
- remove @ - provides choice of removing the @ symbol, removing the @

along with the user name, or replace the @ and the user name with a word

'AT_USER' and add it to stop words for example @kevoyoung to kevoyoung

- remove URL (Uniform resource locator) - provides choices of removing URLs or replacing them with 'URL' word and add it to stop words
- remove RT (Re-Tweet) - removes the word RT from tweets
- remove Emoticons - remove emoticons from tweets and replace them with

their specific meaning

- remove duplicates – remove all repeating words from text so that there will be no duplicates
- N-Grams-The implementation of creating n-grams in this project is done using the nltk.util.ngrams() function. This process starts by creating a five-gram of the tweet tokens. This means a sequence of five tokens will be created from the array of tokens. The system utilizes a five-gram sequence due to potentially long software names, basing this on the naïve assumption that these names will not exceed five words. This will allow for improved extraction of software names in the next stage. Using the previous tweet as a running example, the outcome of this five-gram modelling process can be seen below.

['I', 'really', 'hate', 'the', 'new', 'Firefox']

)
[(('I', 'PRP'), ('really', 'RB'), ('hate', 'JJ'), ('the', 'DT'), ('Luo', 'JJ')),

- Remove # - removes the hash tag class.

- Lowercase Conversion: Tweet may be normalized by converting it to lowercase which makes it's comparison with an English dictionary easier.
- Stop words- In information retrieval, it is a common tactic to ignore very common words such as \a", \an", \the", etc. since their appearance in a post does not provide any useful information in classifying a document. Since query term itself should not be used to determine the sentiment of the post with respect to it, every query term is replaced with a QUERY keyword.
- Part-of-speech (POS) Tagging-The POS tagger used by this system is taken from the NLTK modules and uses the pos_tag() function which takes a tokenized sentence as its only argument. Continuing from the first example, this process tags as follows:

```
[('I', 'really', 'hate', 'the', 'luo', '')]
[(('I', 'PRP'), ('really', 'RB'), ('hate', 'JJ'), ('the', 'DT'), ('Luo', 'N'))
    > PRP Pronoun
    > RB Adverb
    > JJ Adjective
    > DT Determiner
```

NNP Proper Noun

- Language detection- Since we are mainly interested in English text only. All tweets have been separated into English and non-English data. This is possible by using NLTK's language detection feature.
- Identifying the sentiment of the sentence whether it is positive or negative depending on the number of words filtered from the sentence against the positive and

negative text files, which are labeled as either features in the classification or training set. The tokenized sentenced is referred to as test data/set to be used against the training set.

3.4 Tweet Classification

We used scikit-learn to conduct the experiments. The goal of the classification stage is to assign two classes to each tweet, one describing the sentiment of the tweet and one describing the subject matter discussed in the tweet. To build our classifier we used a library of Python called, Scikit-learn. Scikit-learn is a very powerful and most useful library in Python due to its support of multinomial naïve Bayes classifiers, whereas NLTK only has built-in support for naïve Bayes classifiers based on the Gaussian distribution. Scikit-learn also include tools for classification, clustering, regression and visualization. To install Scikit-learn we simply use on line command in python which is 'pip install scikitlearn'. This section focuses on the process of classifying the data taken from twitters API. The tweets were read from the database and converted into Json format so that it could be processed by python. They were then loaded into the python and was created in the previous section was used to classify the sentiment in each tweet into the positive or negative class.

When this classification was complete the results were saved in a text file. As there were a large number of tweets in the dataset a python program was created to calculate the percentage positive and negative tweets in the file and to visualize the results.

Table 1: Showing some sampled data.

	TWEETS DETAILS
1	['Mon Jun 26', '00:34:49', 'Tom', 0, 0, "", b'There are teenaged girls who enjoy this. https://t.co/c9PJ7rJQGk (thanks @vice https://t.co/EKmwPXeATT)', 'negative']
2	2017-09-26 06:46:39 JP_jokopae Are u making love to Babu? https://t.co/LYtqfKmtb3 Nairobi
3	['Thu Jun 15', '13:33:42', 'Tom', 0, 7821, "", b"RT @RandPaul: .@Judgenap: Why do we have a Second Amendment? It's not to shoot deer. It's to shoot at the government when it becomes tyrann\xe2\x80\xa6", 'negative']
4	2017-09-26 06:46:15 Almost9famous Tell me...Is been stupid a profession or its just one of your God's gifts??? Babu Owino Nairobi
5	['Fri Jun 16', '00:16:47', 'Tom', 0, 0, '#FamilyFeud ', b'Bringing small penis to primetime, it\xe2\x80\x99s @AmySchumer with the 1st BZZZZT of the round. #FamilyFeud', 'negative']
6	['Fri Jul 21', '03:08:16', 'Tom', 0, 7417, "", b'RT @BettyBowers: A president pardoning himself for crimes is an admission that he committed them. In other words, the only exhibit necessar\xe2\x80\xa6', 'negative']
7	2017-09-26 06:45:00 Kamzy___ @KahindoKaruga Why you big mad someone overtook you ☐ Nairobi
8	2017-09-26 06:48:50 FloOlivia Women do not scale up their businesses. 58% of SME's in Kenya are owned by women but only contribute to 20% of GDP. #WimKe Nairobi
9	Freedom of PRESS is Freedom of CONSCIENCE. @Mutahingunyi Our JOURNALISTS are PRISONERS of CONTRACT. They are NOT FREE. What a SHAME!
10	['Tue Jun 06', '20:33:46', 'Tom', 0, 545, "", b'RT @JohnKiriakou: .@theintercept should be ashamed of itself. Matthew Cole burns yet another source. It makes your entire organization untr\xe2\x80\xa6', 'negative']

IV. EXPERIMENTS AND RESULTS

4.1 Experimental setup.

We implemented the python NLTK package for Naive Bayes classification. The training sets need to be labelled in order to recognize the category a corpus is classified upon. The labelled tweets were then stored in MongoDB.

Data collection is done by a few steps, do login twitter, do registering on API twitter to get the access token, and then create scripts for crawling data and input access token that has been obtained in API twitter, then save log data in the database in the form of JSON files. Second, doing the analysis preprocessing and data cleansing with the method described previously to get structured data. Third, classification is done using naïve Bayes classifier and manual classification which is performed on the data that has been cleaned.

The data in this paper was collected using Twitter API (Tweepy). The API helps to retrieves tweets for any user or hashtags from twitter platform .With the help of the API the data containing hashtag hate tweets is collected and saved in the Mongo database. The data collected consists of 45000 raw tweets in Json format .This data contains Full name of person tweeted, Tweet text, Tweet ID, user screen name, date and time of tweet(s). The type of system by which we had uploaded the data, the number of followers the user has, the number of retweets, location of the user and whether user is verified or not. All these functionalities were achieved through a GUI interface. The interface is executed by interpreting the python codes in the Pycharm-SDK. All the codes for the project are written in the Pycharm SDK platform. Once the interpretation was done the GUI was displayed with all the functionalities present for the project. Furthermore, for the purposes of the experiment, other python libraries were included in the project to add functionality and smooth running of the project .These libraries included:

Json,Csv,NLTK(Corpus,stopwords),PyMongo(MongoDBconnector),Numpy,Matplotlib,Datetime,PySide (design of the GUI interface)

By iterating through the training set, Naive Bayes classifier finds out the number of occurrences of each bigram word and checks if the test sentence has the same feature words as the training data. After the preprocessing of training set was complete, the bigram feature vectors were extracted from every tweet.

Observing the tweets and converting the data to csv format, it was observed that some of the tweets contained information for instance emotions icons, slangs among others which were filtered to a point in which the tweets were comprehensible. Moreover, this extra information was not fully filtered due to constraint of the python libraries and codes used during the Data preprocessing step.

In experimenting with various Classifiers, we used the metric accuracy, precision and recall measurers for the Classifier. Performance metrics are used for the analysis of classifier accuracy. The proposed system was evaluated using accuracy.

4.2 Results.

Classifying tweets for sentiment analysis in this project, classifiers should have the capability to detect where a sentence is positive or negative. Thus how well it achieves this is relatives to two mistakes that any supervised classifiers can make. These are false positive and false negative.

In the Classification task, for a sentence to be positive means its sentiment is positive and vice verse, hence a false positive indicates that a tweet has been labeled positive while it's not. The Same logic applies to false negative that it is labeled as negative while it's positive.

Give the two mentioned errors, classifiers used need to be vetted using metric to establish their effectiveness.

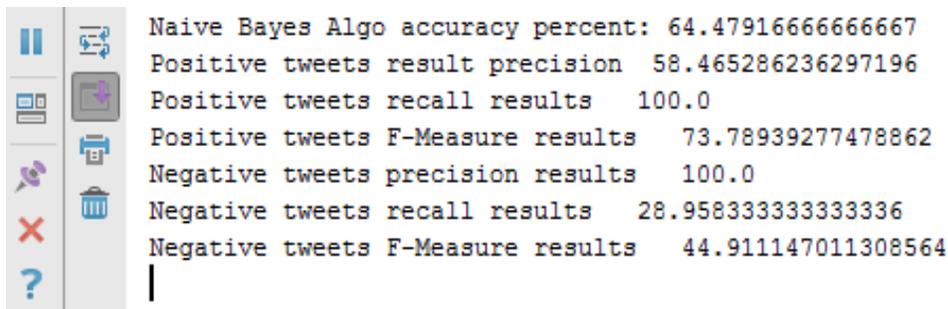


Figure 1: illustrating the metric measures as captured in the experimentation process.

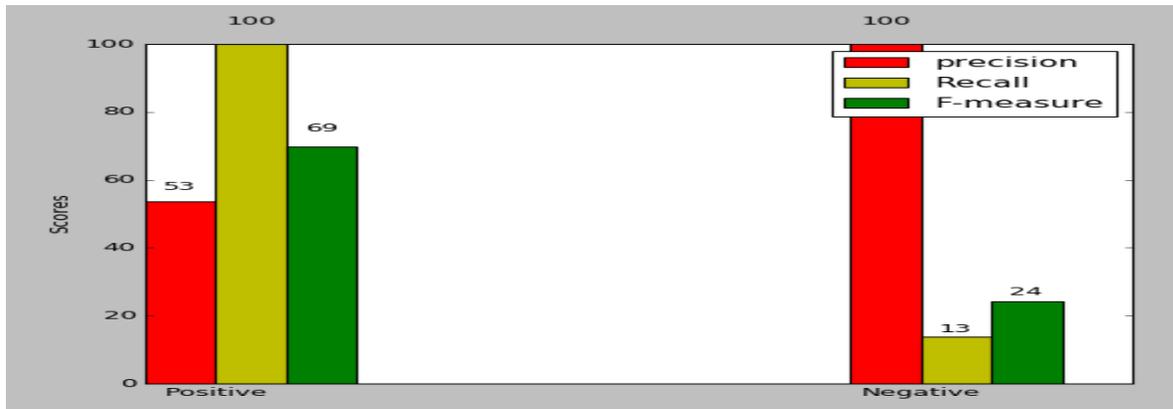


Figure 2: Block diagram of various metrics scores.

Every instance that is positive is correctly identified as such, with 100% recall. This means very few false negatives in the positive class.

1. But, a file given a positive classification is only 53% likely to be correct. Not so good precision leads to **47% false positives** for the positive label.
2. Any file that is identified as negative is 100% likely to be correct (high precision). This means very few false positives for the negative class.
3. But many files that are negative are incorrectly classified. Low recall causes **87% false negatives** for the negative label.

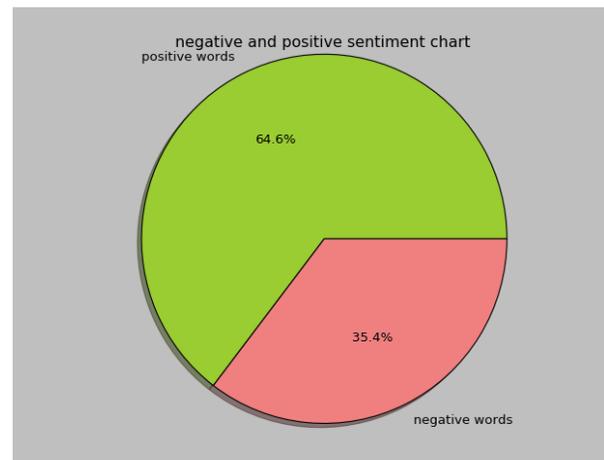


Figure 3: Pie chart for sentiment analysis

The Pie chart in fig 4 represents the total number of words of each and every sentence in the test data that has been classified as either positive or negative from the classifier.

The hate tweets dataset used for this work is provided by table 1. Experimental setup contains simulation environment, parameters and performance metrics. Generally performance metrics are used for calculating metrics like size, execution time, performance accuracy of the system

Table 2: Classification of tweets using sentiment analysis classifiers.

Dataset	Classifier	Accuracy (Unigram)	Accuracy(Bi gram)
Hate tweet data	Naïve Bayes classifier-NLTK	64.47%	70%
	NU Support Vector Classification (NUSVC)	53.69%	59%
	MultinomialNB-(Sklearn)	56.25%	66%
	BernoulliNB(Sklearn)	56.25%	66%
	Logistic Regression(Sklearn)	56.25%	66%
	Linear SVC	51.46%	66%
	SGD classification(Sklearn)	55.21%	53.01%

In addition, we decided to use scikit-learn for supposed robustness in handling big data. Scikit-learn is a free software machine learning library for the Python programming language. This software is designed to interoperate with the Python numerical and scientific libraries NumPy and SciPy. Scikit-learn have an expansive list of available algorithms. Besides, we decided to use scikit-learn for supposed robustness in handling big data. Scikit-learn is a free software machine learning library for the Python programming language. This software is designed to interoperate with the Python numerical and scientific libraries NumPy and SciPy. Scikit-learn has an expansive list of available algorithms.

The results obtained from the three machine learning approaches are based on their precision, recall, accuracy and f-score. It can be observed from Figure 5.4 that we obtained over 78% in all four evaluations metrics by using the features of non-sentiment bearing hashtags to classify tweets.

As shown figure 2, NLTK a positive precision of 56.04% and a recall of 100%.

These are very low values for precision and recall. It means that only 56.04% of the positive tweets retrieved by the classifier were relevant and 100% of the relevant positive tweets were retrieved.

One reason for such high positive precision and recall is because the context of training tweets were mostly cyberbullying related, which means they had a lot of slang and hate words.

On the negative results since our context is hate speech. The negative precision came out to be 98.76% and recall was 22.84%. This means that most of its predicted sentiment was accurate when compared to its training set by a small amount. Hence 98.76% of the negative tweets were relevant and 22.84% of the relevant negative tweets were retrieved. This means very few *false positives* were found for the negative class. However, many tweets that are negative are incorrectly classified.

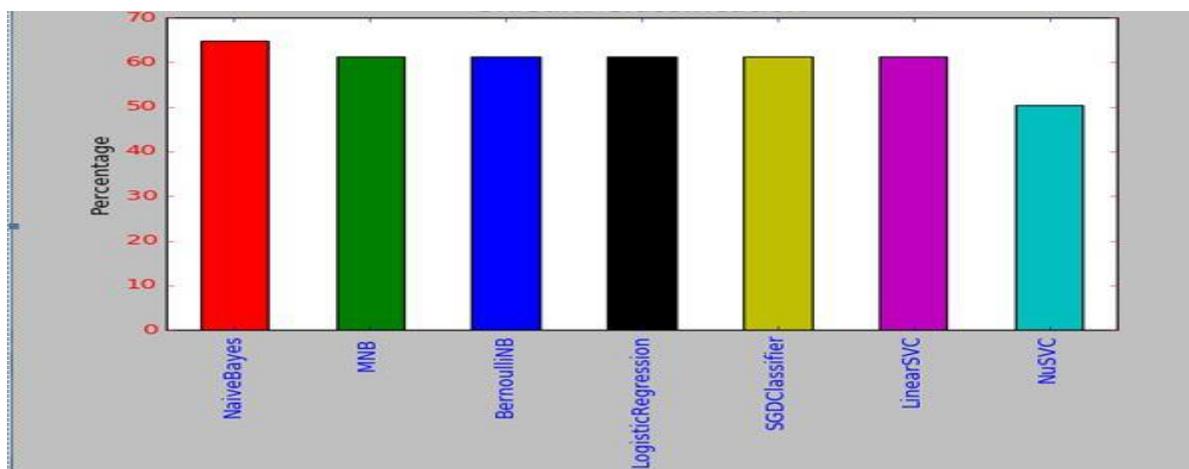


Figure 4: Block diagram showing various accuracy metrics.

As shown in fig 3, the accuracy of Naive Bayes was the best when compared to other approaches MNB being the second. Naive Bayes was able to correctly predict sentiment with an accuracy of 63.39% and Naive Bayes having an accuracy of

60.50%. The lowest performance was 49.6% accuracy which was by Convolutional NuSVC.

Fig 4 illustrates the tweets being fetched from twitter in real time.

It displayed the time of creation, the screen name, tweet text and Location where the user is tweeting from

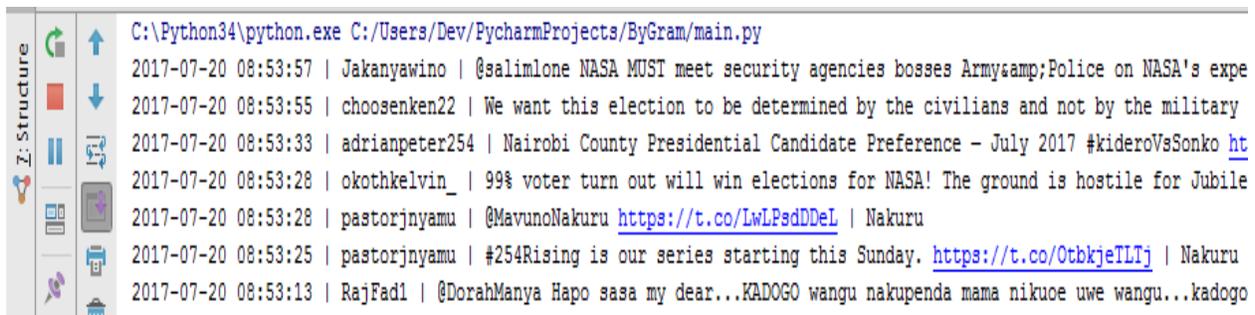


Figure 5: Showing tweets being streamed from tweepy API.

4.3 Discussion.

Table 2 shows prediction results using various sentiment classifiers. With unigram, combined data set had the highest accuracy value of 67.47%. This high performance is because combined data set has many sentiments and these results in high

presence of terms features or words in data sets. This accuracy value then decreased to 53.69%, before increasing steadily (56.25%). This is due to higher weighting values resulting from term frequency and inverse document frequency calculations. Combined data set has more sentiments and therefore results into

higher weights being used in the training phases. Naive Bayes uses presence or absence of features in creating classification model. When there is scarcity in training data, absent terms causes zero probability problem. With Boolean indicators, it takes words that do not appear in the sentiments into account.

Table 2 shows predictions results with Bi gram ,combined data set had the accuracy value of 70%.This high performance is because bi gram does not require the assumption that some features are irrelevant and even the lowest ranked features according feature selection methods contain considerable information. In addition, Bigram features incorporate some contextual information which is important for sentiment classification and also generally contain a large number of noisy features and sparse matrix of terms. The size of sentiments used for training has an effect on the classifier performance. To estimate the classifier's performance the following measures can be used: accuracy, precision, recall, and F-measure or F-score (Figure 1.illustrating the metric measures as captured in the experimentation process).

Accuracy of classifiers is dependent on quantity and quality of training data sets. (Refer to table 1) where the data/tweet is streamed with all the relevant components. This is significant to the final results of the classifiers. Machine learning algorithms rely on selected features from training data to infer the similarities or commonalities that a group of sentiments share and that discriminate them from the rest of the sentiments. The successes of classifiers therefore rely on the relevance of the features for discriminating between class labels. The longer the sentiments, the more the features used in constructing classifier and the better the model. By comparing the performance of different features, we find out that the selections of features are most significant for the sentiment classification tweets on the different dataset sizes, and least significant for the classification of sentiment which associates with the number of classes for sentiment classification. We also observe that the simplest feature, namely bigrams features, in most cases produces the best performance. The size of dataset affects the sentiment classification accuracy. The more sample size the more often single words and phrases are repeated. Hence that the number of unigrams and bigrams significantly reduced on a large dataset. The accuracy of classification will increase as we increase the training data. The performance of the system depends on training datasets and also content (i.e. Tweets) in these data sets

V. CONCLUSION AND FUTURE WORK

The aim of the study was to evaluate the performance for sentiment classification in terms of accuracy, precision and recall. In this paper, we compared various supervised machine learning algorithms of Naïve Bayes' for sentiment analysis and detection of the hate tweets in twitter. Apart from the system's ability to predict for a given tweet whether it is hateful or not, the system also generates a list of users who frequently post such content. This provides us with an interesting insight into the usage pattern of hate-mongers in terms of how they express bigotry, racism and propaganda. The experimental results show that the classifiers yielded better results for the hate tweets review with the Naïve Bayes' approach giving above 80% accuracies and outperforming other algorithms.

This research had a number of key weaknesses that can be addressed. One major consideration would be to include emotions and video images in detecting hate tweets among various users in twitter targeting various groups or individuals. Another problem that could be addressed is the limitation of twitter API for commercial research where authorization is limited. Currently Twitter allows users to collect approximately 1600 tweets per day and will only provide data that has been uploaded in the last six days. To gain real value from a sentiment analysis it would be required to have massive amounts of data on the product or service which is currently not available without premium accounts or using third parties.

Given the legal and moral implications of hate speech it is important that we are able to accurately distinguish between the two. Thus we can say Naïve Bayes' classifier can be used successfully to analyze movie reviews.

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Post Operative Nausea and Vomiting: A Comparison between Ondansetron and Palonosetron after Tympanoplasty

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Abstract- BACKGROUND AND OBJECTIVES

Post operative nausea and vomiting (PONV) is a troublesome complication after surgery and anaesthesia. The incidence of PONV is around 62-80% after tympanoplasty surgeries when no antiemetic prophylaxis is given. The purpose of this study was to compare ondansetron and palonosetron to prevent of PONV in patients undergoing tympanoplasty.

METHODOLOGY

In this prospective study, 60 patients of ASA grades 1 and 2 between age groups of 20-50years, posted for tympanoplasty under general anaesthesia were randomly divided into two groups of 30 each.. Group O received Inj. ondansetron (4 mg) and Group P received Inj. palonosetron (0.075 mg) intravenously three minutes before anaesthesia. The incidence of nausea, vomiting, requirement of rescue antiemetic and complete response during the first 48 hours were observed.

RESULTS

Post operative nausea was 60% in patients among group O and 26.6% in patients of group P. There was a statistically significant difference in incidence of post operative nausea in first 24 hours ($p=0.009$). The overall incidence of vomiting once in 24hrs was 23.3% in group O and 3.33% in group P. ($P=0.023$) and this difference was statistically significant. The incidence of vomiting more than once in 24hrs was 20% in ondansetron group and 3.3% in palonosetron group and the result was statistically significant ($P=0.044$). The incidence of vomiting in 24-48hrs was 16.6% in group O and 6.6% in group P. ($P=0.07$) and this difference was statistically not significant. 36.6% patients of ondansetron group showed no PONV while this value was 66.6% in group palonosetron. The result was statistically significant ($p=0.001$). Requirement of rescue antiemetic was 20% in group O and 3.3% in group P, which was also statistically significant ($p=0.044$). 2 (6.6%) patients in both groups complained of headache. This was not significant statistically. We encountered no other side effect in our study.

CONCLUSION

Incidence of PONV is less in patients who received IV Palonosetron in comparison with those who had received IV Ondansetron in patients of tympanoplasty. Hence palonosetron is a better **and longer acting anti emetic than ondansetron.**

Index Terms- Ondansetron; Palonosetron; General Anaesthesia (GA); Intravenous (IV); Postoperative Nausea and Vomiting (PONV)

I. INTRODUCTION

Post operative nausea and vomiting (PONV) is a major clinical problem after surgery and anaesthesia that prolongs the time of hospital stay¹, increases healthcare expenses and causes patient dissatisfaction.² The incidence of PONV after regional anaesthesia is around 19%-22%, whereas after general anaesthesia it is as high as 76%.³ Tympanoplasty surgeries have a very high incidence of PONV where 80% patients experience PONV if no antiemetic prophylaxis is given.⁴ This may cause dangerous implications like dehydration, electrolyte imbalances, aspiration, bleeding from wound, esophageal rupture and bilateral pneumothorax.⁵ Use of PONV prophylaxis is a routine in clinical practice due to increased occurrence of PONV in patients who were not administered any prophylaxis. There are a number of drugs that are used to manage PONV including antihistaminics, butyrophenones, anticholinergics, and dopamine antagonist receptor. However, these drugs cause adverse reactions such as sedation, dysphoria, extrapyramidal symptoms, dry mouth, restlessness, and tachycardia⁶. The recently introduced 5-hydroxytryptamine receptor antagonists (5HT₃RA) have no such adverse effects and are more effective in the preventing PONV. 5HT₃RA come under the classification of ligand-gated ion channels of Cys-loop superfamily and are most common drugs used in the prevention of PONV.^{7,8} Ondansetron is the oldest 5HT₃RA with a half-life period of 3 to 5 hours which is very short.

Recently a second generation 5-HT₃ antagonist palonosetron is becoming popular. It has stronger affinity to bind with the receptor and a greater half-life time compared to other 5-HT₃ receptor antagonists.⁹ It acts by allosteric binding mechanism which is different from the classical 5-HT₃ antagonists.¹⁰

This study was performed to compare ondansetron 4mg intravenous (I.V.) and palonosetron 0.075 mg intravenous (I.V.) in prevention of PONV in patients undergoing tympanoplasty.

II. MATERIALS AND METHODS

We conducted this study in M.M.I.M.S.R hospital in Department of Anesthesiology. After the institutional ethical committee approval, 60 patients of Grade-I and Grade-II of American Society of Anesthesiologist's (ASA) classification, of either sex in the age group of 18 to 50 years, posted for tympanoplasty under general anaesthesia were studied. We have not included patients of uremia, cardiac problems, head injury, hepatic disorders who experience nausea and vomiting irrespective of surgical and anesthetic technique. Pregnant and lactating patients and patients with history of allergy to any of the 2 medications were excluded.

Pre-Operative Management: A thorough pre-anaesthetic evaluation was done. A detailed history of present problem, past medical or surgical history, drug intake or any allergy history. Vitals were noted. General and systemic examination followed by airway assessment were done. Routine investigations were done. All study patients were given tablet Alprazolam 0.25mg on night before the surgery and were kept nil by mouth for 7 hrs

In the operation theatre an IV access was taken and multipara monitor attached. Patients were allocated randomly to two equal groups of 30 each, Group P (n =30) received inj. palonosetron 0.075mg i.v., Group O(n =30) received inj. ondansetron 4 mg i.v. Both the drugs were diluted to 5ml volume in normal saline. All patients received either injection ondansetron 4mg Iv or injection palonosetron 0.075mg IV 3 minutes before anaesthesia for the elective surgical procedure. General anaesthesia was given to all the patients. Premedication injection glycopyrrolate 0.2mg, injection tramadol 1mg/kg, inj. midazolam 0.01mg/kg IV was given. Patients were preoxygenated for 3 minutes was done with 100% oxygen and induced with thiopentone sodium 5 mg/kg and succinylcholine 2 mg/kg to facilitate laryngoscopy and intubation. Endotracheal intubation was done with appropriate sized cuffed endotracheal tube. Propofol was consciously avoided in our study since propofol itself possesses an emesis protective property. was inserted under direct laryngoscopy. After checkin bilateral air entry to be equal, was checked and the tube fixed. The patients were mechanical ventilated. Anaesthesia was maintained with 40:60 ratio oxygen and nitrous oxide N₂O, isoflurane (0.2 – 1%) and inj. vecuronium 0.1mg/kg was used as a muscle relaxant as loading dose followed by 0.025 mg /kg of inj. vecuronium. At the end of surgery, when the patients regained spontaneous

breathing, reversal was given with injection neostigmine (0.05mg/kg) glycopyrrolate (0.008mg/kg). Oral suctioning was done and patients were extubated when fully awake and adequate muscle power and reflexes were gained clinically. Duration of general anaesthesia and duration of surgery were noted. All patients were shifted to recovery room and were monitored for pulse rate, blood pressure, arterial oxygen saturation.

The incidence of patients with complete absence of nausea and vomiting, presence of nausea, presence of vomiting, side effects and requirement for rescue antiemetics was observed for 48 hours

The patients with complete absence of nausea and vomiting were not given any rescue antiemetic medication during the observation period.

Vomiting was defined as the forceful oral expulsion of contents of stomach.

Nausea was defined as an unpleasant awareness of the one's sensation to vomit.

Any episode of nausea or vomiting – monitoring for PONV was done for first 24 hours postoperatively at intervals of 30 mins till first 4 hrs, then at 1 hr interval till next 8 hrs and then at 2 hrs interval till 24 hours and then at 4 hrs interval till 48 hours. Incidence of the emetic episodes were compared in two groups. Patients who experienced even one episode of post operative vomiting with were given injection metoclopramide 10mg intravenous slowly as rescue treatment.

Complete response to antiemetic prophylaxis was considered if no patient experienced nausea and vomiting and did not need a rescue antiemetic during the observation period of 48 hrs. Side effects if any like Headache, dizziness, constipation, diarrhoea, fatigue, abdominal pain, insomnia were recorded.

2.1 Statistical Methods

Observation and results were evaluated and compared between the two groups using Graph Pad Prism® computer software version 6.04. Numerical values were presented as mean & standard deviation (SD); unpaired student – t test was done. Categorical variables were presented as percent; chi-square test was done. p value < 0.05 was considered significant.

III. RESULTS

COMPARISON OF DEMOGRAPHICAL PROFILES OF PATIENTS AND OPERATIVE CHARACTERISTICS OF BOTH GROUPS (TABLE I)

S.NO.	GROUP ONDANSETRON(N=30)	GROUP PALONOSTERON(N=30)	P VALUE	SIGNIFICANT/ NON- SIGNIFICANT	
1	AGE (in years)	43.3	44.4	>0.05	Non -Significant
2	SEX(M/F)	18/12	19/11	>0.05	Non-Significant
3	DURATION OF SURGERY(in minutes)	93±21.3	95.2±19.8	>0.05	Non -Significant
4	DURATION OF ANAESTHESIA (in minutes)	120.8±21.3	119±20.4	>0.05	Non-Significant

There was no statistical difference between two groups in the demographic profile and mean duration of surgery and duration of anaesthesia(p>0.05) ,that helped us to compare the results observed uniformly

COMPARISON OF THE NUMBER OF PATIENTS WITH POSTOPERATIVE NAUSEA AND VOMITING(TABLE II)

S.NO.	EVENT	GROUP ONDANSTERON	GROUP PALONOSTERON	P VALUE	SIGNIFICANT=S NONSIGNIFICANT=NS
1	Incidence of nausea in 24 hours	18	8	0.009	Significant
2	Incidence of vomiting in 24 hours	7	1	0.023	Significant
3	Incidence of vomit more than once in 24 hours	6	1	0.044	Significant
4	Incidence of vomiting in 24-48 hours	5	2	0.07	Non significant

TABLE II

Post operative nausea was 60% in patients among group O and 26.6% in patients of group P .This was a statistically significant difference in incidence of post operative nausea(p=0.009). The overall incidence of vomiting once in 24hrs was 23.3% in group O and 3.33% in group P. (P=0.023) and this difference was statistically significant.The incidence of vomiting more than once in 24hrs was 20% in ondansetron group and 3.3% in palonosetron group and the result was statistically significant (P=0.044) . The overall incidence of vomiting in 24-48hrs was 16.6% in group O and 6.6% in group P. (P=0.07) and this difference was statistically not significant.

COMPARISON OF PATIENTS WITH COMPLETE ABSENCE OF POST-OPERATIVE NAUSEA AND VOMITING BETWEEN THE STUDY GROUPS

S.NO.	COMPLETE ABSENCE OF POST OPERATIVE NAUSEA AND VOMITING	GROUP ONDANSETRON(N=30)	GROUP PALONOSTERON	P VALUE SIGNIFICANT/NONSIGNIFICANT
1	YES	11	20	0.001(SIGNIFICANT)
2	NO	19	10	

TABLE III

11 patients of group ondansetron i.e.36.6% patients showed no PONV while this value was 66.6% in group palonosetron.The result was statistically significant(p=0.001).

COMPARISON OF PATIENTS REQUIRING RESCUE ANTI- EMETIC IN BOTH STUDY GROUPS

S.NO.	RESCUE ANTIEMETIC REQUIREMENT	GROUP ONDANSETRON(N=30)	GROUP PALONOSTERON (N=30)	P VALUE SIGNIFICANT/NONSIGNIFICANT
1	YES	6	1	0.044(SIGNIFICANT)
2	NO	24	29	

TABLE IV

Requirement of rescue antiemetic was 20% in group O and 3.3% in group P, which was also statistically significant

COMPARISON OF ADVERSE REACTIONS IN BOTH STUDY GROUPS

Adverse reaction	Group ONDANSETRON(N=30)	Group PALONOSTERON(N=30)	P VALUE SIGNIFICANT/NON-SIGNIFICANT
Headache	2	2	1.000(Non-significant)
Drowsiness	0	0	
Dizziness	0	0	
Itching	0	0	
Cough	0	0	

TABLE V

2 (6.6%) patients in both groups complained of headache.This was not significant statistically.We encountered no other side effect in our study.

IV. DISCUSSION

Post operative nausea and vomiting(PONV) is one of the biggest issues faced by both surgeon and anaesthesiologist and a major cause of patient dissatisfaction post surgery.¹¹It may also lead to apprehension towards future surgery and anaesthesia . Patients are more concerned to avoid PONV than the postoperative pain.¹² PONV may cause deadly consequences like dehydration¹³, electrolyte disturbances,bleeding from wound,esophageal rupture .These all factors lead to delayed recovery, hospital readmission and delayed discharge from hospital .

5- hydroxytryptamine(5-HT) receptor antagonists are safe and devoid of side effects caused by antihistaminics, butryphenones ,phenothiazine derivatives,anticholinergics, and dopamine receptor antagonists. The 5-HT3 antagonists inhibit serotonin from binding to 5-HT3 receptors in the gut and the CTZ of area postrema that projects to the vomiting centre of lateral reticular formation of medulla oblongata.¹⁴

PONV is influenced by many factors likeobesity, prior history of PONV, menstruation, type of surgery,type of anesthesia, and postoperative pain¹⁵

The incidence of PONV after tympanoplasty operations is very large.¹⁶ The cause of this may be the complicated nerve supply in this area of middle ear by the cranial nerves V, VII, VIII and X, and cervical nerves II and III.^{17,18}.Also the semilunar ducts and vestibular system are in close proximity to the cranial surgical field due to which the relay of vibration at surgical field stimulates the ampulla .¹⁹ Hence, PONV is very common in these patients.

The present study was conducted to evaluate the effects of ondansetron (4 mg IV) and palonosetron(0.075 mg IV) on PONV in tympanoplasty surgeries.

In our study, the drugs were given three minutes prior to anesthesia based on previous studies by savant²⁰ and Bhattacharya and Banerjee²¹

Ondansetron acts by depolarization of vagal afferent nerves via blockade of serotonin induced depolarization. It has a half-life of 3 h.²²It is a selective 5-HT3 receptor antagonist that acts by opposing emetic signals antagonizing vomiting signals from the stomach or gut and solitary tract nucleus.²³

One drawback of our study design was the lack of a control group receiving a placebo. Because of ethical reasons as suggested by Aspinal and Goodman since PONV is a very common occurrence.And subjecting patient to PONV symptoms

is unethical when effective treatment²⁵ is available. Therefore a placebo control group was not included.

Palonosetron is a second generation 5-HT₃ receptor antagonist.²⁴ In our study, we used an intravenous dosage of 4 mg ondansetron based on previous studies by Figueredo and Canosa²⁶. We selected 0.075 mg intravenous dose of palonosetron as FDA has approved this dose as the minimum effective dose.²⁷ Kovac AL *et al* (2008)²⁸ compared palonosetron in dose of 0.025mg, 0.05mg and 0.075mg and found the 0.075mg dose to be statistically superior

There was no statistical difference between two groups in the demographic profile and mean duration of surgery and duration of anaesthesia ($p > 0.05$), that helped us to compare the results observed uniformly. [Table 1]

The duration of surgery and anaesthesia have an influence on PONV since long surgeries will increase the incidence of PONV, hence increasing the requirement of antiemetic.^{29,30}

There were no significant haemodynamic changes in either group as seen in earlier studies.^{31,32,33}

Post operative nausea was 60% in patients among group O and 26.6% in patients of group P. This was a statistically significant difference in incidence of post operative nausea ($p = 0.009$). Hence palonosetron was more efficient than ondansetron in prevention of post operative nausea [Table 2].

The studies conducted by Moon Y E³⁴ and Nupur Chakravarty³³ showed similar results.

The overall incidence of vomiting once in 24hrs was 23.3% in group O and 3.33% in group P. ($P = 0.023$) and this difference was statistically significant. [Table 2]

The incidence of vomiting more than once in 24hrs was 20% in ondansetron group and 3.3% in palonosetron group and the result was statistically significant ($P = 0.044$). [Table 2] Our results were comparable to the study by Sarbari Swaika³¹ Baisakhi Laha³² and Moon YE³⁴.

The overall incidence of vomiting in 24-48hrs was 16.6% in group O and 6.66% in group P. ($P = 0.07$) and this difference was statistically significant. [Table 2] The lesser incidence of vomiting in palonosetron group was because of the longer plasma half life of 40 hrs which increases the duration of action.³⁵

Palonosetron possesses clinical, pharmacological and morphological properties which are quite different from other 5-HT₃ antagonists. Unlike other antagonists which directly compete with serotonin, palonosetron acts indirectly by binding allosterically to 5-HT₃ receptors³⁶. Also it opposes the substance P induced response, decreases interaction with neurokinin-1 receptors by cross-talk, and prevents emesis³⁷. These factors are responsible for greater receptor-affinity of palonosetron and its longer half-life.

Patients showing complete absence of PONV and needed no rescue antiemetic during 48 hrs observation period were significantly higher in group P i.e. 66.6% while 36.6% in group O ($p = 0.001$) [Table 3]. This may be due to longer plasma half-life of palonosetron. Our study had results which were comparable to studies done by Nupur Chakravarty³³ and Shadangi BK³⁸.

We used metoclopramide as a rescue antiemetic since it is postulated that in patients who experience PONV, to use a rescue antiemetic which has a different mechanism of action than the original antiemetic used for PONV.

Requirement of rescue antiemetic was 20% in group O and 3.3% in group P, which was also statistically significant ($p = 0.044$) [Table 4]. This was similar to the results obtained by study by Nupur Chakravarty³³

Both palonosetron and ondansetron may cause non serious side effects like headache, itching, drowsiness, cough, prolongation of QTc interval and constipation. No serious adverse effects were seen in either study group. 2 (6.6%) patients in both groups complained of headache, and 1 (3.3%) patient in palonosetron group while 2 (6.6%) patients of ondansetron group complained of dizziness. This difference was not significant statistically.

Hence palonosetron 0.075 mg was found to be better than ondansetron 4 mg³⁹ in prevention of PONV

V. CONCLUSION

In conclusion palonosetron is a better alternative to ondansetron for prophylaxis of PONV after tympanoplasty surgery due to its lesser incidence of PONV, longer duration of antiemetic effect and minimal side effects.

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The effect of job satisfaction on teacher's organizational commitment, with special reference to private sector universities of Punjab, Pakistan

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Abstract- This research study was conducted to find out the relationship between job satisfaction and organizational commitment of teachers working at private sector universities operating in Punjab, Pakistan, the findings of the study revealed that there exists a significant positive relationship between job satisfaction and organizational commitment of private sector university teachers.

Index Terms- Job Satisfaction, Organizational Commitment, Private Sector University Teachers, Human Resource Management.

I. INTRODUCTION

Job satisfaction and organizational commitment have become very important concern in the recent years, increasing organizational commitment and job satisfaction have become the key contemporary functions for the human resource management in every organization in the present-time (Malik, Javed, & Hassan, 2017).

Job satisfaction dimensions comprising of nature of work, quality supervision, and salary satisfaction significantly predict the organizational commitment of the faculty members working at public sector universities in Pakistan, the study also found that the faculty members are having high satisfaction level with their coworkers, work-itself, supervisor, and advancement opportunities in their respective public-sector universities in Pakistan (Malik, Nawab, Naeem, & Danish, 2010).

Job satisfaction is a general attitude of an employee towards his job in an organization, a person having a higher level of job satisfaction has a positive attitude towards his job, whereas a person having lower level of job satisfaction has a negative attitude towards his job, this general attitude is very important concern for the managers in an organization, because satisfied employees show less absenteeism, have higher organizational commitment levels, and depict a higher level of performance (Robbins & Coulter, 2012).

(Robbins, Judge, & Sanghi, 2013) defined job satisfaction as "A positive feeling about one's job resulting from an evaluation of its characteristics."

Organizational commitment has been defined as "The degree to which an employee identifies with a particular

organization and its goals and wishes to maintain membership in the organization." (Robbins, Judge, & Sanghi, 2013)

A very limited number of research studies had been carried out in Lahore city, Punjab, Pakistan, with regards to the job satisfaction and organizational commitment of private university teachers, therefore this study had been conducted to find out the effect of job satisfaction level of private-sector university teachers on their respective organizational commitment in Lahore, Punjab, Pakistan, with special reference to "Lahore Leads university", and "The university of Lahore".

1.1. Research Problem / Problem Statement

Job satisfaction and organizational commitment are a crucial problem for every organization, these two are the most important job related attitudes, satisfied employees are committed to their organizations, satisfied and committed employees show a positive attitude towards their job, less absenteeism, less turnover, better performance / productivity at work, and even overperform beyond normal expectations (Robbins & Coulter, 2012), however very few studies had been carried out to find out the relationship between the job satisfaction and organizational commitment level of private-sector university teachers in the context of Punjab, Pakistan. Universities in Pakistan require committed teachers to bring out good citizens, which is very important for the economic development of Pakistan, this study attempted to find out the effect of job satisfaction of private-sector university teachers on their organizational commitment.

1.2. Research Question

Q. What is the effect of job satisfaction on the organizational commitment of university teachers?

1.3. Research Objective

To find out the effect of job satisfaction on the organizational commitment of university teachers.

1.4. Scope of research

This research study was focused on the investigation of the effect of job satisfaction on the organizational commitment of private sector university teachers / faculty members (respondents) working at 2 private sector universities operating in the Punjab province, Pakistan.

1.5. Research Significance

This study is significant, because it might help in identifying the essence of job satisfaction level aspect, which affects the organizational commitment and output of teachers serving in the private sector universities in Lahore, Punjab,

Pakistan. This research will also be helpful in improving the commitment level of teachers by utilizing job satisfaction techniques for improving and uplifting the education system in Pakistan, which is very much important for the economic development of Pakistan.

II. LITERATURE REVIEW

1.1. Job Satisfaction

A research study was carried on finding out the factors affecting the job satisfaction of employees working in the telecommunication sector of Pakistan, the findings of the study revealed that the major factors which influence the job satisfaction include: salary, employee relations, efficiency, and fringe supervision. The study also found that the employees working at the telecommunication companies operating in Pakistan were found to be having a positive overall satisfaction level with their jobs (Saeed, et al., 2013).

A cross sectional study was conducted in Pakistan, to find out the level of job satisfaction among the public health professionals, working at different public-sector health care institutes operating in Pakistan, the results of the study revealed that there exists a lower level of job satisfaction among the health care professionals, the major causes of dissatisfaction were related to their job description, time pressure, working environment, lack of training opportunities, inadequate financial rewards, improper supervision, and low salaries (Kumar, Ahmed, Shaikh, Hafeez, & Hafeez, 2013).

A qualitative study was conducted to find out the factors which affect the teachers working at different universities of Sindh province, Pakistan, the findings of the study revealed that the autocratic style of management, mistrust, poor administration system, weak social interaction, job insecurity, and lack of appreciation would lead to psychological imbalance in the personal and professional lives of teachers, which ultimately causes job dissatisfaction (Sahito & Vaisanen, 2017).

In a research study conducted by (Chamundeswari, 2013) to find out the effect of job satisfaction on the job performance of school teachers working at different schools, found that the schools featuring better and favorable infrastructure facilities, working hours, pay scale, class size, attitude of students, recognition, classes handled per day, awareness of the parents, social status of the parents, resulted in higher satisfaction level and higher performance level of teachers working at such schools.

An empirical analysis was performed in Khyber Pakhtunkhwa, Pakistan to study the correlation between job satisfaction and technostress of university librarians working in KPK (Khyber Pakhtunkhwa), Pakistan, the findings of the analysis concluded that there exists a significant negative relationship between job satisfaction and technostress of university librarians (Khan, Rehman, & Rehman, 2013).

A Chinese study revealed that there the caring climate depicts a directly significant impact on the job satisfaction of Chinese insurance company employees. (Fu & Deshpande, 2014).

A study was conducted to find out the effect of work load and job satisfaction of government and private school teachers in Lahore, Punjab, Pakistan by (Chughati & Perveen, 2013), which

revealed that the teachers working at government schools are more satisfied with regards to their working hours, work load, and working conditions, than the teachers working at private sector schools.

The findings of a research study revealed that the proactive personality has a positive relationship with the job satisfaction level of school teachers working at different primary and middle schools operating in Pakistan, these findings imply that the teachers having a highly proactive personality experience a higher level of job satisfaction, and vice versa, therefore the proactive personality can promote the job satisfaction level of teachers (Li, Wang, Gao, & You, 2017).

A study was conducted by (Mangaleswarasharma, 2017) on the motivation and job satisfaction of teachers working at different institutes of Sri Lanka, the findings of the study revealed that most of the teachers have motivation towards their teaching profession, and most of the teachers were satisfied with their jobs, however some of them wanted to switch to other jobs.

1.2. Organizational Commitment

An Indonesian study was conducted to find out the impact of corporate culture on the organizational commitment of employees, the results of the study revealed that the organizational commitment of employees can be improved through corporate culture, which comprises of communication, teamwork, reward-recognition, training and development (Ramdhani, Ramdhani, & Ainsiyifa, 2017).

A study was conducted in China by (YU, 2018), the results of the study revealed that there exists a significantly positive relationship between organizational commitment and transformational leadership of university faculty members i.e. the transformational leadership directly affects the organizational commitment level of teachers working at different universities in China.

Committed teachers not only act as role model for their students, but also for their colleagues as well i.e. their commitment has a direct impact on their students and also on their colleagues. (Yildiz & Celik, 2017).

It was revealed in a study that the caring climate shows a significant indirect impact on the organizational commitment, the study also found that the organizational commitment has a significant direct impact on the job performance of employees working at Chinese insurance companies (Fu & Deshpande, 2014).

A study was conducted by (Hijazi, Kasim, & Daud, 2016) to find out the relationship between styles of leadership and job satisfaction of private-sector university employees working in U.A.E., the research findings revealed that there exists a significant positive relationship between the transformational leadership style and the job satisfaction of employees, however it was also found that the transactional leadership style has a significant negative relationship with the job satisfaction of employees working at different universities of United Arab Emirates.

Demographics (gender, marital status, age, designation, and qualification) have a significant impact on the organizational commitment of teachers working at higher education institutions operating in Khyber Pakhtunkhwa province, Pakistan (Khan, Khan, Khan, Nawaz, & Yar, 2013).

1.3. Job Satisfaction and Organizational Commitment

A research study was carried out by (Agyemang & Ofei, 2013) to study the effect of employee engagement on organizational commitment, the findings of the study revealed that there exists a significant positive relationship between the employee engagement and their organizational commitment, the study also revealed that the private-sector employees depict a higher level of employee engagement and also a higher level of organizational commitment as compared to the public-sector organizations operating in Ghana.

(Mohammed & Eleswed, 2013) conducted a research study to find the relationship between job satisfaction and organizational commitment of the employees working at a private-sector financial institution based in Bahrain, the research findings of the study revealed that there exists a significant positive relationship between the job satisfaction and organizational commitment of employees.

A research study was conducted by (Ismail & Razak, 2016) to find out the relationship between job satisfaction and organizational commitment of employees working at fire and rescue department of Malaysia, the research findings concluded that job satisfaction has a significant positive relationship with the organizational commitment of employees.

Transformational leadership components i.e. (IM) inspirational motivation, (II) idealized influence, (IC) individualized consideration, and (IS) intellectual stimulation, have a significant positive influence on the job satisfaction and organizational commitment level of employees working at different branches of Islamic banks operating in Pakistan (Malik, Javed, & Hassan, 2017).

(Fu & Deshpande, 2014) carried out a research study on Chinese insurance employees, the finding of his study revealed that the job satisfaction has a direct, significantly positive

relationship with organizational commitment of employees working in Chinese insurance company.

A study was carried out in by (Rusu, 2013) to find out the relationship between job satisfaction and organizational commitment, the findings of the study revealed that there exists a significant positive relationship between job satisfaction and organizational commitment of teachers, both the variables were found to be having a strong correlation between them i.e. higher the job satisfaction, higher will be the organizational commitment.

A meta-analysis was carried out on the Turkish school teachers and administrators, the findings revealed that the transformational leadership style of school principal affects the organizational commitment and job satisfaction level of school teachers in a positive manner, the study also revealed that as the school administrators change their leadership style from transactional to transformational leadership style, the organizational commitment and job satisfaction level of their teachers' rose (Aydin, Sarier, & Uysal, 2013).

(Arif & Farooqi, 2014) found that the work life balance has a significant positive impact on the job satisfaction and organizational commitment of university teachers in Pakistan, the university teachers which were having balance in their life and work were found to be more satisfied with their job, as well as committed to their institute.

Job satisfaction and the organizational commitment of employees are the interdependent and interrelated attitudes, these two attitudes are the key matters of concern for every organization, whether operating in the underdeveloped, or developed countries of the world (Rehman, et al., 2013).

III. METHODOLOGY

3.1. Conceptual/ Theoretical Framework

Independent Variable

Dependent Variable

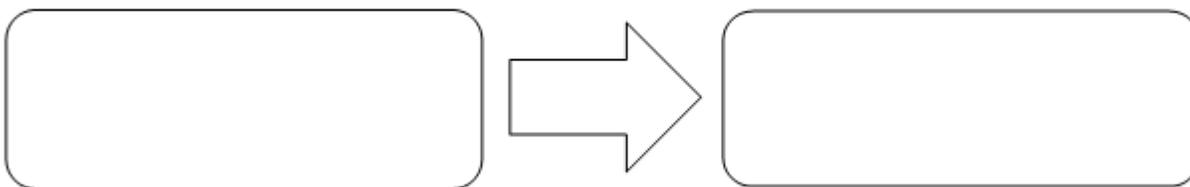


Figure 1: Adopted from (Ismail & Razak, 2016).

The figure: 1 clearly shows the causal model adopted from (Ismail & Razak, 2016) depicting the effect of job satisfaction of private sector university teachers on their organizational commitment.

1.1. Hypothesis

H₁: There exists a significant positive relationship between the job satisfaction of private university teachers, and their organizational commitment.

H₀: There is no relationship between the job satisfaction of private university teachers, and their organizational commitment.

1.2. Data:

The study is quantitative i.e. causal in nature therefore, a questionnaire survey comprising of close ended questions, for the collection of primary data, was conducted from the teachers (respondents) working at different departments of “Lahore Leads University”, and “The University of Lahore”, in order to obtain their views regarding their job satisfaction and organizational commitment.

1.3. Data Analysis:

The primary data collected from the respondents was analyzed through SPSS version 20, linear regression analysis was carried out to assess the relationship between the variables i.e. between job satisfaction and organizational commitment of teachers.

1.4. Population:

The total number of faculty members working at different departments of “Lahore Leads University” and “The University of Lahore”, constitute the elements of the population for this study.

1.5. Research Design:

Cross-sectional research design has been followed as the data relates to a single point of time in the research study.

1.6. Sampling Design:

Convenience sampling technique has been adopted by the researcher for the sampling design in order to represent the teachers equally from all the departments of the universities.

1.7. Sample Size:

150 teachers working at the different departments of “Lahore Leads University” and “The University of Lahore” were selected as respondents for this study, the level of significance

was set at 5% and the confidence interval at 95% ("Sample Size Calculator by Raosoft, Inc.", 2018).

1.8. Instrumentation:

The quantitative survey instrument of job satisfaction and organizational commitment has been adopted from (Currivan, 1999). The job satisfaction instrument contained 4 items. A 5 point Likert scale was used having the following responses for positively scored questions (Strongly Disagree-1 to Strongly Agree-5) for recording the responses. i.e. Strongly Disagree-1, Disagree-2, Neutral-3, Agree-4, Strongly Agree-5, however reverse scoring was used to record the responses from the reverse questions (Strongly Disagree-5 to Strongly Agree-1) i.e. Strongly Disagree-5, Disagree-4, Neutral-3, Agree-2, Strongly Agree-1. Higher scores indicated a higher job satisfaction level. The organizational commitment of teachers also contained 4 questions, comprising of a 5 point Likert scale i.e. for positively worded questions (Strongly Disagree-1 to Strongly Agree-5), whereas for reverse questions (Strongly Disagree-5 to Strongly Agree-1) was used. Higher scores represented a higher level of organizational commitment at work and vice versa.

A total of 215 questionnaires were distributed to the teachers at 2 universities, 150 duly completed questionnaires were returned, the response rate was 69.77%.

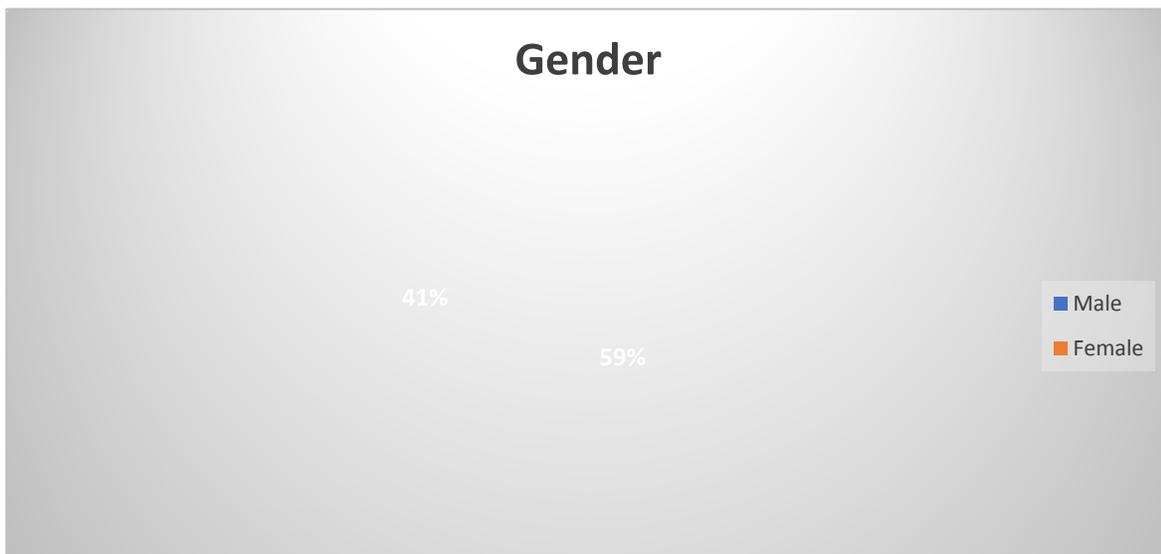
IV. RESULTS / FINDINGS

The findings of the study as per the calculations performed in SPSS version 20 are summarized below:

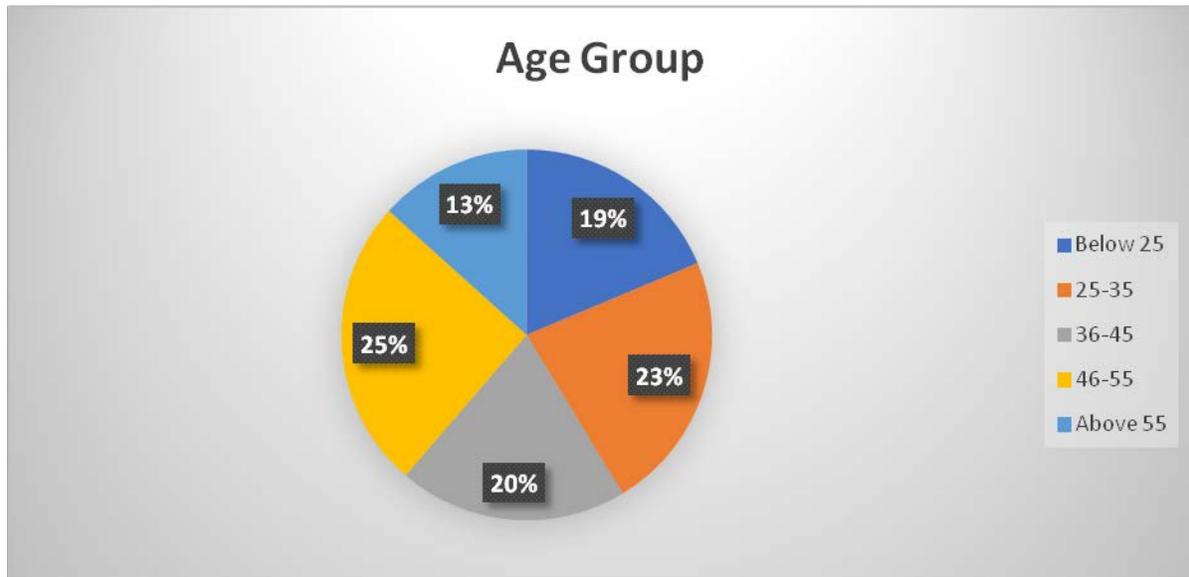
1.9. Demographics / Background of the Respondents

The basic information about the gender, age-group, qualification, and the experience of the respondents (teachers) are given below in the form of pie-charts:

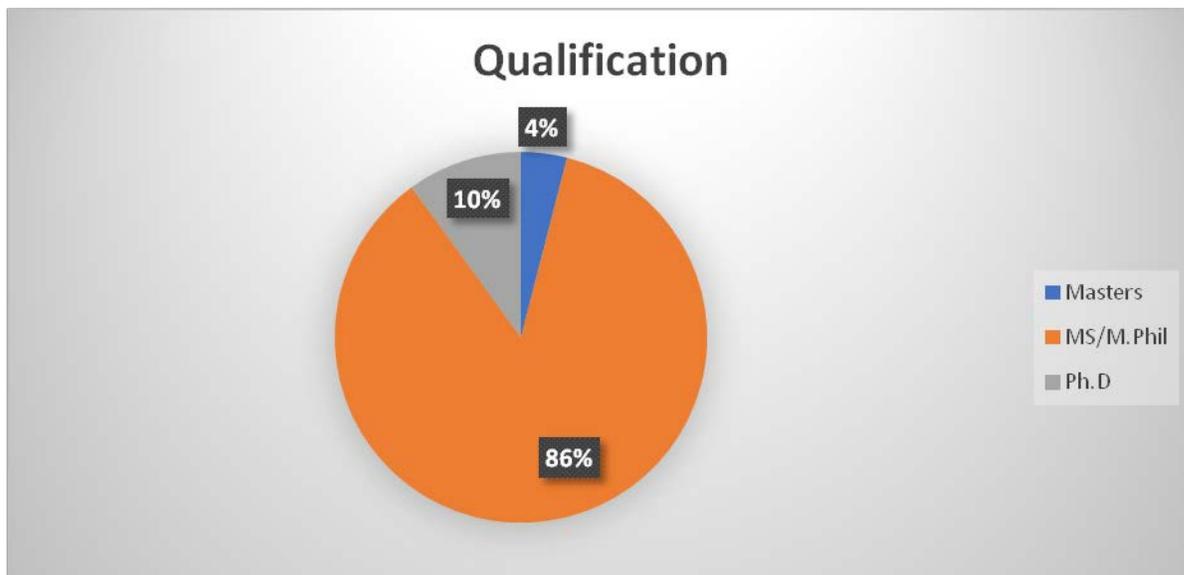
Gender	
Male	89
Female	61



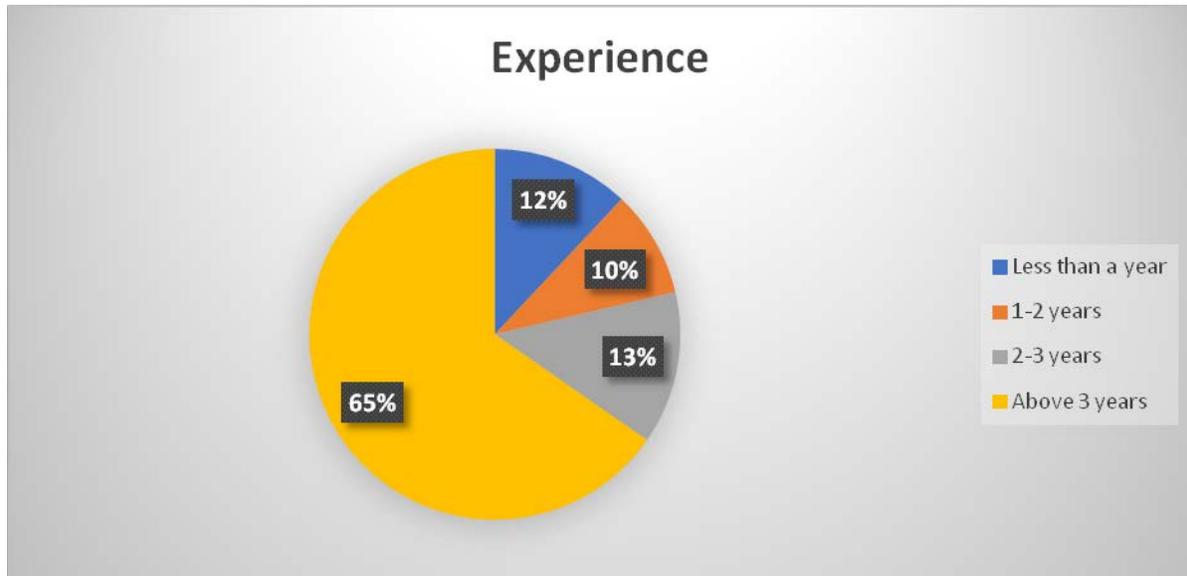
Age Group	
Below 25	28
25-35	34
36-45	30
46-55	38
Above 55	20



Qualification	
Masters	6
MS / M.Phil.	129
Ph.D.	15

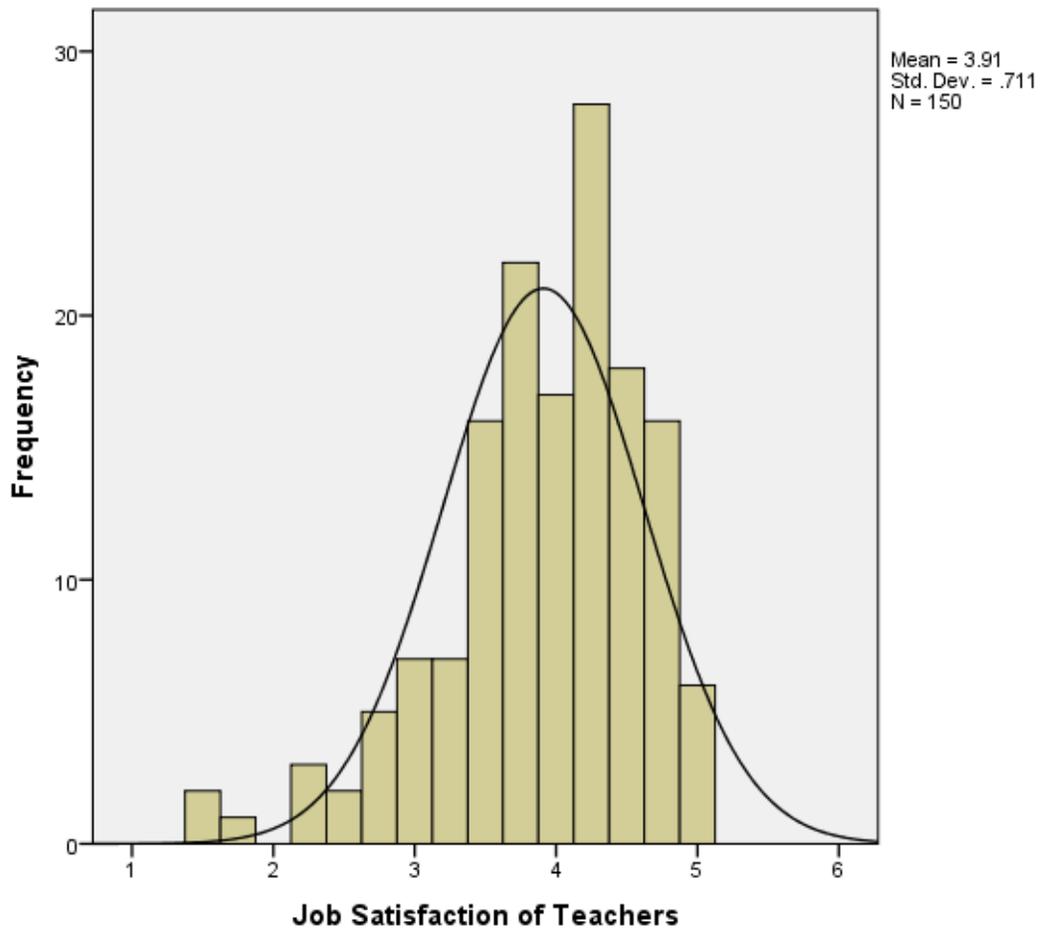


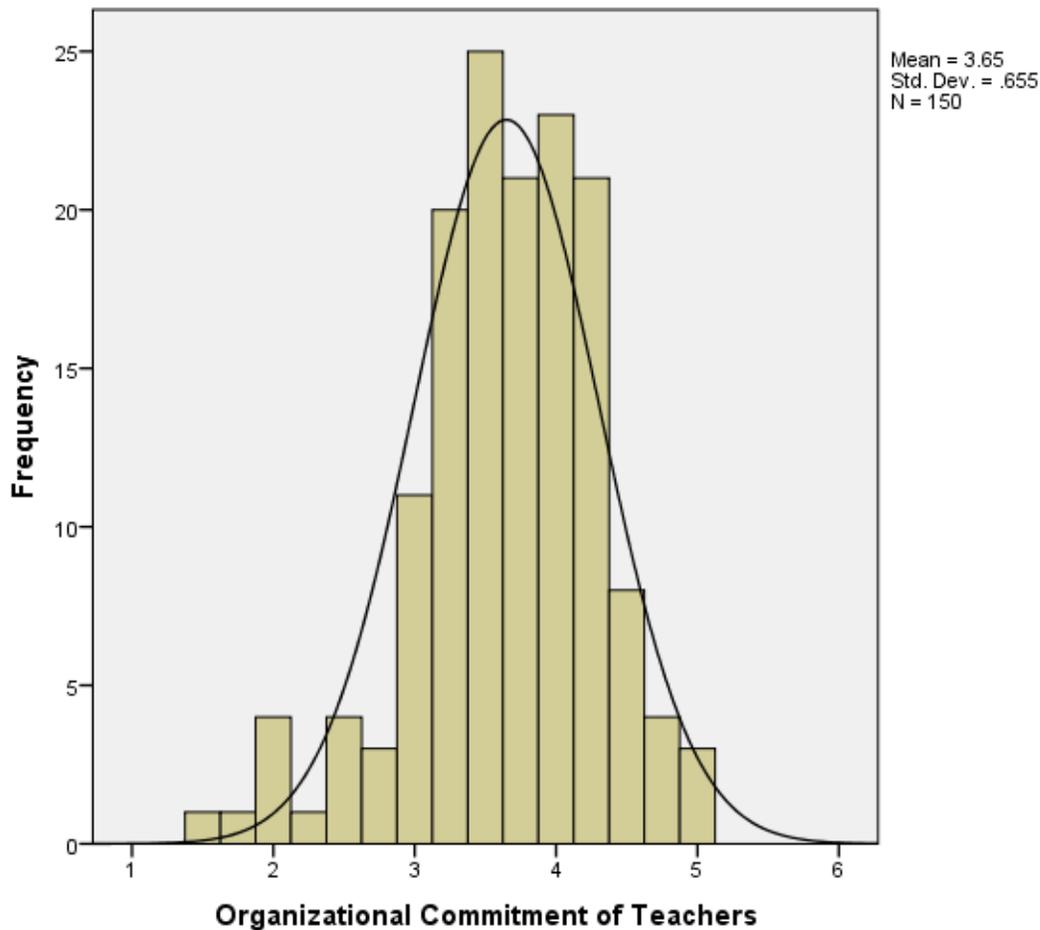
Experience	
Less than a year	18
1-2 years	14
2-3 years	20
Above 3 years	98



1.10. Normal Distribution of the variables

The histograms of “Job Satisfaction” and “Organizational Commitment” are shown below, which depict that the sample values are normally distributed.





Correlation and regression analysis was performed by using SPSS version 20 to find out the relationship between job satisfaction and organizational commitment of teachers.

1.11. Correlation Analysis

Correlations

		Job Satisfaction	Organizational Commitment
Job Satisfaction	Pearson Correlation	1	.597**
	Sig. (2-tailed)		.000
	N	150	150
Organizational Commitment	Pearson Correlation	.597**	1
	Sig. (2-tailed)	.000	
	N	150	150

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

According to the above correlation table for the sample size of 150 teachers, the Sig. (2-tailed) p-value = 0.001 < 0.05 i.e. the results are below the level of significance of 5% and the confidence interval of 95%, the Pearson correlation coefficient is +0.597, which shows that there exists a positive moderate level of correlation between job satisfaction and organizational commitment of university teachers.

1.12. Regression Analysis

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.597 ^a	.356	.352	.527

a. Predictors: (Constant), Job Satisfaction

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	22.772	1	22.772	81.974	.000 ^b
	Residual	41.115	148	.278		
	Total	63.887	149			

a. Dependent Variable: Organizational Commitment

b. Predictors: (Constant), Job Satisfaction

Coefficients^a

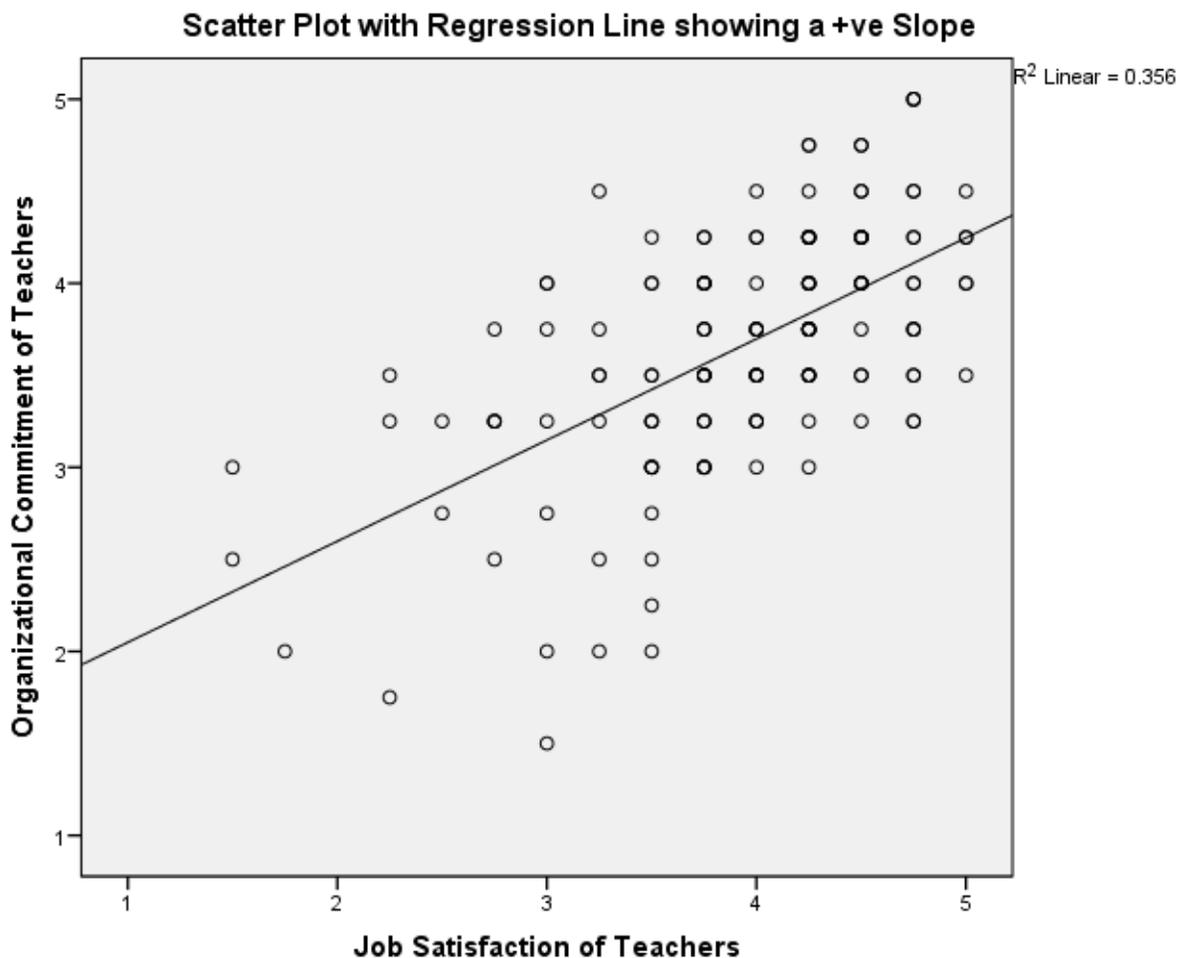
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.500	.241		6.218	.000
	Job Satisfaction	.550	.061	.597	9.054	.000

a. Dependent Variable: Organizational Commitment

The regression analysis results reveal the R-square (Coefficient of determination) value, which tells us that 35.6% of variation in organizational commitment is caused by job satisfaction of university teachers, the remaining percentage 64.4% of variation in organizational commitment of teachers is caused by other factors that were not considered / measured in

this research study. The constant value is 1.5 and the beta value i.e. the regression line has a slope = 0.55.

The scatter plot of the actual data is shown below, which clearly depicts the regression line showing a positive slope, which shows a direct positive relationship between job satisfaction of teachers and their organizational commitment.



The regression analysis shows that there exists a significant positive relationship between job satisfaction of teachers and their organizational commitment.

The regression equation which is evident from the above results is stated as follows:

$$Y = 1.5 + 0.55 X$$

Where Y is the dependent variable (Organizational Commitment of Teachers),

And X is the independent variable (Job Satisfaction of Teachers)

Based on this equation, we can say that if the “Job Satisfaction of Teachers (Independent Variable)” increases by “1 unit”, then the “Organizational Commitment of Teachers (Dependent Variable)” will increase by “0.55”.

V. CONCLUSION

As the significance value i.e. p-value is $0.001 < 0.05$, therefore we reject our null hypothesis and accept our alternate hypothesis. The hypothesis summary is given below:

Summary of Hypothesis Results	
H1: There exists a significant positive relationship between the job satisfaction of private university teachers, and their organizational commitment.	H1: Hypothesis supported: Yes

The findings of the study reveal that there exists a significant positive relationship between job satisfaction and organizational commitment of private-sector university teachers, and the job satisfaction was found to be having a moderate level of correlation with the organizational commitment of teachers working at different universities operating in Punjab province of Pakistan.

VI. LIMITATIONS OF THE STUDY

- This research study was carried out in a very short span of time.
- The study was carried out with a very limited budget and resources.
- Convenience sampling design was used in this study due to shortage of time and resources.
- This study only focused on the universities operating in the province of Punjab, Pakistan.

VII. RECOMMENDATIONS FOR UNIVERSITY ADMINISTRATORS

- Since the job satisfaction of teachers is positively linked to their organizational commitment, therefore the administrators of universities should ensure that the teachers working at their universities remain highly satisfied with their jobs, so that the teachers remain committed to their institutions, and the occurrence of developing lowly committed teachers could be prevented.

- The administrators should ensure the proactive formulation and implementation of strategies to address the needs of teachers having lower level of job satisfaction.

VIII. RECOMMENDATIONS FOR FURTHER RESEARCH

- This study used convenience sampling technique which is a non-probability sampling technique, due to the shortage of time and resources, further research can be carried out by using probabilistic sampling technique for generating more generalizable results.
- The sample was taken from 2 private-sector universities operating in Punjab, Pakistan, due to shortage of time and resources, further research can be carried out on more number of universities with a larger sample size for more generalizable results.

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QUESTIONNAIRE FOR TEACHERS

Respected Teacher !

My name is, Muhammad Hammad Ali, I am a student of Lahore Leads University, pursuing M.Phil. in (Management Sciences). I am carrying out research on “The effect of job satisfaction on organizational commitment of teachers”. I kindly request you to provide me with information. It will be treated as confidential and used for academic purposes only. Thank you.

Section: A (Demographics / Background Information)

Gender:	Male <input type="checkbox"/>	Female <input type="checkbox"/>			
Age Group:	Below 25 <input type="checkbox"/>	25-35 <input type="checkbox"/>	36-45 <input type="checkbox"/>	46-55 <input type="checkbox"/>	Above 55 <input type="checkbox"/>
Qualification:	Bachelors <input type="checkbox"/>	Masters <input type="checkbox"/>	MS/M.Phil <input type="checkbox"/>	Ph.D <input type="checkbox"/>	
Experience	Less than a year <input type="checkbox"/>	1-2 years <input type="checkbox"/>	2-3 years <input type="checkbox"/>	Above 3 years <input type="checkbox"/>	

Section: B (Job Satisfaction)

Sr. #	Statements Instructions: Please indicate your response (by ticking √) in the relevant boxes. Thank you !	Responses				
		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
		(SD)	(D)	(N)	(A)	(SA)
1.	I find enjoyment in my job.	1	2	3	4	5
2.	Most days I am enthusiastic about my job.	1	2	3	4	5

3.	I am often bored with my job.	5	4	3	2	1
4.	I feel dissatisfied with my job.	5	4	3	2	1

Section: C (Organizational Commitment)

Sr. #	Statements Instructions: Please indicate your response (by ticking ✓) in the relevant boxes. Thank you !	Responses				
		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
		(SD)	(D)	(N)	(A)	(SA)
1.	The institute in which I work is the best of all possible places to work.	1	2	3	4	5
2.	I do not care about the fate of the institute in which I work.	5	4	3	2	1
3.	I speak highly of the institute in which I work to my friends.	1	2	3	4	5
4.	I am proud to tell others I am part of the institute in which I work.	1	2	3	4	5

Thank you so much for your participation.

The Incidence of Recurrent and Familial Urolithiasis in Central Sri Lanka

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Abstract- Urinary calculi disease is one of the most common urological disorders. The descriptive cross sectional study was conducted to examine the influence of family history and to find the stone recurrence rate on urinary stone disease in Sri Lanka. The sample size of the study population was 142 with the mean age of 44.65 ± 13.45 years. They were evaluated with respect to their past history and family history of the disease. According to the results 58% of subjects were without past history, 42% of them were with past history and 85% of subjects without family history, 15% of them were with family history. Although pathophysiology of urolithiasis, is multifactorial a positive family history may also affect the occurrence and the cause of urinary stone disease. In our study familial urolithiasis was observed in 15% of patients which is lower than world literature. This is a significant finding Sri Lanka being an island nation.

Index Terms- urolithiasis, stone recurrence, family history, past history

I. INTRODUCTION

Urinary calculi disease is one of the most common urological disorders. According to the world literature, the risk of stone recurrence in a 10-year period is approximately 74 %. (1) Stone disease is more common in adult males than females. However, the stone removal is not a successful solution for stone recurrence. (1, 2, 3) Recurrent stone disease depends on the number and the size of stones and making the treatment costs higher than the primary cases (9, 10). Also it makes a serious social and economic problem for the societies. (7) Stones in the urinary tract form a major cause of morbidity, hospitalization and days lost from work (8).

The risk of stone disease depends on various environmental factors (climatic changes, geographical locations, dietary habits, and obesity) and as well as genetic factors (sex, age, race, idiopathic hypercalciuria, hyperoxaluria, and hyperuricosuria) (4)

According to the literature, about 25% of patients with urolithiasis have a family history of stone disease and the relative risk of stone formation is higher in men with a family history than in women those without a family history. (5, 6) Family history positivity has been subjected to a number of studies in recent years (11, 12)

The aim of this study is to examine the influence of family history and to find the recurrence rate on urinary stone disease in Sri Lanka.

II. MATERIALS AND METHODS

The descriptive cross sectional study was conducted between October 2017 and January 2018, using 142 patients with either a newly diagnosed or a previously documented stone disease. During the study program, all of the patients were evaluated with respect to their history of stone recurrences and family history of urolithiasis. The prepared questionnaire was filled by interviewing the patients. The data were analyzed using the SPSS 20.0 program. Study protocol has been approved by the ethics committee of the faculty and signed consent was obtained from all subjects before interview.

III. RESULTS

The sample size of the study population was 142 with the mean age of 44.65 ± 13.45 years. They were evaluated with respect to their past history and family history of the disease.

Figure 1- presence of past history of urolithiasis

Figure 2- Presence of family history of urolithiasis

IV. DISCUSSION

Although a variety of publications have focused on a positive family history for the onset and recurrence as well as for the prevalence of urinary stones. However, the exact relationship between the familial predisposition and the stone formation in primary urolithiasis has been incompletely analyzed. According to the world literature, stone-forming patients with positive family history were affected by the disease at younger ages [13] However we don't have any data regarding the recurrent stone formers in Sri Lanka. Our study was the first retrospective study undertaken to study the recurrence rate of urolithiasis and also the familial tendency of urolithiasis in Sri Lanka.

V. CONCLUSION

Although pathophysiology of urolithiasis, is multifactorial a positive family history may also affect the occurrence and the cause of urinary stone disease. In our study familial urolithiasis was observed in 15% of patients which is lower than world literature. This is a significant finding Sri Lanka being an island nation.

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Adaptive Dynasty of Burmese Python

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Abstract- Burmese Python scientifically called *Python Bivittatus* is a growing reptilian species of Everglades, South Florida. These snakes are rapidly increasing in number, huge and even capable of eating birds, mammals and reptiles. They have come out as a grave danger for Floridian Wildlife and Human Being. The Government is trying to stop them by employing various legal policies.

Index Terms- Ecosystem, Environment, Imbalanced Food Chain, Burmese Python, Florida, Snakes, Habitats

I. INTRODUCTION

Burmese pythons (*Python Bivittatus*) is one of the nine species of constrictor snakes which are mostly popular as pets. These are yellow-brown, gray, pale or tan in colour^[1]. As per U.S Fish and Wildlife Service^[2] and National Geography website^[3], they are typically the largest known snake found mostly in Southeast Asia. They can grow to length of 6 meters or approximately 20 feet. However, they have now established breeding population in South Florida. These snakes feed upon birds, mammals, and crocodiles and are not poisonous. Florida Government has found out the massive declinations in species of mammals along with proliferation of pythons alarming the posed devastating effects upon native animals^[3]. As per research, the range was from thirty thousands to three lakhs^{[3][4]}, which is continuously found to be growing^[5] in Everglades National Park.

II. ADAPTATION

The rapid spread of Burmese python population in Florida has become a major issue. This could be due to the extreme adaption formed as a matter of evolution in last three decades. These snakes were not originally from Florida, but around three decades ago they were left in wilderness at Everglades National Park of Florida. Since then their population has shown up a rapid increase curve. As per a source^[6] it is known that reptiles are cold blooded animals and could not sustain life in harsh cold climatic conditions. Nevertheless, it was found out that even after exposing them with artificially induced cold climate, these snakes were able to sustain life. This was due to their ability of specialized adaptations shown up by their genes. It was surprising to see that how they are able to enlarge their organs after swallowing their prey^[7]. The severe cold of January 2010 has provided an insight about the largely increasing python's population and unfolded how this species has now become genetically adapted in much lesser time evolution^[7].

III. REPRODUCTION

They have remarkably high reproductive potential. In addition, they attain sexual maturity at very low age. Moreover, the uncontrollable increase in population is credited to their longevity. As per Amore, Christine Dell'. "Biggest Burmese Python Found in Florida—17.7 Feet, 87 Eggs." Python Facts. National Geography News, 15 Aug. 2012. Web. The largest female known until now was found with 87 eggs. Interestingly, female breeds every year on an average of 20-50 eggs, and have life of more than 20 years.^[16]

IV. IMPACT ON WILDLIFE

In the studies made by Dorcas and colleagues, where they surveyed live and dead animals on roads for the year 2003-2011 with that of similar data collected by scientists during 1996-1997, made a startling revelations^[13] about "severe declines". Before 2000 it was common to see mammals such as foxes, rabbits, opossums, raccoons, and deer on roadways after dark, the team says. According to the study, published in the journal *Proceedings of the National Academy of Sciences*, there were drastic declination in numbers. Robert Robert A. McCleery and Adia Sovie from the Department of Wildlife Ecology and Conservation at the University of Florida released the following data of *Figure 1*.



Figure 1: Severe Declinations^[17]

A. Spatial Ecology

To understand the spatial ecology of Burmese Pythons, researchers have used several techniques like capture analysis and radio-telemetry studies. In capture analysis, the gut analyses revealed the swallow up of birds, rodents and crocodiles as food by these pythons^[9]. In the radio-telemetry technique where pythons were implanted with radio transmitters to track the movement patterns, shows the homing nature of these snakes.

B. Invasive Impact

They are classified as an invasive species in Florida. Invasive species disrupts the ecosystem by preying on native species. The female snakes breeds almost every year producing around twenty to fifty eggs and can even live for more twenty years^[10]. They have very flexible dietary requirements namely; they can survive for long periods even without food independent of type of prey. However, if prey is readily available, they can eat it regularly. As a result, they pose a great threat to wildlife, especially mid-sized mammals. Severe declines during the year of 2003-2011 has been observed in populations of bobcat, fox, raccoon, rabbit, opossum, and other species sightings. These declines were concordant with the spatial geography of python spread^[11].

V. CONTROL AND REGULATIONS

Many methods were implemented to control the thriving Burmese python population in Florida as the python-occupied areas has become inaccessible to humans. Florida legislators have also put into place provisions targeted at the release of exotic snakes into the wild. The Florida Government has allotted one such dog search team^[12]. The PIT Tags were implanted in those snakes having diameter more than 2 meters by the Florida Fish and Wildlife Commission for regulations. It was done to stop the entry of these snakes to any other regions^{[13][9]}.

VI. CONCLUSION

The Burmese Pythons have shown a very rapid evolutionary feature in terms of survivorship. Here we have seen that how the uncontrolled growth in population of these snakes has resulted in declination of other species and has proved as threat to the ecosystem. Hence, we can exemplify the impacts of imbalanced food chain in nature. Moreover, with this environmental research we can understand the food chain, biodiversity and biological evolutions with time constraints and as per natural conditions. This example shows the flexibility of an organism for survivorship and as per need.

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Reference memory error of rats in radial maze of different sizes with suppression of foraging exploration by increased travel distance within larger maze.

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Abstract- Aim: This study aims to examine the effect of radial maze size (number of locations) on learning and performance efficiency of rats, i.e., do rats economize their physical effort when exploring the bigger maze and to assess the effect of sequence of training, 8-arm after 24-arm maze versus 24-arm after 8-arm maze, on relative performance of each rat in the two mazes. **Materials and method:** 22 Albino rats of Wistar strain obtained from National Institute of Nutrition Hyderabad, India were divided into two groups and were trained in 8-arm maze following training in 24-arm and vice-versa. The performance of the two groups were compared after obtaining plateau phase from the 10 trial moving average of Reference memory error for locating the onset of plateau phase. **Results :** One group of rat which were trained in 24 arm maze followed by 8-arm maze shows decrease in percentage Reference memory error in 8-arm maze i.e., 2nd maze (P-value=0.003). The other group which were trained in 8-arm maze followed by training in 24-arm maze shows decrease in percentage Reference memory error in 24-arm i.e. 2nd maze (P value= 0.001). **Conclusion:** The present study shows that rats after being trained in one radial maze perform better in another radial maze as far as Reference memory error in fully trained stage is concerned. This shows that repeated training with allothetic cues improves the ability to perform a task irrespective of maze size .

Keywords: Allothetic cues, Cognitive map, Radial Maze, Reference Memory Error.

I. INTRODUCTION

This study aims to examine the effect of radial maze size (number of locations) on learning and performance efficiency of rats, i.e. do rats economize their physical effort when exploring the bigger maze and to assess the effect of sequence of training, 8-arm after 24-arm maze versus 24-arm after 8-arm maze, on relative performance of each rat in the two mazes.

Since the report of Olton and Samuelson (1976)¹, the radial maze become a popular preparation for the study of animal memory. As rats develop cognitive map while navigating maze these maze studies are used to study spatial learning and memory in rats².

The strategies used by rats to find food in mazes with multiple food locations, such as a partially baited radial maze are thought to reflect foraging strategies used by these animals in their natural habitat³. For efficient task solving between foraging session, rats must employ a win stay strategies based on long-term reference memory (Ewa Jakubowska-Dogru.et.al.2003)⁴.

Studies showed the length of the arm is one factor which can affect the performance in Radial maze in which there is a strong preference for short arms and no evidence for a difference in the ability to discriminate previously visited arms from unvisited arms as a function of arm length (Michael F.Brown,1990)⁵. Likewise, other studies also showed the performance of rats in radial maze is effected by spatial orientation and configuration ,external cues, chunking and even by task which rats have to solve in the maze^{6,7,8,9,10}.

In the view of such inclusive studies, by focusing on Reference memory , we decided to work on spatial memory of rats in 8-arm and 24-arm mazes to observe the effect of radial maze size on learning and performance efficiency of rats and assess the effect of the sequence of training, 8-arm after 24-arm maze versus 24-arm after 8-arm maze, on the relative performance of each rat in the two mazes.

II. MATERIALS & METHODS

22 Albino rats of Wistar strain obtained from National Institute of Nutrition Hyderabad, India were divided into two groups and were trained in 8-arm maze following training in 24-arm and vice-versa. The performance of the two groups were compared after obtaining plateau phase from the 10 trial moving average of Reference memory error for locating the onset of plateau phase.

The present study was approved by IAEC,544/CPCSEA ,Ref no:IAEC/SS-1/2016/UCM-93.

Animals: The 22 albino rats of Wistar strain were used during the experiments. The rats were obtained from National Institute of Nutrition, Hyderabad, India.

Food Reward: Soaked Bengal Grams.

8-ARM MAZE: Arrangement of Cues: Zero (0) watt light bulbs of different colour; three in numbers each light source is visible from the central choice area. Each bulb was enclosed in different shape.

Arrangement of Rewards: Rewards were placed in three out of eight arms; in such a way that one bait (Arm4) was along a cue, one in an arm (Arm7) in between two cues and one (Arm2) in arm exactly opposite to a cue.

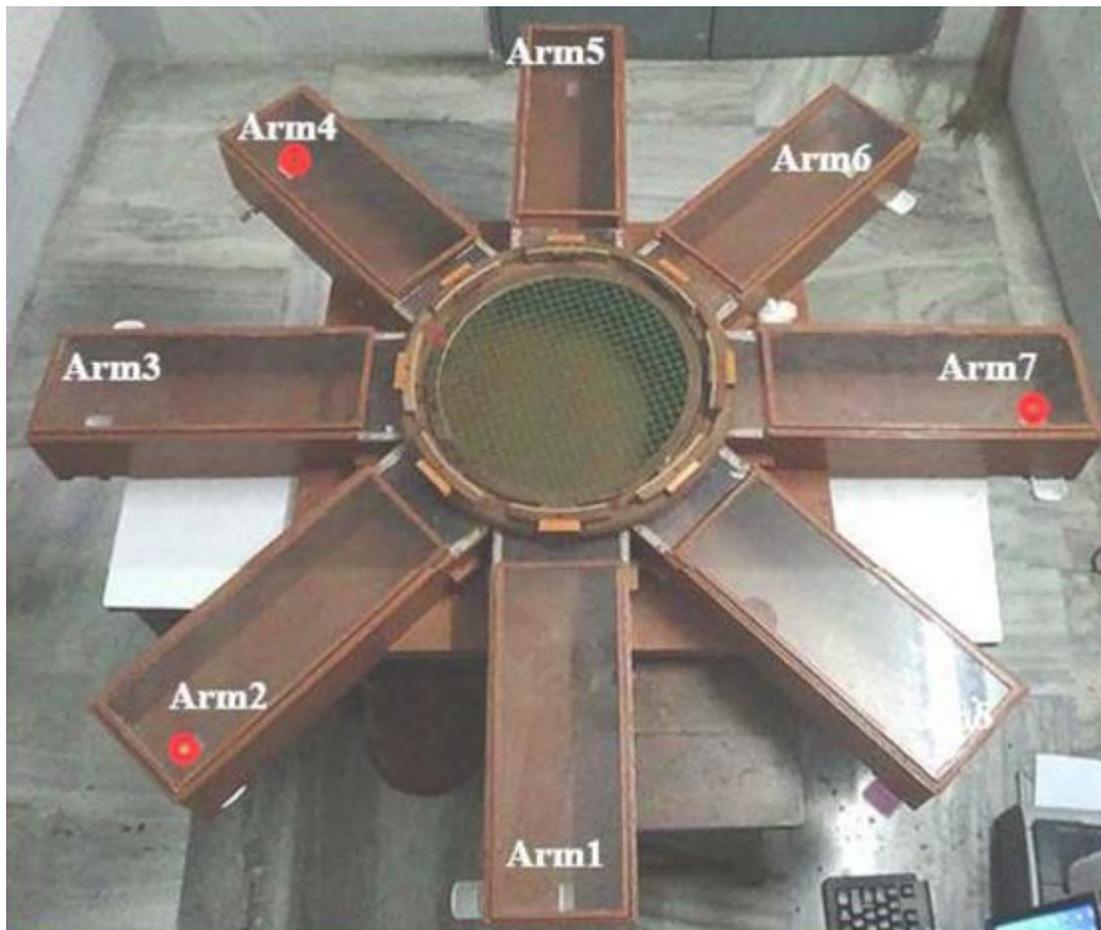


Figure: RADIAL 8-ARM MAZE (red circle showing location of baits).

24-ARM MAZE:

Arrangement of Cues: High contrast 3D objects of different shape, seven in number, were placed outside the maze along the arms at regular intervals at such height that these objects could be seen from the large central area.

Arrangement of Rewards: Rewards were placed in five (5) out of twenty four arms distributed non-homogeneously. The baited arms are: West 1, West 2, West 9, East 4 and East 8. (shown in figure2)



FIGURE:RADIAL 24-ARM MAZE (Red circle showing location of baits)

Procedure: After group habituation in which food (reward) were placed at each end of each arm and allowing rats to explore the maze, rats were trained in maze to retrieve rewards only from the rewarded arms till performance has reached a plateau. In each trial, working memory error (revisit to any of the previously visited arm), Reference memory error (visit to non-baited arm) and reward gained were recorded.

From the standard error chart Working Memory Error (WME), Reference Memory Error (RME), reward gained, 10 trials moving average of RME per trial was done to locate the onset of plateau phase. It is the 'n'th trials from where the curve gets stabilized at low level, does not show notable fluctuation and does not overshoot the previous level.

III. RESULTS

One group of rat (n=13) were trained in 24-arm maze followed by training in the 8-arm maze. The other group (n=9) were trained in 8-arm maze followed by training in the 24-arm maze and reference memory error were compared.

Table 1: COMPARISON BETWEEN REFERENCE MEMORY ERROR IN RATS (n=13) TRAINED IN 24-ARM FOLLOWED BY 8-ARM MAZE.

PERCENTAGE REFERENCE MEMORY ERROR MEAN±SD	24-ARM	8.231±6.170	STATISTICAL ANALYSIS (paired T test) P VALUE=0.003875947
	8-ARM	1.385±2.022	

We compared the percentage of RME of rats between 24 –arm and 8-arm maze. MEAN, SD value for 24-arm and 8-arm maze are 8.231±6.170 and 1.385±2.022 respectively. The p-value of percentage error is 0.003875947 which is statistically significant.

Table 2: COMPARISON BETWEEN REFERENCE MEMORY ERROR IN RATS (n=9) trained in 8-ARM FOLLOWED BY 24-ARM MAZE.

PERCENTAGE REFERENCE MEMORY ERROR (RME) MEAN ±SD	8-ARM	18.28±4.286	STATISTICAL ANALYSIS (paired T-test) P value=0.001524364
	24-ARM	2.850±3.392	

We compared the percentage of reference memory error in 8-arm maze and 24-arm maze. The MEAN±SD value for 8-arm and 24-arm are 18.28±4.286 and 2.850±3.392 respectively. The P value of percentage error is 0.001524364 which is highly significant.

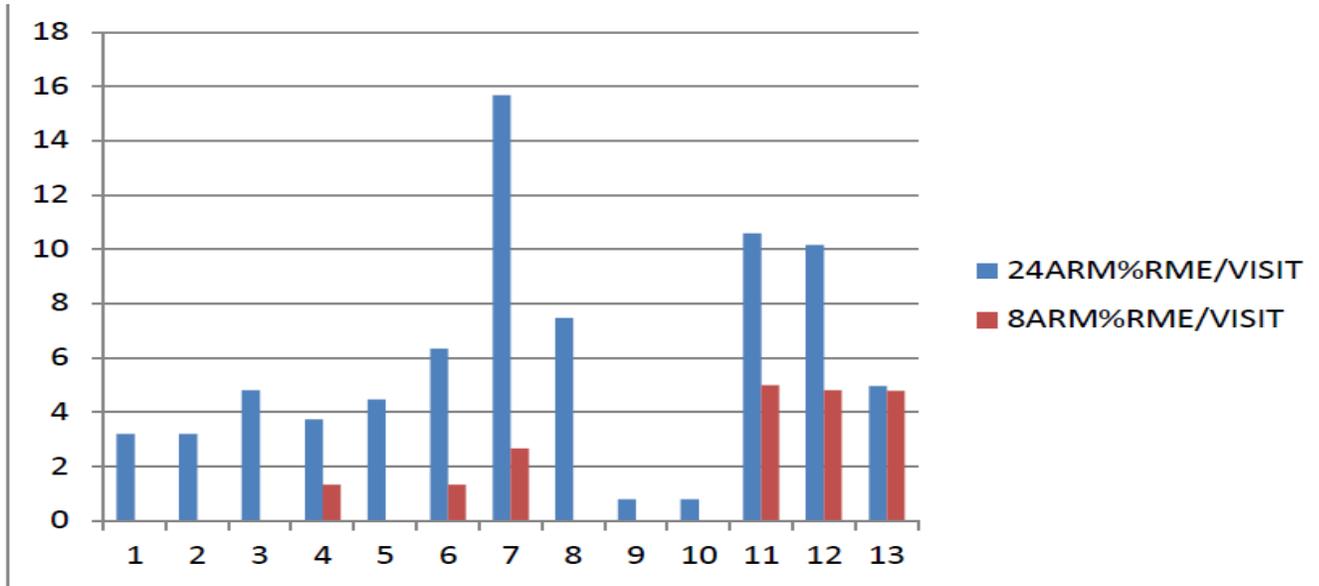


FIGURE1: GRAPHICAL PRESENTATION OF REFERENCE MEMORY ERROR OF RATS TRAINED IN 8-ARM MAZE FOLLOWING PRIOR TRAINING IN 24-ARM MAZE SHOWING DECREASE IN ERROR IN 8-ARM MAZE(2nd maze).

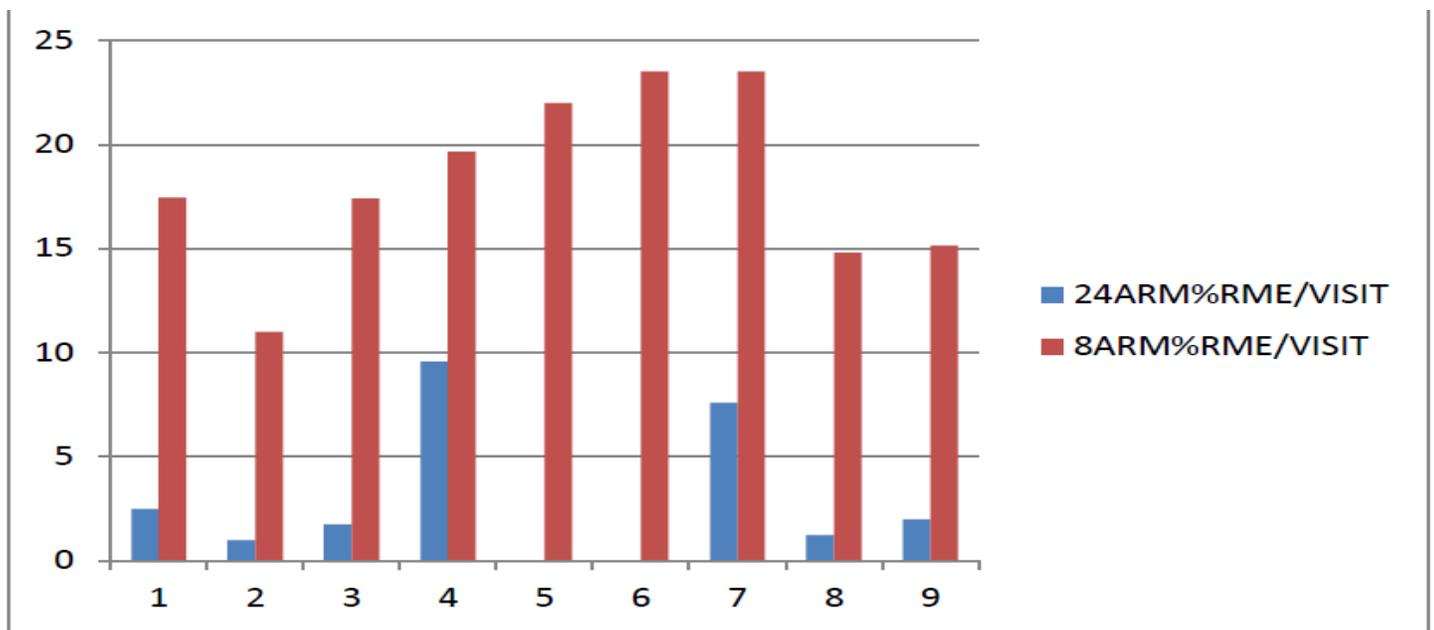


FIGURE 2: GRAPHICAL REPRESENTATION OF REFERENCE MEMORY ERROR OF RATS TRAINED IN 24-ARM MAZE FOLLOWING PRIOR TRAINING IN 8-ARM MAZE SHOWING DECREASE IN ERROR IN 24-ARM MAZE.(2nd maze).

IV. DISCUSSION

In the present study we have trained 13 rats (n=13) to stable performance, first in partially baited 24-arm radial maze (5-arms rewarded) and then in partially baited 8-arm radial maze (3- arms rewarded), as depicted in table 1. These rats performed better in 8-arm maze as compared to 24-arm, in terms of plateau phase errors of reference memory. Percentage of reference memory error is significantly higher in 24-arm maze as compared to 8-arm (p=0.003).

Table 2 depicts the comparison of RME between 8-arm and 24-arm maze where the rats were first exposed to 8-arm and then to 24-arm where the performance in the 2nd maze, although larger was better than the smaller 8-arm maze. The comparison showed statistically significant improvement in the performance in the 2nd maze ($p=0.0015$).

The statistically significant improvement in reference memory performance in the second maze indicates that prior maze-experience has a significant impact on the reference memory of rats. This conjecture is consistent with the studies of Maaswinkel and Whishaw 1999¹¹, Stuchlik et al. 2001¹², Wallace et al. 2002¹³, who also commented that after additional training with idiothetic cues a stable performance level can be reached.

V. SUMMARY AND CONCLUSION

In the present study, we observed that rats after being trained in one radial maze perform better in another radial maze as far as reference memory in fully trained stage is concerned. This shows that repeated training with allothetic cues improves the ability to perform a task irrespective of maze size. The results of this study neither prove nor contradict the hypothesis that rats visit nonrewarded locations partly as foraging exploration and that rats economize their physical effort when exploring the bigger maze.

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Plant Parameters Influencing the Cooling Performance of Vegetated Roofs: A review

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Abstract - High indoor and outdoor temperatures are subjects of concern across the globe. Studies have proven that roofs are the primary component contributing to overheating inside buildings due its maximum solar exposure. This paper reviews plant parameters that could influence the cooling performance of vegetated roofs by studying various typologies. Eight key plant parameters influencing the cooling performance of vegetated roofs have been identified: shading effect of plants, leaf area index LAI, plant evapotranspiration, species selection, plant form, plant physiology, albedo and colour. Studies reveal that shielding effects of plants play a major role in reducing heat gained by roof structures. The presence of dense plants foliage (matured plants with high LAI) creates great magnitude of shadow effects and reduces reflective solar radiation received by building envelope. It is worth noting that rough leaf provides more space on its surface; thus offer better cooling performance. In addition, plant species appear to have different degree of reflectivity; the dark-coloured leaf absorbs the most sunlight energy while light-coloured leaf reflects excess sunlight back to the atmosphere. Hence, roof integrated with dark-coloured plants will be much cooler in comparison. These parameters provide basic source of information with regards to plants selection and integration strategies to be considered when integrating plants on roof for optimum cooling performance.

Keywords - Plant Parameters; Vegetated Roofs; Cooling Performance; Leaf Area Index, Air Temperature Reduction.

I. INTRODUCTION

The effects of deforestation and rapid urbanisation have led to many climate-related problems such as higher temperature in urban and rural areas worldwide. Heat has negative impacts on occupants' health. Extreme heat induces excessive loss of body fluid and dysregulation of body temperature, resulting in heat-stroke and death. One of the most significant impacts associated with heat gain issues is the indoor temperature that is outside the range of thermal comfort [2].

Roofs represent the most important source of heat received by buildings in hot and humid regions; it contributes about 70% of the overall heat gain. Many researchers have concluded that rooftop greening could mitigate heat problems. Its benefits have been widely recognized, including indoor air temperature reduction, energy savings, reduced urban heat-island effects and health enhancement. Essentially, plants can act as biofilter to improve air quality by trapping airborne particles through their leaf surfaces and absorb atmospheric gaseous pollutants from the surroundings [1].

The main objective of this research is to investigate plant parameters influencing the cooling performance of vegetated roofs. This paper is organised into several sections. Section II highlights the typologies of vegetated roofs adopted worldwide. Section III discusses the various plant parameters that could influence the cooling performance of vegetated roofs. Section IV presents the limitations of implementing vegetated roofs. The final conclusions are highlighted in Section V.

II. TYPOLOGY OF VEGETATED ROOFS

The passive cooling of vegetated roofs could be defined in many ways. There are few types of vegetated roofs that are commonly used in buildings. The typical vegetated roofs is composed of few basic components including layered substrate that cover the floor of rooftops with a drainage layer for draining water off the roof and a filter fabric [4].

Modern vegetated roofs were first introduced in Germany in 1880. Vegetated roofs or better known as 'green roofs refer to technology that is established on rooftops for the growth of vegetation. Various environmental and social benefits associated with rooftops greening have been widely recognized include air and noise pollution abatement, storm water management, thermal reduction, energy savings, urban heat island mitigation, human health promotion, and agriculture production and recreational opportunities to the dwellers. Vegetated roofs are usually composed of layered materials to accommodate plants growth [5]. Vegetated roofs systems could be classified into two main types as shown in Table 1.

Table 1 Typology of Vegetated Roofs Systems

Extensive type	Intensive type
<ul style="list-style-type: none">• Thickness of soil 3-6 inches (5-15cm)• Lighter: 15-50 lbs/sq. ft.• Lesser plant choice• Lesser maintenance• Cannot be walked on• Lower cost of installation	<ul style="list-style-type: none">• Thickness of soil 6 inches or thicker (> 30cm)• Heavier: up to 150 lbs/sq. ft.• More plant choice , can accommodate trees• Accessible as garden• Higher maintenance• Higher cost of installation

Source: INC, 2015



Fig. 1 Intensive vegetated roof in Malaysia. Source: Author

Apart from these systems, vegetated roofs could also be constructed with various design features as highlighted below:

- i. Green cloak – suspended trellises covered with vine plant and climbing plants. Green cloak does not add extra weight to building structure compared to typical vegetated roofs. A previous study indicated that it could reduce the indoor temperature in Maryland in July to the extent of 3.1oC [6].

- ii. Vegetated trellises – made of simple timber structure, cable and rope wire could cool the roof and ground surface which lead to building cooling by providing bio-shade through the climbing plants [7]. By observing Fig. 2 and Fig. 3, the importance of shading created by plants leaves can be seen. The room behind shaded by the vegetated trellises has significantly lowered the indoor temperature compared to the unshaded one.



Fig. 2 Climbing plants grown around trellis system as a roof canopy for the house. Source: Author



Fig. 3 Vegetated trellises provide shade for the wall of the rooms. Source: Author

III. PLANT PARAMETERS INFLUENCING THE COOLING PERFORMANCE OF VEGETATED ROOFS

A. *Plant's Shading Effect and Leaf Area Index (LAI)*

One of the main plant parameters that show significant cooling effects of vegetated roofs is the shading effects provided by plants. Plants are proven to be effective in cooling buildings by altering the heat energy absorbed. The amount of heat absorbed by roof structure is determined by the shielding effects of vegetated roofs due to presence of plants foliage. The vegetation foliage could act as a natural device to shade building. Essentially, the vegetative ground cover surrounding a building

could reduce reflective solar radiation as well as long wave radiation heat gain received by the buildings. Study has proven that air conditioning unit compressor that is placed around plants will reduce ambient temperature and improve COP (co-efficient of performance), thereby consuming less energy [8].

Deciduous plants could be grown over trellises and pergolas assembling a control shading device system to block low sun angles from west (Fig. 4). Vegetated shading devices and awnings could provide deep shade with the use of natural ventilation to bring in fresh air [9]. Research has proven that a shaded site provides 0.64 – 2.52°C lower air temperature, 3.28 – 8.07°C lower surface-soil temperature in comparison with an unshaded area [10].



Fig. 4 Vegetated trellises grown climbing plants as a roof canopy to reduce solar energy collected by the ground surface. Source: Author

When integrating vegetated roofs, leaf area index (LAI) should be considered to gain maximum cooling effects. Leaf area index (LAI) is defined as the ratio of leaf area per unit roof surface area ($LAI = m^2 / m^2$) that characterizes plant canopies. Essentially, LAI accounts for several plant parameters : thickness of plant layer, age, foliage density and leaf dimension [9]. For

instance, the ratio of 0.15 (15% surface coverage with plants) is the loose foliage that not fully cover the surface and the ratio that is close to 1.0 (100% surface coverage with plants) is the dense foliage, usually matured plants (see Fig. 5).

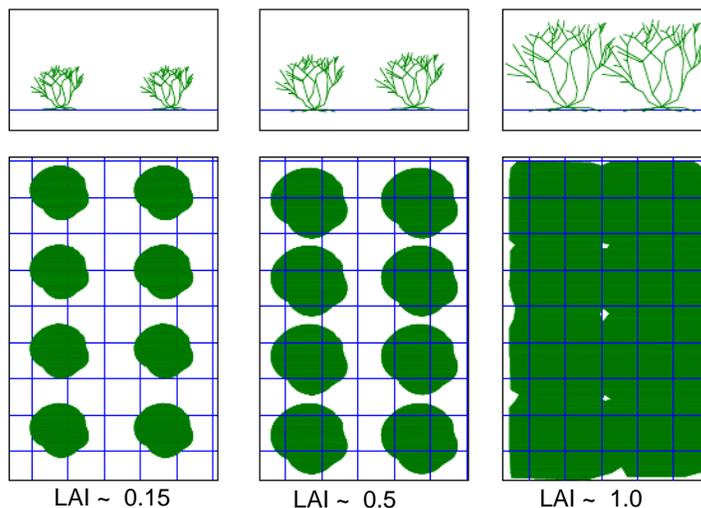


Fig. 5 Leaf Area Index (LAI) mapping of plants grow around trellis system. Source: Author

Nevertheless, plants with $LAI < 1$ may offer more shades compared to those of higher values as some plants do have overlapping leaves and sections of stems with no leaf cover, hence $LAI = 1$ is not equal to uniform leaf coverage on roof surface [9].

The shadow of the leaves not only blocks incoming sunlight but also dissipates the heat by wind passing over the leaves themselves. The smaller leaves stay cooler than bigger leaves, due to the fact that air movement around them is greater [11, 12]. Leaves could provide shade as well as dispense the heat striking them. It is worth noting that many smaller leaves are more effective than a few large leaves; the size and shape of

leaves are also a factor in determining the rate of heat dissipation [13].

Furthermore, plants shading could reduce heat gain and cooling loads by minimizing heat transfer through exterior walls. These will save energy and peak electricity demand. However, plants shading does not play a role at night, cloudy days and roof that shaded by objects [14, 15]. A research reported that indoor air temperature has decreased for about $3^{\circ}C$ for a roof shaded by a tree [16].

Shading plays a significant role in plants cooling. The effectiveness of cooling depends on the high volume of foliage. Street trees, for example, have cooling effects of about 100m off

their canopy [17]. Plants will absorb solar irradiance and convert it to photochemical energy; some of it will be reflected back as infrared radiation. About 40% - 60% of irradiance leaf captures could still be lost as heat, depending on plant species and environmental influences [18].

B. Plant Evapotranspiration

Plants prevent themselves from overheating in the sun by a process called 'evapotranspiration' – the leaf transpires (i.e. breathes) moisture to its surface, which then evaporates. In the plants physiological process, a small portion of solar radiation is used for photosynthesis, the rest for evaporation of water. This process helps to regulate temperature. Transpiration and evapotranspiration from plants and soil could reduce ambient air temperature. Plants evapotranspiration could increase ambient moisture, thereby increasing indoor humidity. Plants foliage facilitates carbon dioxide intake and release oxygen in the transpiration process [19]. In the process of evapotranspiration; plants evaporate water to the air through leaf surfaces. Evapotranspiration happens through stomatas, microscopic pores on leaf surfaces. Stomatas play a role in controlling water loss of plants as well as controlling gas exchange between leaf and the atmosphere. The leaf evapotranspiration rate is regulated by stomatas' aperture, depending on several factors: air temperature, relative humidity, light levels, water potential between atmosphere and leaf and carbon dioxide concentration of leaf externally and internally. Stomatas open in the day and close at night as they react to ambient light levels. Thus, evapotranspiration would not happen at night [19].

The cooling process through evapotranspiration often occurs on the surrounding foliage and ambient air. Evapotranspirational cooling rate relies on environmental conditions and physiological characteristics of the plants, which include the density and size of stomata pores (resistance and conductance) and leaf area index [14, 15]. Placing plant layer close to air intake of mechanical system has potential in evapotranspirational cooling; the pre-cooled ambient air by plants save air-conditioning energy to achieve desire cooling temperature. Evapotranspiration cools air and humidifies air around the vegetation layer. Plant's cooling could replace the energy consumed in air-conditioning. Hence, the building's carbon budget could be off-set through bio-cooling as well [20]. In the evaporation process, sunlight exits water molecules of leaf, transforming it from liquid to vapour. The water molecules could hold huge amount of energy from escaping as heat [21]. Plants produce large amount of moisture content to dry indoor environment. The evaporation of water from plants is expected to cool building. One m³ of space consumes 680 kWh water evaporated [22].

A hydrated plant will have 100% relative humidity. When water content is low in the atmosphere, a gradient is created to move water out of plant. If the relative humidity is high in atmosphere, driving force for transpiration will be reduced. When all moisture cannot be held, dew will be formed in condensation. Warmer air holds more water by creating larger driving force to move water out from plants though increased transpiration rates. When atmosphere becomes drier, driving force for water movement from plants will become larger; the

transpiration rates will also increase. When the plants have higher water content, the absorbance of visible radiation will also become higher [23].

Koyama (2013) concluded that transpiring plants will convert incoming solar radiation to latent energy while dissipating, and cause no increment in temperature [24]. Therefore, evapotranspirational cooling of plants is an effective way to consume heat and does not warm up the surrounding surfaces [25].

C. Plant Species Selection, Plant Form and Plant Physiology

The performance of vegetated roofs depends on the selected plant species. Different species would have different cooling capacity. In plants selection, plants form and physiology should be taken into account to gain maximum cooling. The cooling potential of vegetated roofs is also influenced by other factors such as moisture content of soil. In fact, plants provide cooling through a few mechanisms: air flow modification, providing insulation layers of stagnant air within envelope, short-wave irradiance absorption and conversion to biomass and alteration of the fraction of solar energy reflected from ground into space. All these cooling mechanisms have relative contributions that are reliant on plant form, species, moisture availability, canopy cover, plant vigour and seasonality [9].

According to Friedman (2008), cooling performance of plants are influenced by:

1. Leaf thickness
2. Leaf texture (Rough leaf offers greatest cooling benefits)
3. Foliage density (Dense foliage blocks the ground from collecting energy)
4. Leaf colour lightness [21]

The plant species have different degree of reflectivity. Dark coloured leaf absorbs the most sunlight energy while light coloured leaf reflects excess sunlight back to the atmosphere [21]:

The earth is warmed by the sun when it absorbs waves transferred via sunlight. As plants receive sunlight, the energy excites atoms in leaf. It triggers photosynthesis followed by heat creation. Insufficient heat would result slow growth in plants. In contrast, too much heat would destruct the temperature sensitive molecules of the plants. The ambient temperature remains cooler for the shaded ground as it does not collect energy. Hence, the shaded areas would not release heat during nighttime [21].

Additionally, smooth leaf surface has lesser surface area compared to rough leaf. Rough leaf provides more space across its surface; its leaf offers greater cooling benefits due to high humidity [21]. Vegetated roofs have shadow effects where the magnitude effect relies on the density of foliage [22]. Vegetated roofs with increased density of plants in Mediterranean climate was reported to have reduced cooling load of about 60% compared to a well-insulated bare roof structure of U-value 0.24 W/m²K [26].

D. Albedo and Colour

Vegetated roofs are commonly used to control solar radiation by increasing the surface albedo values with plants cover. Effectiveness of vegetated roofs albedo is dependent on the percentage of green spaces coverage on its surface [27]. Vegetated roofs reduce heat flux via roof, shielding the surface from direct solar radiation and the effects of evaporative cooling, generating natural cold air and prevents heat from entering the building by creating an insulation layer [16].

It was reported that vegetated roofs lowered the ambient air temperature by 1°C - 4.3°C in many cities. A well-covered green roof could block up to 60% heat in a building and glare reductions compared to a bare concrete roof. Vegetation provides insulation for reducing cooling and heating costs. In hot summer, rooftop temperature of Chicago's City Hall temperature was measured to be 10°C cooler than the adjacent tar roof [28].

A Malaysian home owner of wooden house that was almost fully covered with vegetation claimed that the vegetation has made their home as cool as if it were air conditioned. The creepers overrun the entire house has also increased structural integrity of the wooden house after its walls coming apart and began to rot [25]. The solar energy heats the house is often associated with the surface albedo, when the reflectance of roof is low, more energy is kept to heat up the indoor environment [29]. High albedo could lower down the absorbance and heat accrual in roof. The surface temperature will be reduced which corresponds to lower sensible heat fluxes and higher mitigation potential [23].

The layers of material in terms of colour and structure that we use are chosen to control the radiant heat and light entering the building. Some materials will block or reflect heat, others, light. Leaves with higher water content will be more effective to block the heat as they absorb more energy than dry-leafed plants [23]. Pale-coloured leaf reflects more energy and large canopy size provides better shades. Thicker leaves re-emit and store more heat [7]. The temperature of thick dark green roof surfaces is almost 10°C lower than areas covered by sparse vegetation [23].

IV. LIMITATIONS IN IMPLEMENTING VEGETATED ROOFS

Despite all the beneficial factors, there are some limitations in implementing vegetated roofs. A study on the obstacles to implement vegetated roofs in Malaysia showed that vegetated roofs are not popular mainly due to the fact that they are difficult to construct and laborious to maintain. Many people have a perception that vegetated roofs are expensive to install due to limited materials supply and local experts [30].

V. CONCLUSIONS

Vegetated roofs have positive contributions to indoor comfort and cooling energy requirements in comparison to the conventional buildings. The use of plants to shade buildings is an effective passive strategy of solar heat control. The cooling performance of vegetated roofs are influenced by plants

parameters, including shading effects of plants, plants evapotranspiration, plants form, plants physiology, species selection, roof surface albedo and roof colour. Roof grown with plants tends to be cooler compared to bare surfaces. Furthermore, the heat-island effect is also reduced because the hot air released by the hard surfaces is replaced by fresh air supplied by the vertical mixing of vegetated roofs. These parameters could provide a guide to the architects, landscapers, developers as well as the end users for better integration of vegetated roofs in the built environment. Research to improve applications and practices of vegetated roofs will continue to enhance its overall cooling performance.

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Factors Affecting Entrepreneurial Attitude of Prospective Graduates in Jimma University

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Abstract- This study investigates the Factors Affecting Entrepreneurial Career Intention of Prospective Graduates in Ethiopia the case of Jimma University. The population of this study was 362 prospective graduates of Jimma University. The researcher stratified the total population of the study based on their department and the samples were census was employed to the entire from each stratum. In this study, both primary and secondary data were used. The data were collected through respondent administered questionnaire. Quantitative design was employed to produce statistical figure for analysis. Data were entered in to SPSS v.20 and analyzed through cross tabulations and chi-square (p) values. It is found that there is statistically significant association between entrepreneurial intention with the value of (p= 0.030), when the respondents grouped by field of study, entrepreneurial motivation (p=0.001) and parents own a business which directly influence the entrepreneurial intention to become an entrepreneur. This implies that, entrepreneurial education must be introduced into the tertiary institutions which are not currently offering entrepreneurship courses. This may help reduce the rising unemployment situation in the country especially that of university graduates.

Index Terms- Entrepreneurial attitudes, higher education institutions, prospective graduates, unemployment, Career choice

I. INTRODUCTION

Ethiopia is one of the developing countries struggling to become a middle income country by 2020-2023 through remarkable achievement of economic growth, social development and good governance. In spite of the recent uninterrupted economic growth, the country face massive unemployment problem of youths including university graduates. Seemingly, to reduce the problem the government has been implementing a well thought policies and initiatives such as promoting the development of small and medium enterprises. Experiences, indeed, show that such problems can be alleviated to a larger extent through entrepreneurial engagements of the citizens.

As state by Autio *et al.*, (1997) entrepreneurship plays a significant and critical role for economic development of a nation, especially in developing countries due to the role they play for economic progress, job creation, and social adjustment. It seems that University students are potentially suitable for

directing their capabilities toward entrepreneurial actions (Autio *et al.*, 1997).

In other words, the objectives of entrepreneurship education are aimed in changing students' state of behaviors and even intention that makes them to understand entrepreneurship, to become entrepreneurial and to become an entrepreneur that finally resulted in the formation of new businesses as well as new job opportunities (Kuip & Verheul, 2003).

According to Nabi and Holdeni (2008) the aim of entrepreneurship education is to produce graduate entrepreneurship that defines the interaction between the graduate as a product of a higher education institution and their readiness to pursue their career as an entrepreneur.

Edwards and Muir (2005) entrepreneurial curriculum develops differently across universities, either as an optional module within business courses or a specific courses on entrepreneurship.

As stated by Nabi and Holdeni (2008), however, most graduates go about looking for employment in government/public institutions and private institutions after they have gone through a course in entrepreneurship. The proliferation of graduates from public and private higher educational institutions exceeding the level of demand for skilled labor as well as the incompatibility of skills of new graduates with the needs of employers have escalated unemployment of university graduate (Morshidi *et al.* 2008). Consequently, as indicated by the same authors aforementioned, unemployment of graduates has become a national issue in different countries (e.g., Malaysia). The issue of unemployment among graduates needs to be judiciously addressed such that this skilled workforce is not wasted. In this context, it has been proposed that graduates widen their career scope by investigating entrepreneurship as a possible basis for a career.

Entrepreneurship would help these new graduates develop their own career and also ease the current unemployment issue by expanding the job market (Norasmah 2004). Entrepreneurship has been acknowledged by most entrepreneurial researchers as a solution to the problem of unemployed graduates (Kamariah *et al.* 2004; Salmah 2006). From a societal perspective, both entrepreneurship and the educational system are important for economic growth, but the importance of education for entrepreneurship has been acknowledged only recently (Kuip & Verheul, 2003).

According to Nabi and Holdeni (2008) the aim of entrepreneurship education is to produce graduate

entrepreneurship that defines the interaction between the graduate as a product of a higher education institution and their readiness to pursue their career as an entrepreneur. Apparently, in cognizance of the very fact, as stated by Edwards and Muir (2005) entrepreneurial curriculum develops differently across universities, either as an optional module within business courses or a specific courses on entrepreneurship.

One of the most important steps in the field of developing entrepreneurship and self-employment among students is influencing their attitudes into this category. The entrepreneurial tendency is a condition in which a person tends to show entrepreneurial behavior in an independent business or organization. In fact, creating tendency towards self-employment in the entrepreneurial behavior of students is a necessary condition for them (Amiri & Moradi, 2009). Whenever people have more positive trend towards entrepreneurial activities, undoubtedly they understand entrepreneurship as possible action and their success are possible. Therefore, decision for entrepreneurship is the first and most important step in the process of starting a business and entrepreneurial behavior (Khosravi & Chizari, 2011).

As Emmanuel *et al.* (2012) wrote that educational institutions can make positive contribution to improve the entrepreneurial orientation of the people by equipping them with the skills like; creativity, locus of control, ambitious drive to make them able to sense the opportunity and create the jobs for themselves and others in the society.

Ethiopia is one of the least developed countries in the world however, through a series of progressive economic development plans; it has been registering substantial economic growth over the past few years. The assessment of entrepreneurial intention among the College prospective graduates is a necessity in order to identify their level of entrepreneurial orientation. This group of prospective graduates is very crucial as the springboard to the current entrepreneurs in Ethiopia's high-tech industries. A majority of these prospective graduates will immediately contribute more to the economic growth after they graduate, not as salary workers but as entrepreneurs. Could it be that Ethiopian university students lack entrepreneurial orientation and intention? What factors would enhance students' interest towards active entrepreneurial participation? What demographic factors influence entrepreneurial orientation? Seemingly, to reduce the problem the current government has been implementing a well thought policies and initiatives to support small and medium enterprises. Experiences, indeed, show that such problems can be alleviated to a larger extent through entrepreneurial engagements of the citizens. This research investigated the "factors affecting entrepreneurial career intention of prospective graduates in Ethiopia: the case of Jimma University".

Jimma University (JU) is a public higher institute established in December 1999 by the amalgamation of Jimma College of Agriculture (founded in 1952) and Jimma institute of Health Science (established in 1983). The university though young for its age, has made remarkable and multifarious progresses in training, research and service provision since its establishment. Therefore, the university is making a valuable contribution to the overall development of the country by producing high-level professionals, by carrying out problem

solving research and by providing service to the public (<http://www.ju.edu.et>)

II. OBJECTIVE OF THE STUDY

The aim of this study is to investigate the factors affecting entrepreneurial attitude of prospective graduate's in Jimma University. The study specifically aims to examine entrepreneurial attitude of prospective graduates based on selected demographic variables, entrepreneurial career intention/aspiration and entrepreneurial perceived constraint of prospective graduates to start up their own business after graduation.

III. MATERIALS AND METHODOLOGIES

This study can be categorized a quantitative research design was employed to obtain information concerning the current status of the phenomena with the selected dependent and independent variables. In this research paper, both primary and secondary sources of data were used. The primary data was collected through questionnaires. Also, journals, internet, books and other related references were used as secondary data. The population of this study was Jimma University 3816 prospective graduates on undergraduate's regular program in 2012/13 Academic year.

IV. RELIABILITY AND VALIDITY OF THE INSTRUMENT

Reliability refers to the consistency or dependability of the measuring instrument. In order to test the reliability of the instrument the Cronbach's Alpha was applied. This model is used to measure internal consistency of the tools employed to get necessary data from respondents. As the result shows that the reliability of the instrument which employed for academic staff is ranging from 0.64 to 0.85. This implies that the reliability of the instrument is more than the acceptable standard in social science research. Validity, on the other hand, refers to the extent to which the measurement measures what is intended to measure with the objective of the study

V. SAMPLE SIZE DETERMINATION AND SAMPLING TECHNIQUE

The sampling techniques were stratified sampling. By taking in to consideration the number of employees in each college, the population was stratified. While determining the sample size the following formula was taken from Yamene (1967) and will be: A 95% confidence level and P = 5% are assumed for the Equation.

$$n = \frac{N}{1 + N(e^2)}$$

$$n = \frac{3816}{1 + 3816(0.05^2)}$$

$$n = 362$$

Where n = is the sample size
 N = is the population size, and

e = is the level of precision or significance level.

The sample size was 362 prospective graduates from the total population. The number of samples was determined proportionally by considering the number of prospective graduates in each college of the university. The sample sizes are shown in the following table 1.

Table 1. Sample Size Determination

Stratum	Total number	No. of sample
College of Engineering and Technology	726	69
College of Public Health and Medical Science	595	56
College of Social Science and Law	859	82
College of Natural Science	426	40
College of Business and Economics	647	62
College of Agriculture and Veterinary Medicine	563	53
Total	3816	362

Source (Survey, 2013)

A set of questionnaire anchored on five-point scales is designed as to measure the demographic variables, motivation of entrepreneurship, general attitudes, perceived constraint and intention. The interplay between the aforementioned constructs was incorporated with following null-hypotheses accordingly,;

- H1: There is significantly difference in Entrepreneurial Intention by Age.
- H2: There is significantly difference in Entrepreneurial Intention by Field of Study.
- H3: There is significantly difference in Entrepreneurial Intention by Gender.
- H4: There is significantly difference in Entrepreneurial Intention by Parent’s Occupation.
- H5: There is significantly difference in Entrepreneurial Intention by Entrepreneurial motivation.
- H6: There is significantly difference in Entrepreneurial Intention by Entrepreneurial perceived constraint.

VI. ANALYSIS OF DATA

The data were collected and entered to statistical package for social science (SPSS) version 20 The level of significance is determined as 0.05. Later the data were cleaned and coded for further analysis. After validity and reliability analyses, the factors were further tested using standard deviations and chi-square (p) values have been applied to analyze the data. This was followed with the presentation to generate frequency tables, cross tabulations and descriptive statistical values such as mean, standard deviations, T-test and chi-square (p) values to test for association between two categorical variables. The dependent variable in the study is career intention of the prospective

graduates, while the independent variables are the gender, age, study of the program, entrepreneurial perceived constraint, entrepreneurial attitudes, and parent’s profession.

VII. RESULTS AND DISCUSSION

Demographic characteristics of respondents

The demographic characteristics of the respondents are shown below in terms of age, gender, program of the study, entrepreneurial motivation, entrepreneurial perceived constraint, parent’s profession.

Table (2): frequency distribution of the prospective graduates' personal characteristics

Demographic variables	Items	Frequency	Percentage
Age Category	15-20	49	13.5%
	21-25	313	86.5%
	Total	Total	100.0
Gender	Male	239	66.0
	Female	123	34.0
	Total	Total	100.0
Academic Year	Third Year	225	62.2
	Fourth Year	67	18.5
	Fifth Year	70	19.3

Program of study	Total	362	100.0
	College of Engineering and Technology	69	19.1
	College of Public Health and Medical Science	56	15.5
	College of Agriculture and Veterinary Medicine	53	14.6
	College of Business and Economics	62	17.1
	College of Natural Science	40	11.0
	College of Social Science and Law	82	22.7
Parents Profession	Total	362	100.0
	Farmer	84	23.2
	Non Government Organization	56	15.5
	Entrepreneur	72	19.9
	Administrative employee	74	20.4
	Private sector employee	45	12.4
	Other	31	8.6
Total	362	100.0	

Source (Survey, 2013)

As indicated in table 2, the majority of the sample (239) or 66 % was male, while the remaining 34 % (123) was female respondents. The age category of respondent in this study were represented by the 21 to 25 age group and the 15 to 20 years age group (refer to table 2) where 86.5% and 13.5% were recorded respectively. As can be seen from the results shows for the proportion of the respondents' program of study, 22.7 per cent or 82 respondents' were studying in the college of Social Science and Law, 19.1 per cent or 69 of the respondents were studying in the Jimma Institute of Technology, 15.5 per cent or 56 of the respondents were studying in the College of Public Health and Medical Science, 14.6 per cent or 53 of the respondents were studying in College of Agriculture and Veterinary Medicine, 14.6 per cent or 62 of the respondents were studying in the college of Business and Economics and only 11 per cent or 40 respondents were studying in the College of Natural Science at the university.

As it is clearly indicated in table that pertaining to the respondents' parents' profession, most of their fathers have been working as farmer (23.2 per cent; n=84) compared to their mothers who were unemployed (or households) (29per cent; n=105). Administrative employee was ranked in the second higher by the respondents for their fathers' current occupations (20.4 per cent; n=74) and being a private sector employee.

VIII. DETERMINE THE FACTORS AFFECTING PROSPECTIVE GRADUATES ENTREPRENEURIAL CAREER INTENTION

Factors Affecting Entrepreneurial Career Intention of Prospective Graduates

Table 1: The relationship between entrepreneurial intentions by demographic variables

Independent Variable	Dependent Variable	Chi-Square	Significant level (p)
Age Category	Entrepreneurial career intention	.054 ^a	0.817
Gender	Entrepreneurial career intention	2.631 ^a	0.105
Parents Monthly Income	Entrepreneurial career intention	1.774 ^a	0.183
Parents Occupation	Entrepreneurial career intention	0.802 ^a	0.370

Source (Survey, 2015)

The results on independent sample chi-square test indicate that four demographic variables, i.e., Age, gender, parent's monthly income, and parent's occupation, have no significant relationship with entrepreneurial intention. As observed in Table the P-value of each variable of relation is great than 0.05, all are

not significant at this level. The findings support earlier findings of Tamizharasi and Panchanatham (2010) who found that there is no association between the level of entrepreneurial attitudes and their age, which is consistent with the researcher finding.

Table 2: Relationship between entrepreneurial intentions by field of study and parents own business classification

Independent Variable	Dependent Variable	Chi-Square	Significant level (p)
Field of Study	Entrepreneurial career intention	69.24 ^a	0.030
Parents own a Business	Entrepreneurial career intention	87.524 ^a	0.001

Source (Survey, 2015)

As observed from the above table there was statistically significant (Chi=69.24^a; p= 0.030), (Chi=87.524; p= 0.001) association between entrepreneurial intentions by study and parents own business. This findings is similar to Peterman and Kennedy (2003) finding, it is important to offer entrepreneurship courses to all University students so as to improve their entrepreneurial attitude since it give exposure to entrepreneurship orientations. This finding is also one and the same with Mentoor and Friedrich (2007) finding, they found out that there was a positive entrepreneurial attitude, but the curricula at the institutions of higher learning drive the employee culture rather than the self employment culture. This finding is also consistent with the findings of Herrington *et al.*, (2009) highlighted that

entrepreneurship education can have an influence on self confidence about their ability to start a business, understanding of financial and business issues, desire to start their own business, and desire to further studies at institutions of higher learning. The entrepreneurial intention has a positive and significant relationship with college environment and this has been recognized as one of the critical factors that help students to understand and advance an entrepreneurial attitude. Thus it is insufficient for college to just introduce courses on theory emphasizing entrepreneurship, but it needs to develop suitable educational programs to prepare students for future entrepreneurship.

Table3: The Relationship between Entrepreneurial Intentions by Entrepreneurial Motivation

Independent Variable	Dependent Variable	Chi-Square	Significant level (p)
Entrepreneurial Motivation	Entrepreneurial career intention	99.724 ^a	0.000

Source (Survey, 2015)

As depicted in the above table, prospective graduates (84) viewed entrepreneurship as an attractive career choice importantly. There were significant relationship between prospective graduate's entrepreneurial motivation and entrepreneurial career intention to become entrepreneurs. This finding supports the findings of earlier study carried out by global entrepreneurship monitor (2004) there are various reasons why young people decide to start a business, relating to their living circumstances, their personal attitudes, preferences and objectives and their particular interests and individual strengths. The finding of the present study supports earlier findings of

Bosma and Levie (2009) more important is that if the national attitudes toward entrepreneurship are positive, this will generate cultural support, help, financial resources, and networking benefits to those who are already entrepreneurs or want to start a business. Goodbody (2002) found out that 15% of the undergraduates surveyed indicated that, if given the option, they would prefer to be self-employed rather than work for someone else. These students also excited being their own boss, personal satisfaction, having control and a supportive policy environment for entrepreneurship as their main motivational factors.

Table 4: The Relationship between Entrepreneurial Intentions by Entrepreneurial Perceived constraint

Independent Variable	Dependent Variable	Chi-Square	Significant level (p)
Perceived entrepreneurial constraint	Entrepreneurial career intention	17.631 ^a	0.527

Source (Survey, 2015)

As observed from the above table there was no statistically significant difference between entrepreneurial intentions by entrepreneurial perceived constraint. This finding is not supported by earlier findings of global entrepreneurship monitor (2004) there are various reasons why young people decide to start a business, relating to their living circumstances, their personal attitudes, preferences and objectives and their particular interests and individual strengths. The finding is not supported by the findings of Goodbody (2002), given the option

student would prefer to be self-employed rather than work for someone else. Thus students are also excited by being their own boss, personal satisfaction, making their name, having control and a supportive policy environment for entrepreneurship as their main motivational factors.

IX. RECOMMENDATIONS

The conclusions made on the factors affecting entrepreneurial attitude of prospective graduates including the ability to better understanding on entrepreneurship, willingness to start a business soon after graduation. The management of the university the university should introduce entrepreneurship to promote awareness as part of the curriculum across all colleges and institution in such a way that it changes the attitudes of prospective graduates to the extent that they perceive job creation as the correct ideology of life. The university should be implemented entrepreneurial internship program (getting ready for Entrepreneur for a one month) if Entrepreneurship will be offered as a required subject in the Bachelor degree curriculum in order to build on planning and decision making skills and apply critical thinking to idea generation and evaluation for their business. The University should establish a bureau for small business development; assess local needs, social entrepreneurship, and office of innovation to provide support to the aspiring entrepreneur as well as prospective graduates. The University should be use better media coverage on entrepreneurship on various Media [the community radio station host talk shows, TV, News Papers, magazines, etc] through open discussion forum and celebrate the success stories by involving University professors, and others with the required expertise on the subject matter this can play a crucial role in stimulating the prospective graduates towards entrepreneurship. The University should be arrange campaigns, events, competitions and awards on idea or opportunity identification, business plan development can help to address the fear factor which prevents prospective graduates from becoming entrepreneurs. The notion that only government can provide jobs should be reduced through awareness campaign by all stakeholders. Graduates must be encouraged to take entrepreneurship as a career option rather than depending on government and the private sector for employment.

X. FUTUR RESEARCH

The findings of this research contribute to the growing body of literature on entrepreneurial attitude of prospective graduate's in Jimma University therefore; it is recommended that further research the following topics concerning the factors affecting entrepreneurial attitudes of prospective graduates. Future research should include public and private universities which are analogues institutions so that larger and diverse sample could be used to support the findings in these studies and also improve generalization of the findings. Finally, it would be of benefit when considering these recommendations for future study to take into consideration the advantage that could be gained by employing a qualitative methodology in addition to the quantitative research process. Such an approach would achieve a more in-depth exploration into prospective graduate's attitudes towards and perceptions of entrepreneurship leading to a deeper understanding and insight the subject matter very well and to come up with recommendations based on findings with a better scope/coverage in area and topic concerns.

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Education Recruitment System In The University Of Muhammadiyah Makassar

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Abstract: This study aims to describe how the recruitment system of educators at Muhammadiyah University of Makassar. This research type is qualitative research with descriptive qualitative approach. The primary data source is educators obtained through interviews of leaders at the Muhammadiyah University of Makassar. The results showed that the recruitment of new lecturers through the objective information showed that: from 10 components of the statement evaluated, there are 8 components of high categorization and 2 component statements showing moderate category that is the placement of lecturers tailored to the needs and formations available in each faculty or program study (2.81%) and lecturers graduated / accepted all follow the test stages determined by the committee (2.9%).

Keywords: system, recruitment, educator

1. INTRODUCTION

Lecturers are one of the essential components in the higher education system in Indonesia. The role, duties, and responsibilities of lecturers are very important in realizing the goals of national education, which is the intellectual life of the nation, and improving the quality of Indonesian human resources. The quality of human resources in question is covering the quality of faith / piety, noble character, mastery of science, technology, and art, in order to realize the people of Indonesia is advanced, fair, prosperous, and civilized. To run the function, role, and position of a very strategic, certainly required a competent and professional lecturer in carrying out its duties as mandated by Law No. 14 of 2005 on Teachers and Lecturers. That "Lecturers are declared as professional educators and scientists with the primary task of transforming, developing, and disseminating science, technology and the arts through education, research, and community service." While professional terms are expressed as work or activities undertaken by a person and a source of livelihood that requires expertise, skills or skills that meet certain standards of quality or norms and requires professional education. Lecturers are educators who have a role as a determinant of the success of college goals in addition to other educational personnel, because the lecturers who directly intersect with learners, to provide guidance that his estuary will produce graduates as expected.

The implementation of the quality assurance of education is primarily in the educational unit / program. Organizers of educational units / programs shall provide and provide assistance and compliance with the standards. District / municipality governments, provincial governments, and governments also have responsibility for supervision, monitoring, evaluation, facilitation, advice, direction, and / or guidance to educational units / programs. (Nanang Fattah, 2012).

Improving the quality of education can be realized well when the process runs continuously and sustainably. The process of improving the quality of education gradually becomes a necessity following the improvement of quality better than ever. High demands on the quality and qualifications of university graduate specs from its users put pressure on higher education providers and determinants of the quality specifications of college graduates.

In an effort to evaluate the program of implementation of quality assurance activities there are various aspects involved in it include: input aspects (Antecedents), processes (transactions) and outcomes that can be well observed. In the input, the implementation of the program, some problems that can be identified are: (1) Lecturers, educational success is determined the recruitment process of educators. It is therefore necessary to see how the educational background of productive lecturers (academic qualifications), whether the educational background is in accordance with the field being taught, how the teaching experience and how the on-the-job training experience has been followed so that it can improve the teaching ability .

Recruitment is the search effort or withdrawal of labor for an organization / institution to fill vacancies available. This activity begins with the installation of an announcement of the need for labor, selected until the workforce is placed in a predetermined position. For both government and private organizations or educational institutions, when needed a large number of labor and little will do these activities. This activity aims to find a qualified workforce and is usually tailored to the educational qualifications or field of knowledge held (Simamora, 2004).

As a preliminary process in recruitment, what needs to be considered is the planning process. This plan aims to identify how much human resources will be received from the incoming applications, selected to final considerations (Berman, B. and Evans, J.R. 2010). When the process has been done, then the next stage is the organization will perform labor recruitment. For recruitment information to be known to job seekers, the next is to post announcements through the existing media. The media is either print media or electronic media or through others who know of any information about recruitment. It means that information on recruitment can be known by all prospective workers. Similarly, in educational organizations, in this case the institution of Higher Education. As an institution of higher education, universities are required to meet the availability of qualified lecturers who have been determined education and have the competence of the field of science in order to support the success of the institution now and in the future.

The success of higher education institution in carrying out its vision and mission is determined by the improvement of the work quality of higher education institution, and one of them is the existence of educative staff (lecturer) (guidance of development plan of university lecturer). As a lecturer is required to have knowledge and extensive insight and have expertise in their field so that the science provided can be perceived benefits by the community. In clause 6.1, IWA 2: 2007- ISO 9001: 2000, Head of Higher Education, is obliged to manage the human resources needed to implement the quality management system in order to be effective and efficient to achieve the stated objectives. Leadership of Higher Education is responsible for its management, because the lecturer has a very strategic role as the main support in improving the quality of education.

Ability to manage Human Resource Management for Higher Education, one of them is to prepare and provide lecturers as faculty with educational qualifications that have been determined and have the same science field. In addition to the educational qualifications that have been determined and the competence of the field of science, lecturers must act as a mentor, have a good ethics and as an educator who should exemplify the environment of higher education organizations and community environment. This is because the existence and the role of lecturers is an effort to deliver students / students into people who can practice science both in the community environment and workplace organization environment. But to get a lecturer who has the qualifications of education and competence in the field of science is not easy. In view of Law No.14 of 2005 on Teachers and Lecturers, lecturers must be educated at least graduates of master programs (S-2) who teach on diploma and undergraduate programs, as well as doctoral programs (S-3) teaching in master programs. Another problem that arises is if the needs of lecturers who teach adapted to the competence of the field of science, it is increasingly difficult for higher education institutions to meet it. Based on the problem then it is necessary to do research to know the recruitment system of educator at Muhammadiyah University of Makassar.

2. RESEARCH METHODS

A, Type of Research

This research is a descriptive research using qualitative approach. Qualitative method is intended to obtain a relatively in-depth understanding and interpretation of the meaning of the existing phenomenon in the field. According to Bogdan and Taylor Qualitative research is as a research procedure that produces descriptive data in the form of written or oral words of people and behavior that can be observed. (Moleong, 2000).

B. Location and Time of Study

Research sites

The location of this research is Muhammadiyah University of Makassar located at Jalan Sultan Aiauddin No. 259 Makassar City.

C. Data Source

Given this research is classified field research, then the required data not only comes from the field, but also required the written data (library research) to support data obtained from the field. Thus, the data sources from this study are:

1. Primary data is data obtained directly from information relating to the subject matter studied. Primary data source of this research comes from field data obtained through interviews of leaders, lecturers, and management of quality assurance. Through this data source, researchers searched for and searched real data in the field. The intended is the evaluation of the implementation of quality assurance program in Muhammadiyah University Makassar. In the implementation, the authors conduct direct interviews with the parties who are considered to be the competent and know the problems being studied.

2. Secondary data is data supporting primary data. Secondary data sources are obtained through the review of documents, books, magazines, and other references deemed relevant. Through this source, the researcher searches and traces the materials that are related to the subject matter covered which includes the implementation of the recruitment of educators at Muhammadiyah University of Makassar, whether in the form of books, documents and other information from various written media covering the implementation of the guarantee quality at Muhammadiyah University Makassar.

D. Data Collection Method

This study uses open standard interview, which uses a set of standard questions, sequence questions, and how to present it to each informant. Standard open interviews were conducted with Informants Leadership of Universities, Study program, Chairman UPM University, and Head of Sub-directorate HR.

3. RESULT AND DISCUSSION

Recruitment of Teachers (Lecturers)

Human resources of lecturers have a vital position in shaping the quality image of graduates as well as the quality of institutions in general. The position is reinforced by the fact that lecturers have authority in the academic process and are even higher than similar professions in educational institutions underneath. Development seems to be a real need for efforts to improve HR performance through a systematic process of development concepts, then productivity can be expected. Lecturers become important parameters in the institutional control process of universities. Thus, thinking about efforts to improve the quality of lecturers should be an obsession of college managers.

Selection Process Of Lecturers

Lecturers recruitment / selection system is the process of recruiting new lecturers to meet the balance of the ratio between lecturers and students. Recruitment of lecturers is done by recruitment team consisting of elements of leadership, head of study program and lecturer board.

The Human Resource (HR) recruitment system in Muhammadiyah University Makassar follows the hiring mechanism established under the Standard Operating System (SOP). To get qualified human resources to support Muhammadiyah University Makassar Vision, Mission and Purpose. Recruitment activities or appointment of new lecturers based on the Statute of Muhammadiyah University of Makassar:

- Based on the urgency of the needs, financial, and prospects of the study program.

- Procedures, mechanisms, and procedures for lecturer recruitment shall be stipulated by joint Rector and BPH decisions.
- Prospective lecturer who passed the selection is appointed as a lecturer of the contract of association and with certain consideration may be renewed his contract or stipulated as a permanent lecturer of the association.
- Professors or personnel with special / special skills who have been returned to duty / not bound by other agencies may be considered to be appointed as non-permanent lecturers (emeritus). (Statute of Muhammadiyah University of Makassar, 2016).

The acceptance of new lecturers is not only based on the Statute of Muhammadiyah University of Makassar but also the reference is the Academic Document of Muhammadiyah University of Makassar, which concerns Human Resources, namely:

Holding lecturers' acceptance gradually and openly based on the need by considering the highest quality, degree, academic, competence, Islamic value, and kemuhammadiyah. (Academic Document University of Muhammadiyah Makassar, 2010).

The stages in determining the needs of lecturers, namely:

- Leaders (Rector, Vice Rector I, Director of SDK, Director of AKSL Head of Sub-directorate SDM) and HR staff hold a meeting to determine lecturers' needs.
- Lecturer's needs are determined based on the needs of the study program who need and are adjusted based on the required expertise specifications by designating efficiency and effectiveness.
- Head of Sub Directorate of Human Resources announces through the Website and Electronic Media and Print Media (newspaper) the acceptance of lecturers broadly will the needs of lecturers based on the required expertise specifications.
- Head of Human Resources and HR staff collect and accept applicants according to the required classification of the study program.

The acceptance of new lecturers in 2017 is technically regulated in the Employment Regulation No 124 of 1416 H / 1995 AD and Regulation of Personnel No. 124 Year 1427 H / 2007 M, (3) Employment Regulation No. 05 Year 1434 H / 2013 M. Selection of new lecturers based on the Decree of the Rector of Muhammadiyah University of Makassar number 140 Year 1438 H / 2017 M about the selection committee of acceptance of lecturer candidates of Muhammadiyah University Makassar. (Muhammadiyah University Rector's Decree Makassar, No. 140 Year 1438 H / 2017 M). Referring to the decisions, the committee appointed to make job descriptions and work mechanism of the implementation of new lecturers acceptance.

The stages of the process in selecting lecturers, namely:

1. Sub Directorate of Human Resources stipulates the selection of lecturer acceptance committee approved by the Rector.
2. Rector, Vice Rector I, Vice Rector II, and Sub Directorate of Human Resources conduct selection of lecturer applicant files.
3. Rector, Vice Rector I, Vice Rector II, and Head of Sub Division of Human Resources to select the completeness of the applicant lecturer in accordance with the requirements.
4. Lecturer receiving committee issued test card of lecturer acceptance selection that has fulfilled the requirements in accordance with the rules of Muhammadiyah University, Makassar.
5. The lecturer's committee prepares the official report of the acceptance of lecturers for the taking of test cards.
6. The lecturer's admissions committee shall determine the participants who pass the file to follow the acceptance of the lecturer who has been approved by the Rector.
7. The lecturer committee announces to pass the file or qualify through the website of Muhammadiyah University, Makassar (www.Muhammadiyah University .ac.id).
8. The lecturer's committee prepares:
9. News of the event and absent of landfill.
 - a. News events and IT absences.
 - b. Event news and absent Microteaching.
 - c. News of the event and absent Interview.
 - d. Letter of assignment of TPA companion.
 - e. Letter of assignment of Microteaching testers.
 - f. Interviewer assignment Letter.
 - g. Taking the test card
10. The admissions committee invites applicants who have met the minimum standard requirements to follow the selection process on schedule determined via phone and SMS broadcast.

11. The admissions committee prepares the administration of lecturer acceptance selection.
12. The acceptance of the lecturers makes a fair selection process, based on the required expertise criteria, the applicant's individual ability, the applicant's ethics and professionalism.
13. Other provisions of the selection process shall be stipulated by the Rector, Vice Rector I and Vice Rector II.
14. The result of the selection process of the applicant is determined on the highest value of the predefined criteria submitted to the Rector as the applicant candidate received.
15. The lecturer's admissions committee shall determine the participants who graduated or accepted as a lecturer of Company of Muhammadiyah University of Makassar which has been approved by the Rector, Vice Rector I and Vice Rector II.
16. The admissions committee announces the lecturers graduated or received through the website of Muhammadiyah University of Makassar (www.Muhammadiyah University .acid) and electronic media (newspaper). (Manual Selection System Procedure Admission Lecturer Company Human Resources (HR) Muhammadiyah University Makassar, 2016).

The minimum requirements of applicant lecturers who need to be met, namely :

1. Indonesian citizen (WNI)
2. Moslems
3. Have knowledge and ability of Al Islam and muhammadiyah.
4. Aged:
 - a. Maximum 35 (Thirty Five) Years on 01 June 2016 for applicants with S2 and S2 Education qualifications
 - b. Maximum 50 (Fifty) Years on 01 June 2016 for applicants with S3 Education qualification
5. Healthy Physical, Spiritual and Drug Free.
6. Not located as a permanent lecturer at other universities
7. For Civil Servants / other permanent employees, obtain permission from their respective Institutions.

Other provisions stipulated by the Rector and Vice Rector I. (Manual Selection System Procedure Admission Lecturer Company Human Resources (HR) Muhammadiyah University Makassar, Year 2016.)

After the lecturer's admission schedule is closed / closed, the next step is to select the file for new lecturer candidates as a requirement of the completion of the file and ready to follow the next selection that has been determined by the selection team. Based on the objective data of the Muhammadiyah University Statute of Makassar, academic documents, and personnel regulation of Muhammadiyah University Makassar on the acceptance of new lecturers, it can be described the stages of the acceptance of new lecturers based on the results of the following interviews.

Identification of new lecturer candidates using the selection stages as revealed by Head of Human Resources Sub Unit of Muhammadiyah University Makassar, that:

Administrative requirements are the first step for file selection for new lecturer candidates conducted by a selection team at the University level. Education qualification is the main requirement in the recruitment of lecturers. Lecturer qualifications required Minimum education S2. Prospective lecturer Who pass the next file will take the competency test in several stages, namely:

- 1) Written test covering general knowledge and insight of Al Islam muhammadiyah,
- 2) IT Capability Test,
- 3) Micro Teaching Practice,
- 4) Interview by Chairman of BPH, WR I, II, III and IV

The ability to read the Qur'an. (H. Rusdi, Head of Muhammadiyah University Human Resource Makassar, Interview, on Monday, March 8, 2017).

The new faculty acceptance system implies the existence of policies and guidelines so that the stages of implementation are done in a structured and directed which is a prerequisite that has been determined, for example: 1) administrative requirements related to lecturer qualification required Minimum education S2, 2) general knowledge and insight of Al Islam Muhammadiyah, 3) IT Ability Test, 4) Micro Teaching practice, 5) Interview by Head of BPH, WR I, II, III and IV, 6) Ability to read Al Qur'an.

In addition to the selection committee of recipients of candidates of lecturers of company formed, then formed next is the selection test team of reading al-quran, the team of reader selection of recitations of the Qur'an, TPA examination supervisors, technology information tester team, microteching penguins team, and interview selection team. (Document Manual Procedure of Lecturers Receipt System Company Human Resources, Muhammadiyah University Makassar, 2017.)

The number of new lecturer applicants in 2017 who pass the file to follow the tests that have been determined by the selection team, namely: 438 people (Document Minutes of Acceptance of candidate lecturers

unity cooperation Muhammadiyah University Makassar, August 16, 2017) and then follow the test stages that have been prepared by the selection team .

The lattice of interview material of new lecturer candidates are:

1. National Awareness and Commitment to Company Muhammadiyah, and especially Muhammadiyah University of Makassar (By Chairman of BPH)
2. Scientific and Higher Education (by the Rector)
3. Academic Ability / Thridarna Fields of Higher Education (by Vice Rector 1)
4. Field of Resources and Finance (by Vice Rector II)
5. Insights on the development of student affairs (by the Vice Rector III)
6. Insights / Understanding Al-Islam and Kemuhammadiyah. (H. Rusdi, Head of Muhammadiyah University Human Resource Makassar, Interview, on Monday, March 8, 2017)

After the stages of the test followed by the prospective lecturers then the next step is to wait for the results of the announcement of the University based on the results of the selection of stages-resistant tests that have been followed by prospective new lecturers. Lecturers who passed the selection are required to sign a work statement containing the ability to comply with the rules of Muhammadiyah University of Makassar.

The acceptance of new lecturers is based on the needs and regulations at the Muhammadiyah University of Makassar. The following excerpts of interviews with Vice Rector I Muhammadiyah University Makassar:

The system of recruitment and selection of lecturers is tailored to the needs of Muhammadiyah University of Makassar, and embraces transparency and accountability through the website www.Muhammadiyah University.ac.id, print media, and social media. Recruitment is done based on need, which is related to the programs that are and will be implemented and the projection of the number of students in the next few years. (Rahim Nanda, Vice Rector 1, Muhammadiyah University Makassar, Interview, on Monday, March 20, 2017).

After the determination of the new lecturer graduation is the most important thing done by the university is the placement of lecturers according to the qualifications of science owned and based on the needs of the faculty / study program. As expressed by Vice Rector I Muhammadiyah University Makassar that:

Placement of lecturers tailored to the needs and formations available in each faculty or study program. Placement is the assignment of a lecturer on a new job. Considerations that can be used as the basis of placement is the readiness of lecturers both in terms of adaptability and readiness in terms of new jobs to be occupied. In addition, the readiness of the units that will receive lecturers tailored to the needs. Proper placement is a way to optimize skills, skills to work performance. This is part of the lecturer development process (employer development). Thus, in its implementation pay attention to the principle of efficiency (suitability between the skill required with the lecturer). (Rahim Nanda, Interview, 2017).

The acceptance of new lecturers in addition to observing the stages mentioned above, also carried out by considering the needs of each course and the ratio of students. The number of candidates who passed the lecturer after following the stages of selection above, which is 140 people. (Rector's Decree No. 1009 / II.3.AU / 2017 About Announcement of Lecturer Selection Result Company Muhammadiyah University Makassar Year 2017).

Observation Of Recruitment Of Teachers (New Lecturers)

Based on the criteria and technical acceptance of lecturers whose data sources are through documents and interviews from the informants, then the observation instrument is also prepared with checklists to facilitate the retrieval of data. The choice of reply checklist using scale four that is: 1 = Not satisfied (TP), 2 = Dissatisfied (KP), 3 = Satisfied (P), and 4 = Very Satisfied (SP).

The result of evaluation from 32 Head of Study Program related to recruitment of educator (lecturer) is observed by using observation instrument. The results of observation answers can be seen in the table scores as follows:

**Table 1. Tabulation Score Observation Results Recruitment of Educators
(New Lecturer Candidate)**

No	Objective Standards	Rating				amount Respondents	Number Value	Average Value	Category
		1	2	3	4				
1	Acceptance of new lecturers candidates is published publicly	0	5	5	22	32	113	3.53	T

	through internet print media, and social media								
2	Lecturers' acceptance is done transparently and accountably	0	6	10	16	32	106	3.31	T
3	Placement of lecturers tailored to the needs and formations available in each faculty or study program	2	7	18	5	32	90	2.81	M
4	Lecturers who are graduated / accepted qualify as a benchmark	3	9	8	12	32	93	2.9	M
5	Requirements for graduation of prospective lecturers follow written test covering general knowledge and insight of Al Islam Muhammadiyah	0	0	5	27	32	123	3.84	T
6	Requirements of graduation of prospective lecturers follow IT skills test	0	6	17	9	32	99	3.09	T
7	Requirement of graduation of lecturer candidates follow <i>Micro Teaching Practice</i>	0	3	8	21	32	114	3.56	T
8	Requirements of graduation of prospective lecturer through interview by Chairman of BPH, WR I, WR II, WR III and WR IV	0	0	16	16	32	112	3.5	T
9	Terms of graduation of prospective lecturers based on the ability to read the Qur'an	0	0	14	18	32	114	3.56	T
10	Graduation of prospective lecturers based on the highest scoring achievement (rank order score)	0	0	7	26	32	125	3.9	T
	amount	6	36	108	172		1089	3.4	T

Description T = Height (3.01-4), M = Moderate (2.01-3) , and R = Low (1-2)

The result of data analysis of observation instrument from the above table about recruitment of new lecturers receipt shows with high categorized achievement or is on average 3.4% from 32 respondent's answer with objective standard to be achieved . However, from the 10 components of the statement relating to the recruitment of new lecturers there are 2 statements showing moderate category of lecturer placement tailored to the needs and formations available in each faculty or study program (2.81%) and Lecturers graduated / accepted qualify as the benchmark (2.9%).

4. CONCLUSION

The recruitment of new lecturers through objective information indicates that: from 10 components of the statement evaluated, there are 8 components of high category categorization and 2 component statements showing moderate category that is the placement of lecturers tailored to the needs and formations available in each faculty or study program (2.81%) and lecturers graduated / accepted all follow the test stages determined by the committee (2.9%). Nevertheless, from the objective standard determined, it shows high achievement categorized or is on average 3.4% from 32 respondent's answer.

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Perspectives Of Collaboration In Planning Regional Development Merauke

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Abstract : *In the perspective of collaborative development planning, there are three pillars of development that must be considered viz. the Government, private and community. The third pillar must sit together to plan the next joint requirements. The collaboration between the government, civil society, and the private sector is the role of the optimization measures of government in the implementation of public policies and the Organization of the Ministry of the public. This research aims to find out how the perspectives of collaboration in the regional planning development Merauke The Merauke haven 't run with maximum whereas commitment together with stakeholders in the development of any significant yet. Then the model of collaboration need to be cared for in order to improve public services in the Regency of Merauke. It was concluded that regional development planning collaboration perspective Merauke runs with no maximum, then Government involvement is expected to accommodate the values and interests of the public in decision making, improve the quality of public decision*

Keywords : *development planning, collaboration, and development*

1. INTRODUCTION

Planning is a guide for action in the future. In the public domain, planning is an activity that is not only concerned with public policy-making processes, but also in community community activities. Initially, the planning approach is based on the instrumental rationale. But then the planning approach shifts towards rationality-based planning of communicative action, as it is perceived as more relevant to today's more complex and fragmented society, and is known by the name of participative planning-deliberative, consensus planning, or collaborative planning. Each of these plans emphasizes on a particular aspect, but has a common key activity that is a collaborative process. This leads to such planning approaches commonly known as collaborative planning.

Development is a long-term capacity building process that requires precise and accurate planning. This means planning should be able to cover when, where and how development should be done in order to be able to stimulate economic and social growth on an ongoing basis. In other words, the developer of the development plan must be able to predict the impact of development that will be done in the short term and in the long run.

To create conditions of *good governance* is not an easy thing, as well as able to create a government with high efficiency and effectiveness, it is necessary institutional arrangements that not only embrace the philosophy of poor function-rich structures , but also pay attention / focus on the output the maximum), in accordance with its mandate as the Implementation of Government in the Region, regardless of its affairs and authority as Regional Apparatus.

There are two things that the government should do, *first* : expand piratifter against aspirations that be delivered by its people, and need to be sensitive to the needs of its people. The government needs to know what the people need and listen to what they want. *Second* : the government needs to involve all the will and ability possessed by the community in carrying out development. In other words the government needs to put the people as the subject of development, not just as the object of development strives in providing good service to the community.

Thus the government is increasingly able to absorb the aspirations of many communities, so that the development is implemented to empower and meet the needs of the people. The people should be the actors in the development, the community needs to be nurtured and prepared to be able to formulate their own problems, plan the necessary steps, implement the programmed plans, enjoy the products produced and conserve the programs that have been formulated and implemented.

In Law no. 25 of 2004 Concerning National Development Planning System, for the regions there are 5 scopes of regional planning, namely Long Term Development Plan, Medium Term Development Plan, Strategic Plan of Local Government Work Unit, Local Government Work Plan and Working Plan Unit of Region, - the plan synergizes the top down-boot process up for synchronization between each planning process. In accordance with Law no. 32 of 2004 on Regional Government and Law no. Law No. 25 of 2004 on the National Development Planning System, that local governments that have held direct elections should have a document of development plans ranging from long-term development to annual development plans. But the main priority is to prepare a medium-term development document that adopts the vision, mission of the elected head of the region through a series of processes, as a guide in carrying out development during the 5 year period of the regional head.

The development planning process now emphasizes the work plan as a process of: (1) inputs in the form of finance, labor, facilities, etc.; (2) Activity (process); (3) Output / outcomes. The planning process begins with information on the availability of resources and the direction of national development, so that planning aims to establish optimal relationships between inputs, processes, and output / outcomes or can be said in accordance with the needs, the dynamics of reform and more democratic and open government, most know what he needs.

In the perspective of collaborative development planning, there are three pillars of development that must be considered namely the government, private and community. All three pillars must sit together to plan the needs together to the front. Collaboration between government, civil society and private sector is the step of optimizing the role of government in the implementation of public policy and public service delivery. The government of collaboration is the step of 21st century government order. The involvement of all parties between government, civil society, and private sector in the administration of the government with egalitarianism and democracy framework has created governance that puts the interests of society.

In line with the current development paradigm that is no longer dependent solely on the role of government alone, but develops into development involving stakeholders (governance). Referred to as stakeholders or stakeholders are those affected by policies, parties that may influence policies, and those with the resources and authority to implement the policy.

Collaborative Management is the division of political, funding, and administrative authority among stakeholders representing different layers of government institutions, civil society and the private sector. A system that combines different aspects of decentralization, deconcentration and democratization to effectively achieve a balance between rights and responsibility in natural resource management. Focused specifically on the process of realizing and developing an independent container in the management of natural resources multi stakeholder.

Their involvement is expected to accommodate the value and public interest in decision making, improving the quality of public decisions, improving the capacity of communities, and avoiding conflict. The involvement of stakeholders of each development program will be different. They are generally grouped into groups according to their interests and roles.

Collaborative planning is a decision-making process where multiple stakeholders, looking at issues from different angles, sit together to explore their differences constructively, then find solutions, and to get more out of what is gained if only looking for individual solutions.

Collaborative planning is a communication-based planning (communicative rationality). The understanding is derived from several opinions: that collaborative planning is stakeholder oriented planning, involving stakeholders (Healey, 2006, Allmendinger and Tewdwr-Jones, 2002) not limited by time and place (Graham and Healey, 1999), based on the structuralist concept of Giddens and communicative action from Habermas (1984), resulting in a process involving communication, dialogue, and transaction processes (Graham and Healey, 1999; Healey, 2006). This process is a process of mutual learning between actors, so that each gain knowledge of the problems encountered through a structured dialogue, which will ultimately be mutually beneficial. Collaborative planning will work if there is a dependency between actors, as described by Innes and Booher (2010) in the DIAD Network Dynamic model to show that the collaborative process represents collaborative networks where there is a diversity, interdependence and authentic dialogue inside. Interdependence will give rise to a desire to compromise, to finally reach consensus.

The formation of consensus is a result of democratic processes, structured participation, and requires time and patience. At the practical level, the importance of collaboration space in development is faced by discipline problems, openness and acceptance in relation to spatial planning. So far, the development planning system is still around the interests of political elites and regional bureaucracy. The involvement and

participation of stakeholders is felt to be still lacking in the regional development planning of Merauke Regency. The case is one example demonstrating that the current development process is no longer merely a government dominance. Criticism that development is only in the interests of certain parties, awoken the government to the need for communication and joint action with the stakeholders. This led to the emergence of collaborative governance thinking (Anshell & Gash, 2007; Innes & Booher, 2010), where stakeholders sit together to take a public decision that is the outcome of consensus through a process of face-to-face dialogue. This study aims to analyze how the perspective of collaboration of regional development planning of Merauke Regency.

2. RESEARCH METHODS

Research location and Research Design

The research was conducted in Merauke Regency. The type of research used was qualitative descriptive approach.

Informant

The key informant in this research is Head of Merauke Regency

Method of collecting data

The data source used is primary data obtained by observation and in-depth interviews from informants and secondary data obtained by collecting documents and other sources closely related to this research.

Data analysis

The data analysis used in this research is an explanative analysis that is a case study used to describe an event occurring in the field that is associated with operational activities that require certain tracking which is conditioned by time. Certain that begins with Data Reduction, Data Presentation, so that the final process is a conclusion based on the reduction and presentation of data that has been done. Withdrawal of conclusions from the results of data reduction and presentation is adjusted with the research statement and the purpose of the study. (Sugiyono, 2007).

3. RESULTS

Development Planning in Merauke Regency

The development of Merauke Regency is directed to support the vision of Merauke Regency. The development plan is tailored to a balanced and optimal spatial structure taking into consideration the direction of the development of protected and cultivated areas, rural-urban systems, regional and specific infrastructure systems. With the development plan of this region is expected to occur even distribution of growth so as to minimize the gap between regions, as well as maintaining environmental sustainability. In addition, the direction of spatial development of Merauke Regency is also adapted to the role of Merauke Regency as a National Strategic Area Center bordering PNG, the linkage between the Papua Province, Eastern Indonesia, and the linkage of cooperation with other countries in the Asia Pacific Region such as Australia and PNG. Based on RTRWN's direction, Merauke Regency is also designated as a functional functional area with the National Growth Center (PKN) of Jayapura, Timika and Wamena Regional Activity Center (PKW), and economic linkage between Merauke Regency and other districts that started and has been formed from the volume movement of land, water (sea) and air transport, flow patterns of goods and services, among others by Timika, Agats, Fak-Fak, Palu, Manado, Jakarta, Surabaya and others, while for improvement of minimum external relations of Merauke Regency with Hinterland Areas, such as other sub growth centers in Papua Province (PKW and PKL) such as Kepi (District Mappi) and Tanah Merah (Boven Digul Regency).

Merauke district is expected to support growth for these areas. Given that the Merauke district is physically divided into the broad swampland ecosystem and savanna islands, it requires infrastructure development that can bridge the activities of the people who occupy both spaces and to accommodate the

conservation of natural resources and the culture of the Marind-Anim community. Infrastructure built must continue to prioritize the conservation function as the main consideration in order to avoid environmental damage. Based on the Spatial Plan of Merauke Regency, overall, the functions to be developed within the Development Zone in Merauke Regency are:

- Economic functions, including production activities, collection and distribution, processing industries and trade and services;
- Environmental Functions, including the conservation of natural resources, forest protection, disaster prone, cultural preservation and others;
- Security Function, namely the border area with Papua New Guinea (PNG) and the front porch of Australia; and
- Settlement Function such as urban area of Merauke, Small Town District and Independent Integrated City (KTM), and rural area.

Based on the similarity characteristics and proximity of existing inter-regional relationships, as well as the interconnection of the region with its Hinterland region, the development in Merauke Regency can be divided into five regional development systems following the flow of the division of territory with the DAS system, namely Merauke and surrounding areas, Jagebob, Ulilin County, Okaba County, and Ilwayab Region. These five growth areas are then incorporated into the concept of territory with a complementary "ring" system:

- (1) The Ring1 region, consisting of Merauke City as the center and Semangga, Tanah Miring, and Kurik as its sub-centers. The Ring 1 region has characteristics of strong urban areas, which are grouped into Ring territory units. Ring area has a center and sub-centers that have a range of services to the entire region of Merauke Regency.
- (2) Ring 2 area, with Jagebob as its center. The area of Ring 2 has characteristics as a plantation and dryland farming area that is enough to dominate the region. The center of the ring area has a service orientation towards Merauke (Ring 1) as the main center;
- (3) Ring3 region, with Ulilin as its center. Ring 3 region has the characteristics of plantation area on its territory. The center of the ring area has a service orientation towards Merauke (Ring 1) as the main center;
- (4) The Ring4 region, with Okaba as its center. The area of Ring 4 has characteristics of plantation areas, wetland and dryland agriculture, and trade and services. on its territory. The center of this ring area (Okaba) has a service orientation towards Merauke (Ring 1) as the main center;
- (5) The Ring5 region, which has Ilwayab as its Center and Kimaam as its sub-center. Ilwayab Center has the characteristics of fishery areas, collection and processing of fishery products that exist in this ring region. Then sub center Kimaam also has a function of fishery collection, but its role is not as big as sub center Ilwayab. Sub center Kimaam also have characteristic as agricultural area wetlands and farms. The sub-centers in this ring area have service orientation towards Okaba (Ring 4) as central service center of middle and west region of Merauke Regency.

In RTRW District Merauke, several areas have been designated as strategic areas with consideration of defense and security aspects, economic growth, environmental sustainability, and socio-culture. The strategic areas that are set include:

a. State Border Postal Zone at Sota and Elikobel

This Border Postal Area plays a strategic role in the defense and security between NKRI and PNG. Residents in these border areas are engaged in trading activities as well as visiting relatives, as communities in the border area of Merauke still have relative relationships with communities in the border areas of Papua New Guinea. The elevation of cross-border activities by the people of Papua New Guinea to Merauke Regency and vice versa requires special attention from in terms of defense and security. Currently the number of cross-border posts as one means of securing cross-border activities in Merauke District there is only 1 piece, namely in PPLB Sota. Based on the development of KPE Papua-PNG Border will be opened 1 (one) new PPLB in the northern border area of Merauke-PNG, that is in Elikobel District. Furthermore, it is necessary to develop other border areas in Sota District, Elikobel, Merauke, and Ulilin District.

b. Strategic Area of Environmental Conservation.

Regions that have a strategic value of environmental conservation nationally and internationally so categorized as a strategic area in the District of Merauke, is TN Wasur, CA Rawa Biru, CA Kumbe, SM Kumbe, SM Pulau Kimaam, and SM Island Komolom. These areas in addition to the role of conservation are also to protect some species of animals and plants, including some species protected from extinction. In Wasur National Park there are 74 species of mammals and 410 species of birds including migratory birds from Asia and Australia. While the Kumbe Nature Reserve is designed to protect over 230 species of birds (including

migratory birds from Asia and Australia), 4 types of birds, 20 species of birds of cockatoo / Kasturi and 60 species of mammals. In addition there is also the Rawa Biru nature reserve. Kimaam Island Wildlife Reserve, in addition to being a shelter for various species of birds, is also a refuge for Sea Turtles. In addition to animals, the habitat is also protected in Kimaam Island is Mangrove Forest where Mangrove Forest on this Island is one of the largest Mangrove Forest in the World. Other wildlife reserves are found in Kumbe and Island of Komolom.

c. Economic Strategic Area

- Cluster of Agricultural Production Center (KSPP)
Cluster of Production Center for Agricultural Production (KSPP) was developed to support national food and energy security in a wide scale and Modern Agropolitan Area that includes:

- 1) KSPP I (Greater Merauke) in Agricultural Area in Merauke, Semangga and Tanah Lean District;
- 2) KSPP II (KTM Salor) in the districts of Malind, Kurik, and Animha;
- 3) KSPP III (Kartini) in Jagebob District and Tanah Lean District;
- 4) KSPP IV (Muting) in Muting District and Ulilin District;
- 5) KSPP V (Okaba) in Okaba District;
- 6) KSPP VI (Wanam) in Ilwayab District;
- 7) KSPP VII (Tubang) in Tubang District;
- 8) KSPP VIII (Tabonji) in the districts of Tabonji and Kimaam;
- 9) KSPP IX (Nguti) in Nguti and Tubang Districts.

- Minapolitan area in Merauke and Ilwayab districts
- KTM (Integrated City) Salor
KTM covers development areas consisting of Tanah Miring, Kurik or Okaba areas as production centers around the city area, which can serve as a source of raw materials for economic activities that will be developed.
- Greater Merauke urban area (GreaterMerauke)
Merauke city in addition to acting as the center of the economy and growth centers of the region, also has the potential to develop into large urban areas that cover small towns, such as Semangga and Tanah Miring. The Greater Merauke area will assume the role of a growing regional growth and service area not only for Merauke District but also for the surrounding districts such as Mappi Regency and Bouven Digul Regency.

- Strategic Areas of Cultural Preservation
Marind traditional culture, in addition to need to be preserved also must be developed as a manifestation of the success of social development at the same time can be a tourist attraction. Therefore, there needs to be more detailed recognition, determination, and spatial arrangement for areas that have sacred values in local cultural perspectives such as: Indigenous Conservation area, Sacred Place, Water Source, and Sagu Village.

The annual development planning mechanism is described as activities or activities undertaken at each stage of the planning process from below. Implementation of the bottom-up planning mechanism is governed by Regent's Regulation no. 11 of 2007 on the procedures for the preparation of the determination and reporting of work plans of the local government of Merauke Regency which outlines the following implementation planning guidelines:

1. Stages of preparation and determination of regional development work plans implemented through the following sequence of activities:

- a. preparation of initial draft of regional development plan;
- b. preparation of draft regional development plans;
- c. deliberation of regional development planning;
- d. preparation of the final draft of the regional development plan.

2. Stages of preparation and determination of local government work plan implemented through the following sequence of activities:

- a. preparation and Establishment of Revenue And Expenditure Budget General Policy
- b. preparation and Establishment of Temporary Budget Priorities and Ceiling
- c. preparation and Determination of RKA Regional Device Work Unit By Regional Device Work Unit
- d. Implementation and Establishment of Audit and Costing Results of RKA by TAPD
- e. preparation and Design of Revenue And Expenditure Budget by TAPD

- f. determination of Revenue And Expenditure Budget which is RKPD
 - g. control and Evaluation of RKPD implementation
 - h. Government Institution Performance Report (Government Performance Accountability Report) Regional Device Work Unit
 - i. Government Institution Performance Report (Government Performance Accountability Report)
 - j. Report of Accountability Description (LKPJ)
 - k. report on the Implementation of Local Government (LPPD)
 - l. Information on Regional Government Implementation (IPPD)
3. Preparation of regional development work plans and local government work plans implemented based on an integrated schedule with national development planning system and annual development planning of Papua Province.
4. Regional planning is based on accurate and reliable data and information with the following provisions:
- (a) District data and information shall include:
 - 1. The implementation of regional government;
 - 2. Organization and governance of local government;
 - 3. Regional head, parliament, regional apparatus, and regional civil servants;
 - 4. Regional finance;
 - 5. Potential of regional resources;
 - 6. Local law products;
 - 7. Population;
 - 8. Basic territorial information; and
 - 9. Other information related to the implementation of local government
 - (b) Data and information of Districts and Villages includes:
 - a. The administration of the District and Village governments;
 - b. Organization and governance of the District and Village administration;
 - c. The profile of the District area and the profile of the Village;
 - d. Finance village;
 - e. Other information related to the administration of districts and villages and community empowerment.
 - (c) In the framework of the implementation of local government, in order to achieve the effectiveness and effectiveness, the utilization of data and information is managed in a nationally integrated information system, in the form of Regional Profile and Basic Data of Regional Development Planning.

5. Institutional:

- (1) The organizer and the person in charge Deliberation Of Village Development Planning :
- a. Head of village / organizes and is responsible for the planning of development in village / through Deliberation Of Village Development Planning village, whose organization is assisted by community institutions such as Village Community Empowerment Institution village /(LPMD/K) or other term.
 - b. The District Chief organizes and is responsible for district development planning through Deliberation Of Village Development Planning District, assisted by district level Regional Device Work Unit elements.
 - c. The Regent organizes and is responsible for the development planning in the District through Deliberation Of Village Development Planning District, whose organization is assisted by the head of Development Planning Agency At Sub-National Level.
- (2) Preparation and Budgeting of Revenue And Expenditure Budget
- a. Preparation of KU, PPA, and the draft Revenue And Expenditure Budget by TAPD.
 - b. Preparation of RKA Regional Device Work Unit by Head of Regional Device Work Unit.
 - c. The implementation of the Regional Device Work Unit RKA Audit is conducted by Development Planning Agency At Sub-National Level.
 - d. Implementation of Costing RKA Regional Device Work Unit is held by BPKAD.
- (3) Reporting of regional government administration:
- a. Preparation and reporting of Government Performance Accountability Report Regional Device Work Unit by Head of Regional Device Work Unit.
 - b. Preparation and reporting of Government Performance Accountability Report Regional by Development Planning Agency At Sub-National Level.

- c. Preparation and reporting of LKPJ by Development Planning Agency At Sub-National Level assisted by Team formed by Decision of Regent.
 - d. The preparation and reporting of LPPD by the Assistant for Regional Government of the Regional Secretariat is assisted by a Team formed by a Decree of the Regent.
 - e. The preparation and reporting of IPPD by Development Planning Agency At Sub-National Level is assisted by a Team formed by a Decree of the Regent.
6. Head of village based on the results of the consultation on the development planning of village shall establish the priority list of development programs / activities according to the village development work plan (RKP village) and refer to the District Strategic Plan and the ability / availability of budget sources, as follows :
- a. the administration of village government affairs which is the authority of village is funded by APB village local government assistance, and government assistance;
 - b. the implementation of local government affairs held in village funded from the Revenue And Expenditure Budget allocation through Regional Device Work Unit hereinafter referred to as Regional Device Work Unit budget;
 - c. the implementation of local government affairs organized by the village government is funded from the Revenue And Expenditure Budget through the Village Fund Allocation (ADK) with a provision of 30% used for the operational costs of village and BPD government, and 70% is used for the administration and development of village;
 - d. the implementation of government affairs organized by the village government funded from the state budget.
7. District Heads based on the results of the district development planning consultation shall establish a priority list of District / Cross-District development programs / development activities / activities.
8. List of program / activity priorities shall be set at a budget ceiling of at least 20% of Revenue And Expenditure Budget direct expenditure by referring to the Regional Medium Term Development Plan, RKPD, The strategic plan and Work plan Regional Device Work Unit programs, and the strategic plan and work plan districts.
9. List of District development programs / activities is a priority for the preparation of programs / activities of Regional Device Work Unit.
10. The Regent based on the results of the district development planning meeting shall determine the final draft of the Regional Development Work Plan which lists the priorities of the district development program / activity according to the budget ceiling estimates from various sources of financing by referring to the annual program in the Regional Medium Term Development Plan and Regional Device Work Unit affairs authorities.
11. List of program / activity priorities set forth in the RKPD Final Plan, after being stipulated by a Regent Decree, forms the basis for the preparation of General Policies, Budget Priorities and Ceilings, as well as the draft Revenue and Expenditure Budget.

4. DISCUSSION

Various problems that arise since the enactment of Law no. Law No. 21 of 2001 on Special Autonomy for Papua, especially in the case of regional development planning, is not intended to say that special autonomy is useless. Special autonomy for the present and the future is an unavoidable choice. In terms of regional development planning, development planning with participatory planning model developed through Forum Deliberation of Village Development Planning Development Consultation (Deliberation of Village Development Planning) is considered not able to answer the needs of the community. One of the problems lies in a system of planning within government that is designed on the one hand has not been able to adopt the needs of society and on the other hand has not been able to create the efficiency of governance itself.

From these phenomena led to various assumptions and responses from various circles. There are some who say that participatory development planning developed through Forum Deliberation of Village Development Planning Development Consultation (Deliberation of Village Development Planning) has not been in accordance with the current condition of society.

Others argue that participatory development planning developed through the Development Planning Deliberation forum (Deliberation of Village Development Planning) is only at the level of formality only to

meet the provisions of legislation. Another opinion says that there are deviations in the implementation of participatory development planning that is the mobilization in the community participation and still the dominance of a group of parties in the development planning.

From the above description and explanation, the phenomenon and the assessment generally occur also in Merauke Regency. However, it is necessary to conduct research to find the facts that actually happened in Merauke Regency related to the problem of regional development planning with participatory planning model, in order to take preventive action / repair as soon as possible or if necessary it can be arranged a new mechanism of planning better (participatory) and applicable are more able to accommodate aspira then used the perspective of collaboration. Furthermore, the authors analyzed the results of research data in the field, the data obtained is the result of observation, interviews with informants, reports and books that support research collaboration in Regional Development Planning Merauke regency.

1. Deliberation of Development Planning (Deliberation of Village Development Planning)

The meaning of the District Deliberation of Village Development Planning is the deliberation between district development actors (stakeholders) to finalize the draft Local Government Work Plan (RKPD) based on the work plan of the Regional Device Work Units (Regional Device Work Unit) resulted by the Regional Work Unit (Regional Device Work Unit) forum by reviewing the harmony between the draft work plan The Regional Device Work Unit (Regional Device Work Unit), whose results are used for updating the draft Local Government Work Plan (RKPD). The implementation of the District Deliberation of Village Development Planning observed the results of the discussion of Regional Device Work Unit forums and joint forum of Regional Device Work Unit, Medium-Term Development Plan / The strategic plan Daerah, current development performance and input from the Deliberation of Village Development Planning participants.

The results of the district Deliberation of Village Development Planning are the priority of activities selected according to funding sources from the local Revenue And Expenditure Budget, provincial Revenue And Expenditure Budget and APBN as materials for updating the district / city draft RKPD as the basis for the annual budgeting. RKPD is the Local Government Work Plan which is the main reference for the drafting of Regional Revenue and Expenditure Budget (Revenue And Expenditure Budget).

The purpose of Deliberation of Village Development Planning; the purpose of the implementation of Deliberation of Village Development Planning based on the guidelines that have been compiled things are: First, get input for the initialization of RKPD draft that contains the priority of regional development, the indicative budget funding development based on the Regional Device Work Unit function, the draft of the Village Fund Allocation, included in this update is information about the activities with funding derived from Provincial Revenue And Expenditure Budget, APBN and other funding sources. Second, get the details of the initial draft RKA Regional Device Work Unit, especially those related to development. Third, establish the details of the initial draft of the regulatory framework according to the Regional Device Work Unit related to development.

Deliberation of Village Development Planning inputs, various things that need to be prepared in the implementation of Deliberation of Village Development Planning are as follows: First, coming from the districts are: a) RKPD draft compiled by Development Planning Agency at Sub-National Level based on the priorities of regional development; b) Work Plan Regional Device Work Unit Design result of Regional Device Work Unit forum containing the regulatory framework and budget framework whose activities have been disaggregated based on funding sources from Revenue And Expenditure Budget District, Provincial Revenue And Expenditure Budget, APBN and other funding sources: c) Budget priorities and ceilings issued by Regent consisting of ceiling for Regional Device Work Unit and ceiling for village Fund Allocation: d) List of names of Regional Device Work Unit Forum delegates selected to attend District Deliberation of Village Development Planning: e) Planning and regulatory documents related to development. Second, coming from the districts, among others: a) List of priorities of development activities originating from districts: b) List of district delegation names selected to follow Regional Device Work Unit Forum and District Deliberation of Village Development Planning: c) List of delegate names of Regional Device Work Unit forums that are selected to follow the District Deliberation of Village Development Planning.

The results of observations at the research sites in the implementation of the participatory district development planning meetings include the various elements that are grouped into 3 (three) elements ie the elements of government, elements of support and community elements All participants Deliberation of Village Development Planning conduct assessment of the proposed activities in the format provided that contains about the program / activity, activity location, activity volume. Assessment is based on the criteria set out in the preparation stage.

With regard to clustering in the process of prioritizing development activities undertaken in the district Deliberation of Village Development Planning forum, the Head of Development Planning Agency at Sub-

National Level briefly suggests that: "Assessment serves to explore ideas of Deliberation of Village Development Planning participants through the numbers, so they can easily determine which activities are prioritized. The benefits of scoring or assessment are to enable participants to prioritize activities based on the existing criteria by looking at programs / activities , location of activity and volume of activities The format of the assessment has been provided by Development Planning Agency At Sub-National Level, so that the participants live to include the score In preparing the priority scale the proposed activity is based on the amount of the final value of each activity. " (Informant D, Oct 2014).

Deliberation of Village Development Planning activities have been implemented by the Government both at the village level and at district to district level. It also shows that bottom-up planning has already materialized at the district level. And people's aspirations can be accommodated up to the district level. In this regard the Head of Semangga District explained that:

"All proposals from villages in Semangga area as long as their values and activities are logical are accommodated and we include them in the District's annual development plan (RPTK) and we take it as a proposed development activity in the Regional Device Work Unit and Deliberation of Village Development Planning forum in the hope that the proposal can be approved or can be included in the budget next year so that planned development activities in the village can be implemented in the next year. " (Informant RS, Oct 2014).

The same thing was also expressed by the Head of Merauke District: "We (district government) are just as facilitators, so all of our citizens (from our villages) are accommodated and submitted in district forums (Regional Device Work Unit and District Deliberation of Village Development Planning forums) and we will try to make our proposal acceptable and entry as a priority regional development activities ".

2. Collaborative Perspective of Development Planning

Collaboration is not based on the paradigm of legal authority because there is no legal bond. Questions arise, why do the stakeholders come, sit at a table, work together, enter into agreements, and implement collaboration? Reed and Cedja, as quoted by Bradshaw, describe the prerequisites or preconditions of organizations that support the success of collaboration. The preconditions must be balanced with energy investments as the initial stages of the program and related activities. Energy investment is done since problem determination, goal setting, and structuring.

The stage runs incrementally, but in practice it is more spiral than in a straight line. Consequently, each partner must constantly balance the long-term focus with the flexibility of the effective way found on the journey. This needs to be done to adjust to local needs, availability of resources and prefers and the collective capacity of stakeholders to manage change.

Some of the planning approaches are transactive planning (Friedman, 1973), collaborative planning (Healey, 1996), communicative planning (Sager, 1994, Innes, 1997), participative deliberative planning (For-esters, 2000), and consensus planning (Woltjer, 2000), has relatively similar characteristics in terms of emphasizing the importance of cooperation with the basis of communication among stakeholders. Cooperation process will take place well if there is communication in the form of dialogue therein. In transactive planning, the dialogue that occurs is a life dialogue, which is confirmed by Innes and Booher (1997) as authentic dialogue. In this case, every actor who sits together mutual respect, empathy, reciprocal and mutually beneficial. Thus, dialogue will only occur if the stakeholders participate and sit together in solving the problem. Participation itself will only occur if they have an interest and have the opportunity to voice their interests, and such participation will only occur if there is interdependence and trust. Cooperation through dialogue and participation is directed at consensus building (Woltjer, 2000; Innes, 1996). Processes that include dialogue, participation, and decision-making activities are summarized in a collaborative process.

What are your views on the collaborative planning of regional development in Merauke Regency?

"At the core of the collaboration is already running though not significant but already visible start of the role of various stakeholders Community participation in regional development planning is also increasingly visible, especially those built through cooperation or development of networking between local governments and various social institutions and organizations, such as with LMA, other religious organizations, youth organizations, women's organizations, social institutions, professional organizations / associations, business, universities, press, etc. ".

Furthermore it is said also that:

"Collaboration Regional development planning process begins from the meetings are scheduled both at the village level, district d, then forum an district so that communication can run, if the communication

goes well of course the elements of negotiation of interests will also run wellthe two-way communication between the community and Local Government will be better. Community discusses the planned activities with the Local Government. In addition the local government also provides an overview of the regional development plan. "

This statement is in line with the opinion of Gunton and Day (2003) tends to link collaborative planning with negotiations, suggesting three phases of pre-negotiation, negotiation, and post-negotiation. Pre-negotiation includes: (a) preparing, (b) identifying stakeholder groups that will participate in the collaborative process and appointing representatives of each group; (c) preparing draft basic rules, proposals, objectives, procedures, roles and responsibilities, schedules and logistics, and (d) identifying relevant facts and information required in the process. The negotiation phase includes: (a) identifying stakeholder interests and using procedures such as brainstorming and mapping ideas to identify broad choices, (b) wrapping options and encouraging negotiation principles in a single document, (c) uniting groups into an agreement and ensuring that the representatives of each stakeholder ratify the agreement. Post-negotiations include activities: (a) obtaining approval for agreed agreements to facilitate their implementation, and (b) creating a monitoring process to evaluate the implementation followed by renegotiations that may be required due to a change of circumstances.

A. Negotiation process in planning collaboration

Negotiation in collaboration is a transaction in which the parties to the communication have the right to the final result. (oliver). Other experts say that negotiation is a process whereby at least two parties with different perceptions, needs, and motivations try to agree on a matter of mutual interest (Casse). While Stephen Kozicki argues Negotiation is a of art in reaching agreement by solving differences through creativity.

Negotiation or negotiation is the process of achieving mutual satisfaction through discussion and bargaining. A person negotiates to settle the dispute, alter the treaty or terms, or rate the commodity or service, or any other matter. In order for the negotiation to succeed, each party must genuinely desire an actionable agreement, and as a long-term agreement. Because there is no point in an agreement if it can not be applied or implemented. When that happens then negotiators (negotiators) who are representatives of an interested party will lose credibility and prestige.

Before beginning the negotiation process, there are several steps that must be passed before heading into the negotiation process. There are things to be prepared in advance for the outcome of the negotiations to be as expected. In the preparatory phase, there are at least four stages to go through the planning, compilation, data collection, and determining alternative strategy choices. In the first stage of planning, if done effectively and setting appropriate targets will create the objectivity of the negotiator so that negotiations can take place effectively and produce the agreement as expected. Rackham (1980) suggests four things that need to be considered and done at the planning stage. First, during a negotiation plan, a negotiator explores the options of action to be taken more broadly. Secondly, the negotiator needs to know the equation he has with his counterpart. Third, try longer to find the implications that will result from the issue in question. Fourth, it is necessary to determine the highest and lowest limit of the agreement so that the outcome does not come out of the topic of the problem.

The second stage in the preparation of negotiations in the compilation phase is to determine which issues will be at stake (Lewicki et al, 2003). These stages include the focus, formation, and compilation of strategies to be undertaken during the negotiation process. Strategy is an important element in the negotiation process because it serves to determine the direction and effectiveness of the negotiation. So it can not be denied that a good strategy can bring the negotiation process to the win-win solutions. In this stage also, the previously planned strategy is then compiled into the most final and implemented strategy during the negotiation process to achieve predetermined objectives.

The third stage in the preparation of negotiations is the stage of data collection or research. According to Jackman (2004), data that can be collected and analyzed prior to a negotiation is the opposite of negotiation, negotiation history, negotiation situation, and business or cultural environment. To find out details about individual or representative negotiators or groups represented by the negotiator, refer to some research questions such as who, what backgrounds, what positions they will get, the possibilities of negotiation techniques to be used, the similarities and differences between them the opponent, the expected goal of the opponent in the negotiation, and so forth. The data collected to find out the negotiation history such as the background of the negotiation can be a reference to solve any problems or issues. If the previous negotiation ends with a deadlock then it can be analyzed to cause the failure of the previous negotiation so that the next negotiation will not repeat the same mistake. If the previous negotiations have gone well but the party feels a little disadvantaged, then the negotiator can analyze the factors so as to develop a better strategy to make a profit (Jackman, 2004). To understand the situation of negotiation as a whole, accurate data is needed so that the negotiator gets an idea of where the negotiating outcome will go, whether win-win, win-lose, or even deadlock. The latest data collection is about the business or cultural environment (Jackman, 2004). This is necessary because in the process of

negotiation, the parties involved come from different environments and have different backgrounds. In order for the existing differences not to be a barrier to the success of negotiations, negotiators need to understand the existing conditions thoroughly so that goals can be achieved.

The final stage in the preparation phase of the negotiation is to prepare a choice of alternative strategies to be used. This is done with the aim that the negotiator has an alternative strategy picture that will be used if the negotiation process does not reach an agreement. This stage is commonly known as BATNA or the Best Alternative to A Negotiated Agreement where the concept was first introduced by Roger Fisher and William Ury on the negotiation project at Harvard and described in more detail in his book *Getting to Yes: Negotiating Agreement Without Giving In* (Greer, 2006). As Hoffman (2011) puts it, estimating the opposing BATNA is a prediction of what will happen during the negotiation process. BATNA is obtained after analyzing the data that has been collected during the previous stage process. Venter argues that BATNA is not as concerned with the objective of negotiation, but rather determines the action if the negotiating process can not reach an agreement. The purpose of determining BATNA is to prevent it from any harmful agreement. The strength of BATNA that a negotiator can determine the success of the negotiation process on his part. While the weak BATNA will harm his side if it is known by the opponent. In addition to BATNA, the negotiator must be able to determine MLATNA or the Most Likely Alternative to A Negotiated Agreement and WATNA or Worst Alternative to A Negotiated Agreement as the worst anticipation. An example of the application of BATNA is the US dispute with Iran where the United States through the United Nations proposes halting Iran's uranium development otherwise it will be sanctioned. Here the United States determines the BATNA to perform an economic embargo on Iran by abandoning the import of petroleum from Iran.

From the above explanation can be concluded that before negotiating, a negotiator must make preparations that include four stages of planning, compilation, data collection, and determine the choice of alternative strategies. This process aims to determine the strategy to be used during the negotiation process so that the established goals can be achieved. The data collected can be a reference in determining the strategy and also to understand the overall negotiation situation so that the agreement does not get out of the topic or issue of negotiation and can anticipate if negotiations do not reach agreement.

Based on the results of interviews with informants on the implementation of negotiations between stakeholders with stakeholders in general it is said that the system of negotiation system always refers to Deliberation of Village Development Planning either at the village level to the district.

This was revealed by the Head of Regional Development Planning Board of Merauke Regency that: "Basically, negotiations are held at meetings of Deliberation of Village Development Planning because on this occasion many representatives from all elements are present to convey their expectations in connection with development planning next year."

(Informant D, October 11, 2014 at 12.00 WIT)

In line with that opinion, the Head of Semangga District stated that: "We have made efforts to negotiate with the community but are constrained by the time been tried to invite community figures, religions and customs as well as youth and representatives of women and NGOs but who came not how there are other activities can not be abandoned so we can only negotiate with them only when Deliberation of Village Development Planning is implemented. "

(Informant RS, Oct 15, 2014 at 13.25 WIT)

Subsequently added by the Secretary of Indigenous Peoples Institute Imbuti Merauke District about the negotiation effort as one of the development planning collaboration items as follows: "Each community group has the same hope in development that is equitable development and side with local needs but to sit together to talk about it hard to ask for forgiveness our society is still difficult to sit together discusses the development of regional development because it feels so far less ogled by the government "

(Informant MS, Oct 23, 2014 at 14.15 WIT).

Furthermore, it is said that for the selection of community aspirations in Kelapa Lima District, Merauke District is done at the environmental level. This aspiration screening is done 2 weeks before the implementation of village level Deliberation of Village Development Planning. Although the community aspirations / investigation activities of the problems and needs of the Kelapa Lima Merauke community are generally carried out at the environmental level but do not ignore the people's aspirations from the lower levels, following the reasons presented by the Kelapa Lima urban village:

".... Considering the number of Kelapa Lima residents is quite a lot, of course we are difficult to accommodate all the problems and needs of citizens through citizens forum at RT level, my assumption that each chairman of RW can understand and know exactly what the problem, the potential and the needs of the community so I think the negotiations have been going on that level "

(Informant SA, Oct 11, 2014 at 10.10 WIT).

In line with the reason Kelapa Lima Village Head, a community leader from the element of women put forward the following reasons:

"Ideally the community as a whole should propose what they need, but because of the limited time, place and busyness of the citizens who do not allow the holding of citizen forums at the neighborhood level and I think this is enough to represent what all the environmentalists need, (Informant BD, Oct 11, 2014 at 10.10 WIT).

Another thing that some contractors in negotiations say is that:

"Seems no longer need to negotiate because during this development project is offered with auction system we want to sit down discussing what? ... if the government would invite us to sit negotiate discuss future planning maybe we sit discuss this village needs this and done by this contractor ... it means that the immediate fit of the target may be but if you sit on a new discussion program does not mean the same path " (Informant BDc, 23 Oct 2014 at 11.10 WIT).

This statement was straightened out by the Head of the Regional Development Planning Board of Merauke Regency that:

"Negotiation with the whole community is important because there are many plans not only government but the need for what the community needs and it needs to be discussed together if the procurement project is already directly through LPSE ... cross accessible. " (Informant D, Oct 25, 2014 at 13.10 WIT).

Added also that:

"Planning collaboration is important because there is negotiation and commitment although it is still limited but it seems to be very meaningful to synchronize the proposed development plan from the faithful level, from village to district".

Based on the results of the above interviews, it can be said that the negotiation aspect in the collaborative process of development planning in Merauke Regency has not gone as expected. Thus it is necessary to work hard to build a good system in an effort to establish collaborative development planning in the region.

B. Process commitment in collaborative planning

The commitment of development is the process of enhancing the creative capacities of human beings that originate from the imagination, building theorization, experimentation, conceptualization, organizing, solving problems that use the mind and hands that produce the progress of the individual and all mankind (Mas'ud, 2003). As a commitment, of course, this becomes something of an orientation that experiences ups and downs of the development of meaning in economic and political contexts. This is due to the strong pressure from big and advanced countries to the development of the global world, in which the whole community of nation states is forced to be integrated in the world order system which became the initial track for the creation of conflict of interest in the implementation of development in the distorted empirical context of the original commitment.

In the improvement of human resources in the public sector, the most fundamental thing is the commitment of the parties to the common agreement. With the high commitment of the parties, it is hoped that the purpose of public service will be achieved (Karadal et al, 2008). Several previous studies have shown that generally public sector organizational commitment is lower than that of private sector organizations with high absenteeism and low employee performance (Markovits et al, 2008).

Organizational commitment is defined as a measure of the strength of the employee's identification with organizational goals and values and engaging in it, the organizational commitment is also a better indicator for employees who want to stay on their job or want to move (Mc Neese-Smith, 1996). Commitment to the organization also addresses employee closeness to the organizations they are in and at the same time commitment reflects the power of employee engagement and loyalty to the organization. This involvement and loyalty is strongly influenced by how much work is charged to employees according to their expectations (Babakus, 1996).

Romzek (1990), said that the increase of organizational commitment is a very important thing in working in the public sector because public services require a good level of commitment if the commitment of

an employee either the public service is also good and vice versa whereas the public service has been influenced by cultural (Suleyman, Sozen, 2002).

Mowday, Porter, and Steers (1982: 186) define organizational commitment as: the relative strength of an individual's identification with and involvement in a particular organization. The definition shows that organizational commitment has more meaning than passive loyalty, but it involves an active relationship and an employee's desire to make a significant contribution to his organization. Organizational commitment proposed by Mowday et al is characterized by: (1) strong belief and acceptance of organizational goals and values; (2) readiness to work hard; and (3) a strong desire to survive in the organization. This commitment is an attitude or affective commitment because it relates to how far the individual feels his personal values and goals are in line with the values and goals of the organization. The greater the congruence between the value and purpose of the individual with the value and goals of the organization, the higher the commitment of employees to the organization.

The last typology of organizational commitment was proposed by Allen and Meyer (1990) with three organizational components, namely: affective commitment, continuance commitment, and normative commitment. A common feature of these three components of commitment is the view of commitment as a psychological condition that describes an individual's relationship with the organization, and has implications in the decision to continue or not to membership in the organization.

The following is an interview with the informants in relation to the commitment aspect in the development planning collaboration in Merauke Regency. The form of commitment from local government to prosper the community through development planning as follows:

"Commitment built by the local government is enormous relating to the welfare of the community programs are issued from the government but there is also the aspiration of the society that is received through *Deliberation of Village Development Planning*"

Furthermore, it is added that:

"This is a seriousness of the government in an effort to provide the best for the people *turkam-turkam* that is implemented as a form of our eagerness to drive people to a better life Regional Medium Term Development Plan Merauke District is a document of regional development plan as an integral part of the national development planning system as stipulated in Law Number 25 Year 2004 regarding National Development Planning System. "

(Informant D, 23 Oct 2014 at 11.10 WIT).

In relation to the commitment of the parties in guarding the planning that has been produced, the Head of Merauke District said that :

"Commitment with others outside the government is rather weak this is closely related to the understanding of each stakeholder plus the busyness of each person makes the commitment somewhat weak ... but there are groups of faithful and committed NGOs guarding development at this area "(Informant H, 26 Oct 2014 at 11.10 WIT)

This is justified by the Chairman of the Institute of Indigenous Peoples Imbuti stating that: "We have a commitment to work together to build this area in a better direction we hope the regional leaders can hear the complaints of the community as the presentative institution of our Malind society culture continue to work with other partners both government and religious parties and NGOs and universities to promote development in the regions "(Informant XB, Oct 26, 2014 at 11.10 WIT).

This statement can be concluded that organizational commitment can be defined as a strong desire to remain a member of a particular organization; a desire to exert every effort on behalf of the organization; a belief, acceptance, value and purpose in a particular organization. This is in line with the opinion of Wiener (1982) defines organizational commitment as an impulse from within the individual to do something in order to support the success of the organization in accordance with the goals and put the interests of the organization above his personal interests.

According to Mowdayetal (1979), Commitment demonstrates strong belief and support for the values and goals the organization seeks to achieve. Organizational commitment can grow because the individual has an emotional bond to the organization that includes moral support and accepts the value that is within the organization and the resolve in the self to serve the organization (Porter et al., 1974); (Edfan Darlis, 2002).

5. CONCLUSION

The collaborative perspective in terms of negotiation and commitment has not been maximized, so it is hoped that collaborative development planning with collaborative approach will be enhanced because it impacts all stakeholders both government, private and public.

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Mangrove Forest and Local Livelihood: A Study in two villages of Mahakalapada Block, Odisha

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Abstract

Mangrove forests along the coastal belt of Orissa, especially mangrove ecosystems in the estuarine areas of Mahanadi delta of Orissa rich in varied resources, support livelihood of lakhs of people living adjacent to these forests. They act as refuge against cyclones, storms and tidal surges which is recurrent in this area. Apart from a major source of fuel, fodder and timber, mangrove wetlands harbor fishes, crabs and serve as an ideal habitat for prawn farms the soil being fertile mangrove forests are cleared for agriculture purpose. Other minor uses of mangrove include collection of medicinal plants, collection of molecules, shells for lime making, etc. In view of this scenario the study was carried out in two villages of the Mahakalapada block of Kendrapara district in Odisha with the objectives to understand the livelihood of the people based on their skill and resources. The study also tries to access the role of mangrove for life and livelihood of the people in the coastal ecosystem. Different methodologies have been used to satisfy the various objectives of the study. Techniques of simple statistics have been applied for analysing the data and getting the results to derive a logical conclusion. The analysed data has been presented based on the objectives of the study in the form of tables and graphs, which are described, interpreted and conclusions drawn. Utilising the data of 168 households from two villages, the study found that coastal community has strong economic straps with the coastal ecosystems with which they interact and interfere in various ways. The study also reveals that conservation of mangrove forest by involving the community is the best approach and there should be a committee in the Panchyata level for coordinating the activities of the village committee and resolve the conflicts between the villages. The study gives an ample opportunity to understand the local livelihood of the coastal community and their dependency on mangrove forest.

Keywords: Mangrove forest, Joint Mangrove Management (JMM), Coastal livelihood and Ecosystem

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I. INTRODUCTION

Mangrove wetlands are prominent features of the coastal zone of tropical countries. It consists of a mangrove forest and its associated water bodies. A mangrove forest harbours a group of plant species that grow well in the estuarine areas where the substratum is composed of accumulated deposits of river borne sediment (Selvam et al, 2010). A mangrove forest is interested by a number of tidal canals, channels and creeks and large open water bodies where the water level varies daily due to tidal inflow and outflow as well as seasonally due to freshwater discharge. Wetlands are important repositories of biological diversity and are among the world's most productive ecosystems. They help regulate water flows, remove sediment and pollutants and provide essential habitats for diverse fauna. They are threatened in many parts of the world by drainage for agriculture or urban expansion, conversion to aquaculture ponds, over grazing and in forested wetlands, logging. Biodiversity is usually analyses at three level the variety of communities and ecosystem within which organisms live and evolve the variety of species themselves and the genetic variation within those species. The degradation of the whole ecosystem such as forests, wetlands and coastal waters is in itself a major loss of biodiversity and the single most important factor behind the current mass extinction of extinction of species (John Ryan, 1992).

The mangrove wetland is a multiple-use ecosystem that performs a number of protective, productive and economic functions to sustain the ecological and livelihood security of the coastal communities. Mangrove forest and associated wetlands are: i) Act as a barrier against cyclones and prevent entry of saline water inland during storm surges, ii) Act as buffer against floods and prevent coastal erosion, iii) Provide nursery grounds for a number of commercially important fish, prawns, crabs and molluscs, iv) Enhance fishery production of nearby coastal waters by exporting nutrients and detritus, v) Provide habitats for wildlife ranging from migratory birds to estuarine crocodiles. The economic value of the mangrove wetland stems from i) Availability of wood products ranging from timber, poles, posts to firewood, ii) Availability of non-wood products such as fodder, honey, waxes, thatching materials, etc., iii) Availability of aquatic products such as fishes, prawns, crabs, molluscs, clams and oysters.

According to the Forest Survey of India (1999) the total area of the mangrove wetland is about 4.87 lakh ha of which 56.7% are on the east coast, 23.5% on the west coast and the remaining 19.8% on the Andaman and Nicobar islands (Amrutha et al.2012). Mangrove is highly productive marine and estuarine ecosystem. Mangrove produces a large amount of waste such as leaves, stems, etc. This waste is rapidly degraded into small particles called detritus and is in turn eaten by estuarine species such as shrimp, some fish and small crustaceans on which birds, predatory fish and people depend for their food. Thus the mangrove has the capacity to support major fishery farms. They are important nursery grounds for commercial shrimp and fish seedlings as they discourage oceanic predators due to their shallow waters. The large-scale destruction of mangrove has adversely affected the productivity of nearby fisheries and consequently the economic conditions of fisherman households. The conversion of mangrove forest into shrimp farms in the coastal areas in Asia, including India, is nothing but redistribution of income from poor fishermen to rich investors, mostly non-fishermen marine product industrialists and merchants. The destructions of mangrove forest in India, China, Thailand and other Asian countries is synonymous with the destruction of the fishing grounds of the traditional fishermen leading to their occupational displacement. The area of the mangrove wetlands of India has been estimated from 5 to 6.81 lakh ha (Selvam et al, 2002). The major mangrove wetlands of India area located along the east coast of India. All along the east coast the tidal amplitude as well as the periodicity of freshwater flow decreases from the Sunderban mangrove in the north to the Pichavaram and Muthupet mangrove located at the southernmost end of the east coast (Table 1).

Table-1: Status of mangrove forest in India

Mangrove area	States	Tidal amplitude (m)	Freshwater inflow	Area (ha)	Species diversity
Sunderbans	West Bengal	4 to 6	Perennial	400000	48
Bhitarkanika	Odisha	2 to 4	July to Jan	30000	36
Godavari	A.P	1.5 to 2	Juy to Nov	33200	16
Pichavaram & muthupet	Tamilnadu	0.20 to0.50	Oct to Dec	14000	13

Source: Atlas of Mangrove Wetland of India 2001

A brief account of the ecology of mangrove wetlands is given for a better understanding of this ecosystem. The health of the mangrove in terms of hydrological and soil conditions and the wealth of the mangrove wetlands in terms of species diversity, biomass and productivity are determined by the following factors (a) Degree of protection against high-energy waves, (b) Quantity and duration of freshwater inflow, (c) Larger tidal amplitude with gently sloping coastline (d) Sediment supply. Although there are many mangrove species, but most of the villagers in the study area know only certain variety of species because of their widespread use. The scientific names of the local species according to their uses are at (Table -2).

Table 2: Popular Mangrove Species

Sl.No	Local Name	Scientific Name	Use
1	Bani	Avecinna Officinals	Grazing, Fuel wood, House Construction, Fishing
2	Rai	Rhizophora apiculata	Fuel wood
3	Hental	Phoenix paludosa	House construction, mats, Fuel
4	Harakancha	Acanthus ilicifilus	Fencing
5	Kaliachua	Bruguiera pavviflora	Fuel wood
6	Guan	Ecoecaric agallocha	Fuel wood, Fencing
7	Keruan	Sonneratia apetala	Fuel wood
8	Sundari	Heritiera formes	House const, Fishing implements

Source:-Field Survey

II. MANGROVE FOREST IN ODISHA

Mangrove forests along the coastal belt of Odisha especially mangrove ecosystems in the estuarine areas of Mahanadi delta of Odisha rich in varied resources, supports the livelihood of lakhs of people living adjacent to these forests. They act as a refuge against cyclones, storms and tidal surges which is recurrent in this area. Apart from a major source of fuel, fodder and timber, mangrove wetlands harbour fishes, crabs and serve as an ideal habitat for prawn farms the soil being fertile mangrove forests are cleared for agriculture purpose. It is also noticed that large herbs of buffalo and cattle are being reared in this area with an intentions of sufficient availability of fodder from these forests. Other minor uses of mangrove include collection of medicinal plants, collection of mollaces, shells for lime making, etc. In addition the mangrove occupies a niche that no other ecosystem could have possibly colonized.

The mangrove all along the Odisha coast are threatened due to the high density of population in these areas and competing demand for land for agriculture and prawn farming. The mangrove belt in Kendrapada district called the Bhitarkanika mangrove forests, comprising the areas between in the Dhamara mouth to Barunei on the coast, has been notified as Bhitarkanika Sanctuary (672 Sq.km.). Part of this area (145 Sq.km) is notifies National Park. This letter stretch of mangrove is the only area, which is relatively well preserved. Mangrove vegetation in the Mahanadi delta region between Barunei mouths to Mahanadi mouth (Paradip) is fragmented and degraded due to large-scale encroachment of these areas. Further south, the sparse mangrove vegetation occurs along the coast from Mahanadi mouth to Devi mouth. Degraded mangrove also occurs to the north of Dhamara mouth up to Chudamani in Bhadrak District coast, and also on Subarnarekha mouth in the Balasore District (Wild life Conservation of Odisha, Forest and Environment Department, Govt of Odisha).

Table-3: Mangrove forest covered in Odisha

District	Area under Dense Mangrove cover (km ²)	Area under Mangrove open forests (km ²)	Total Area (km ²)
Balasore	0	3	3
BhadraKh	11	8	19
Jagatsinghpur	4	1	5
Kendrapada	179	13	192
TOTAL	194	25	219

Source:-Rajnagar DFO Office

III. METHODOLOGY

Objectives of the Study

Having seen the various aspects of mangrove forest and the dependency of the people dwelling besides the forest. The study was a comparative analysis in the two villages. The one village which totally depend upon the forest and other one conserving the forest. We made a comparative study on their livelihood by keeping this objective in mind. These are as follows

- i. Role of Mangrove for life and livelihood of the people in coastal ecosystem.
- ii. To understand the livelihood of the people in the study area based on their skill and resources.
- iii. To identify causes of depletion of mangrove if any and what are the techniques of conservation with involvement of different stakeholders.

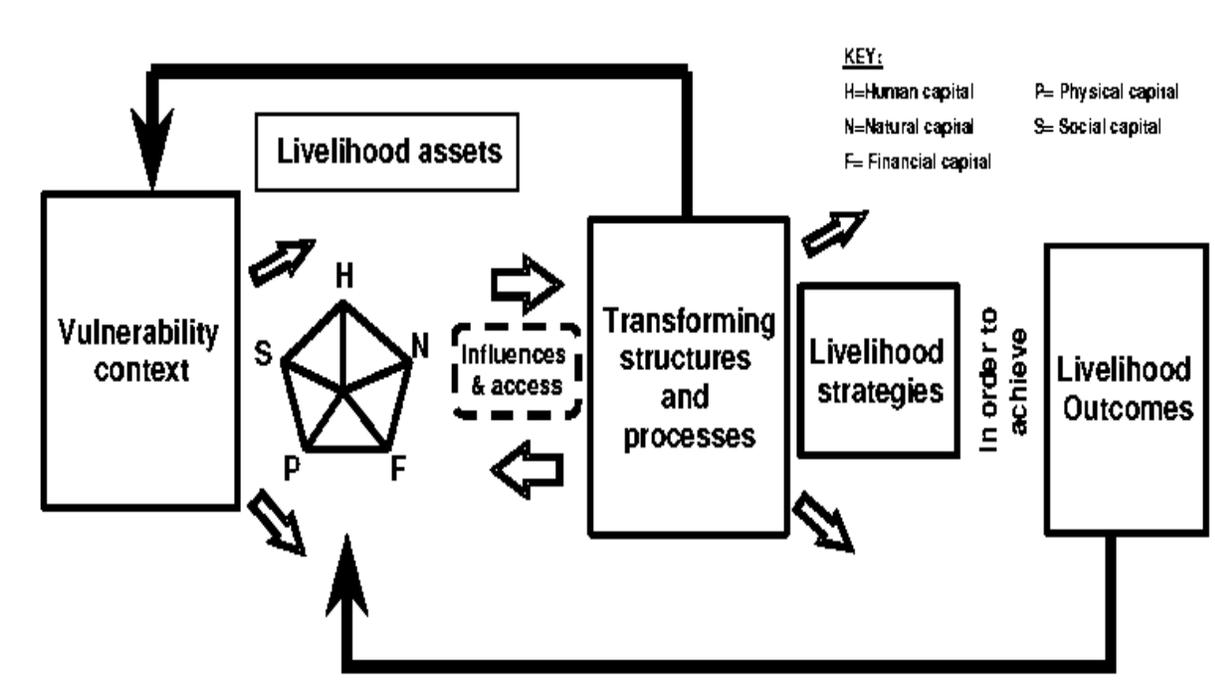
Sampling: The sampling we used for this study is totally based on the objective. The first purposive sampling was used for selecting the study location such as selection of a district, selecting block, selecting panchayat and selecting village and the mangrove area for conducting the study. The base used for this sampling was coastal people who have been residing besides the mangrove forest for the last fifteen to twenty years. As per our study we selected the two villages named as Kalatunga and Kharnasi under the two different panchayat of Mahakalapara Block which is one of the coastal blocks in the Kendrapara district of Odisha.

Data Sources & Tools used: In view of the nature of the study and time available to complete the study it was required to use both type of data sources i.e. primary as well as secondary. Primary data source was also used to cross check the information gathered from secondary data source.

Categories of respondents: To know the dependency on mangrove of different livelihood we have taken the help of different section of people. As per our objective and nature of study we selected different categories of respondents to understand the issues in depth and from various perspectives. This helped in triangulating the information and coming to conclusion. The main respondents in this study were Farmers Community, Fisherman Community, Wage Labour & Other Service holder, Forest Guard and other Officials and different section of the village people.

IV. MANGROVE FOREST AND LIVELIHOOD

Livelihood comprises the capabilities, assets and activities required for a means of living; a livelihood is sustainable which can cope with and recover from stress and shocks, maintain or enhance its capabilities and provide sustainable livelihood opportunities for the next generation, which contributes net benefits to other livelihood at the local as well as global levels in the long run (Orinya, 2016). A slightly different definition by Ellis (2000) "livelihood comprises the assets (natural, physical, human, financial and social capital) the activities and the access to these that together determine the living gained by the individual or household"(p-10). Livelihood in the study village is not so much differing than other coastal area. The main occupation in this village is agriculture and fishing. In the lean period people generally move to other village for wage labour and brick line work. The entire livelihoods in the study areas are not sustainable. Shocks, Trend and Seasonality are more or less in every activity. Due to this, their economic condition is very miserable. To give them a sustainable livelihood some other alternative should be suggested for the habitat. To understand the livelihood of the study area, DFID framework is being used and explains all the livelihood activity.



Fuel: Most of the mangrove species are very good fuel wood. The villagers generally use cow dung; fuel wood and straw for fuel. Almost all the household make cow dung cake as fuel. Generally women are involved in the process of making the cake. Around 43% of households use cow dung for three to nine months. Whereas highest percentage i.e. 60% of the households use straw as fuel for three to six months (Table-4). So the dependency of the people on straw is high as compare to the cow dung.

Table -4 Percentage Distribution of sample HH for Fuel needs from various sources for different period in Months

Months	Straw	Cow Dung	Mangrove Plant	Homestead Plant
0-3	3.77	11.32	100.00	73.58
3-6	60.38	43.40	0.00	26.42
6-9	28.30	43.40	0.00	0.00
9-12	7.55	0.00	0.00	0.00

Source – Field Survey

Grazing: Leaves of the Bani are very favorable fodder for cattle and buffalo’s. Most of the villagers are having cows and bullocks and some households have the goats. There is no common pasture in the village. The study found that around 17% of households leave their cattle and goats to the mangrove forest for grazing although it is only side by the forest (Table-6). 83% of households do not leave their live stocks to mangrove forests for grazing and only 4% of the households leave their live stocks to mangrove forest for grazing for three months (Table-5).

Table 5: Percentage Distribution of sample HHs for Mangrove Uses for grazing and fuel wood by the sample HH for different time Period (Months)

Months	Grazing	Fuel wood
0	83.02	86.79
1	5.66	5.66
2	7.55	3.77
3	3.77	3.77
Total	100	100

Source – Field Survey

Housing: In the past most of the species of mangrove forest was for house construction. Hental, Korue, Sundari, Bani, sisumer are the plants mostly used for house construction. Especially rua from the Hental is very strong and can't be destroyed by the white ants. So it was widely used for house construction by the coastal area people. But due to rapid deforestation the Hental species has become rare species in this area. Although most of the houses in the village are thatched, leaving some of the households most of the households have not used mangrove for their house construction rather they have used bamboo for housing purposes. Only 25% of families used mangrove plant for their house construction although they did it when there is natural breaking of plants due to cyclones (Table-6). The dependency of Kharnasi village on mangrove forests for housing purposes is very high compared to Kalatunga village.

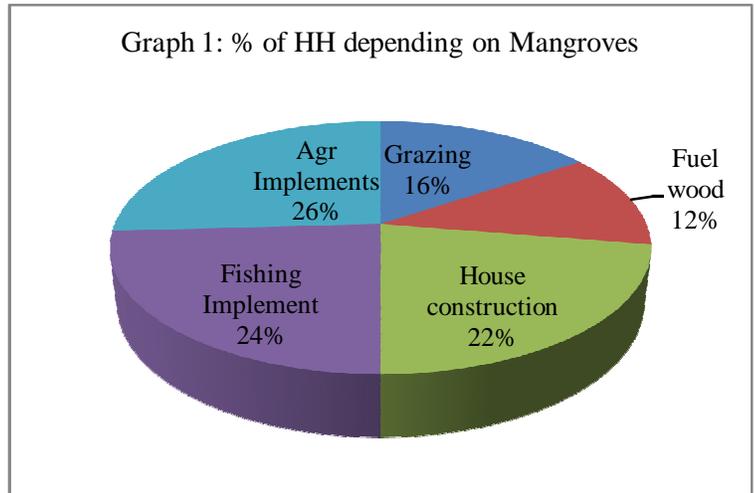


Table -6 Percentage Distribution of sample HHs for meeting different needs from mangrove plants

Particulars	Grazing	Fuel wood	House construction	Fishing Implement	Agri Implements
No of Households	16.98	13.21	24.53	26.42	28.30

Source – Field Survey

Timber for Fishing and Agricultural implements: The fishermen who go to river and sea for fishing with traditional boats (called Dingi) use mangrove plants for making oar, and some sticks required while fishing. 26% of households use mangrove plants for fishing purposes (Table-7). Among the fishermen, highest 13% of the families use mangrove plants for fishing purposes whereas wage labour group do not use mangrove plants for fishing purposes. Mangrove species namely Sundari, Bani and Bandari are used for making agricultural implements. Although a plant called Babul is very good for making agricultural implements are plentifully available and most of the villagers use tractor for ploughing purposes. 29% of the households still depend on mangrove plants for agricultural purposes. (Table-7) Again those households whose main occupation is cultivation, among them, 13% of the households use mangrove plants for making agricultural implements. Households having main occupation as wage labour do not depend on mangrove plants for agricultural implements.

Table 7: Percentage Distribution of sample HHs for Mangrove Uses for House construction, Fishing implements & Agricultural Implements according to different occupational groups.

Main Occupation	House Construction	Fishing Implements	Agricultural Implements	Total
Cultivation	5.66	9.43	13.21	52.83
Fishing	13.21	13.21	9.43	26.42
Wage Labour	3.77	0.00	0.00	11.32
Others	1.89	3.77	5.66	9.43
All	24.53	26.42	28.30	100.00

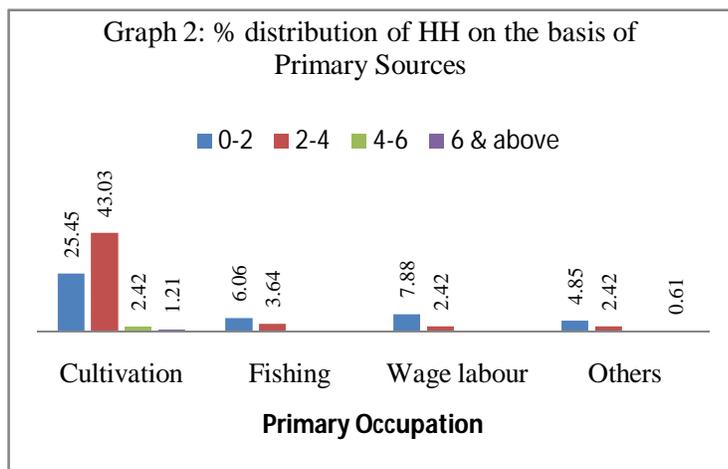
Source – Field Survey

Honey and Wax: Honey and wax were produced in large quantity when there was dense mangrove forest in the past. But because of the sparse forests, honey and wax collection within the mangrove forest has been reduced a lot. But now those people having bee boxes are getting very good income from honey because of presence of the mangrove forest in nearby places. The bees can travel 3 km distance for collecting honey. So honey production is a good source of income which has a direct relation with the mangrove forest.

Fishing: Fishing is the measure sources of income of the two study villages, although agriculture is the main occupation. Almost all the households in the villages are involved in fishing in some forms or other. The villagers are involved in fishing from sea, river, pond, canal and mangrove creeks. Because of the coastal nature of the village, even the river and canal fishing is also salt-water fishing. Fishing from ponds that is nearer to the saline bond is also salt-water fishing and away from the sea coast is sweet water fishing. According to the villagers the dependency of people on fishing has been drastically reduced in last 25 years due to getting less fish from

river and sea by spending more time, manpower and money. Although various factors responsible for the decline i.e. increase in the people involved in fishing, large scale fishing by mechanized boats and trawlers and pollution of the water, deforestation of mangrove is one of the major factors for rapid decline in fish caught. Although the villagers had involved in highly profitable prawn farming business in a small-scale basis, but due to their bad experience of loosing the business they are no more interested to do the same. Generally the investment for prawn farming is very high compared to the capacity of the villagers. It needs a lot of care and responsibility for the prawn farm by consultation with the specialists or slight negligence leads to loss of the whole return. As these prawn farms are nearer to the sea due to its nature of salt water aquaculture, at any time there is every chance of sea wave flushing out the farm due to cyclone, high tide and heavy rain. Because of the highly risk nature of the above activity and lower economic status of the villagers, they could not bear the losses out of their investment. They were compelled to stay away from the activity but leased their own farms to outsiders i.e. contractors, businessmen etc. to get some income. Gradually the people have diversified their occupation. In addition to cultivation, people in Kalatunga village became engaged in other wage labour activities i.e. soil, brick lines, masonry, etc. and also started migrating outside the village permanently for livelihood.

Deforestation of mangrove led to decline in amount of fishes, especially prawn seedlings and crabs from creek and canal. Creeks are the waterways within the mangrove forest and the canal within the village has the connection to the mangrove creeks. As mangrove forest is a very good nurturing ground for prawns and crabs, due to loss of this area the amount of crabs and prawn seedling has been gone down drastically in both creeks and canals. But due to recent conservation measures there was a check on the trend. Although there is no special evidence about the increase in fishes in the rivers and the sea due to the mangrove but the seedling of prawns, and crabs, fishes caught in the coast is directly proportional to the intensity of mangrove in the area. As mangrove creeks act as nurturing grounds for the prawns,



crabs and fishes in the coast, the eggs given by the prawns and fishes in the sea flow to the coast during high tide and the seedlings get the required nutrition for the healthy growth. So one can directly relate the dependency on coastal fishing to the dependency on mangrove. So even fishing from the sea coast, river estuaries, mangrove creeks and canals formed due to the distributaries of rivers. The dependency of people in Kalatunga village on fishing as well as fishing from different sources of depends on various factors. It all depends on (i) their asset positions both agricultural land and the productivity, (ii) skills of the family members and availability of work for them, (ii) their owning of fishing assets like boat and net.

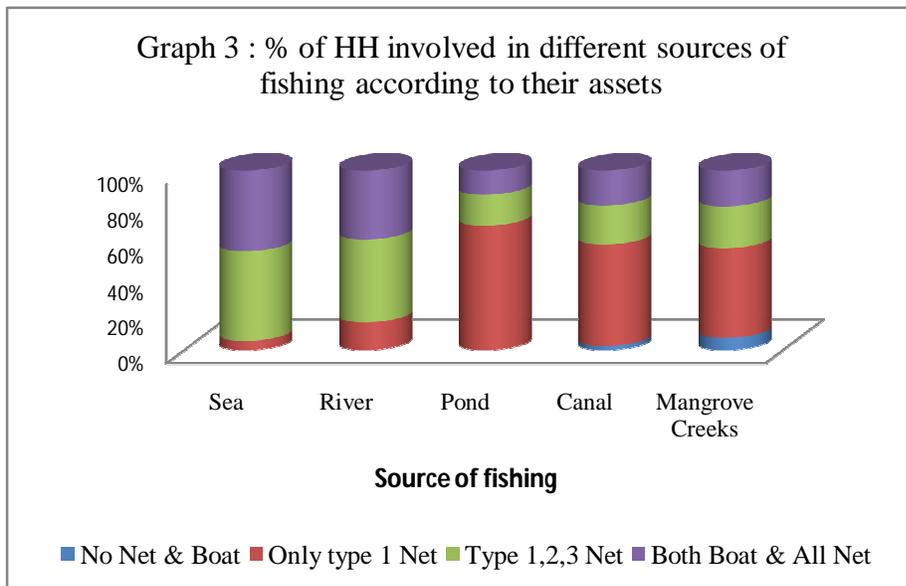
People having more agricultural land with high productivity have taken cultivation as their main occupation. The agricultural lands in the villages are of two types. Firstly the agricultural land nearby the canal, where there is flooding of land by water canals in the rainy season due to lack of drainage facility. This leads to salinity and low productivity. Secondly, the agricultural land away from this canal and saline bond, where productivity is comparatively high. Those people having first type of land have less productivity compared to the second type of land. In this position people prefer share cropping with wage labour activity and fishing. It can be seen that the percentage of households having land size from 2 to 4 acre are involved in cultivation as main occupation is 43% (Table -8). On the other hand those households whose main occupation is fishing have no land. At the same time those households whose main occupation is wage labour have land of 4 acre and above (Table-8).

Table 8: Percentage distribution of households on the basis of primary sources of livelihood & landholding size

Land in acre	Cultivation	Fishing	Wage labour	Others	Total
0-2	25.45	6.06	7.88	4.85	44.24
2-4	43.03	3.64	2.42	2.42	51.52
4-6	2.42	0.00	0.00	0.00	2.42
6 & above	1.21	0.00	0.00	0.61	1.82
Total	72.12	9.70	10.30	7.88	100.00

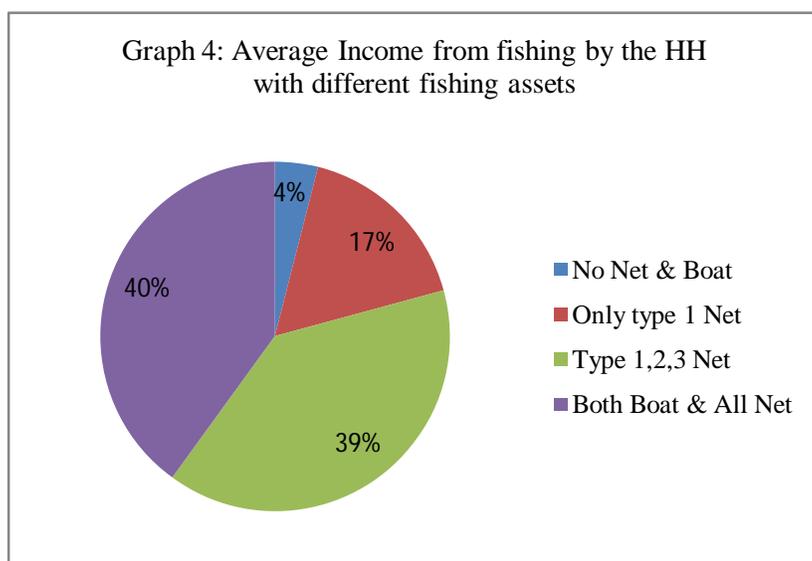
Source: Field Survey

The occupation of the family also depends on the skills of the family members in different activities. There are people the villages having various skills for example, brick line, soil and masonry etc. Certain people who are skilled and can withstand hard labour in the day time and get regular income from these wage labour activities, whereas they are unskilled in fishing and as a result could not get regular income from fishing. With their low economic status, they could not even afford to invest so much on fishing assets like nets and boat and keep these assets idle for certain period when wage labour activities are available and fishing caught is less due to seasonality. On the other hand, those who are involved in river and sea fishing catch the fishes during night time starting evening 6 o'clock to morning 6 o'clock for 12 hours being awakened. As they have to catch fishes at time when more fishes can be caught, they are irregular in their eating and sleeping habits. So their health does not permit them to do hard labour work for a longer period. Generally women members of the family do not go outside for wage labour activities barring a few involved in agricultural wage labour activities within the village due to very poor condition. But women members in most of the families are involved in catching fishes from canals, creeks and ponds.



The preference of sources of fishing also depends on the type of assets they have. None of the villagers have mechanized boat for fishing. Those boats available in the village are traditional boats made up of wood cost varying from five thousand rupees to six thousand rupees according to the size of the boat. They also use mangrove for oaring. The life of the boat is around three years. Minimum number of two persons is needed for catching fishes in this boat. Those having boat go for fishing in river and sea. They do not go deep sea fishing but catch fishes within two kilometres from the coast. Those who do not have boat can hire boat at the rate of Rs200/- per month. Most of the villagers have throwing net which is used mainly in ponds, canals, creeks and river. But people who have a larger share of income from fishing use mono-filament gill net of different points of according to the size of the fish they wanted to catch. This is mainly of two types, middle and large size. These net are purchased in kg based on the quality of thread varying from Rs250/- to Rs700/- per kg. Prawn nets have to touch the ground as the prawns generally move on the ground in water.

There is a relation between the type of nets and boat owned by the persons and the sources of fishing. Households having no net and boat do not go to sea and river for fishing but 4% of the households go for mangrove creeks and 2% of households go for canal fishing (Table-9). Those households having only throwing net, among them 68% of households involved in pond fishing, 49% of households involved in canal fishing and only 2% go for sea fishing that is by hiring or going as a share in group fishing (Table-9). Among the households having throwing net and mono-filament gill net of points middle and large size, 19% of households depend on sea fishing, 23% depend on river fishing, 19% canal fishing and 13% fishing in mangrove creeks (Table-9). Among the households having all the three types of nets and boat, 17% households depend on both sea



and canal fishing, whereas 11% households depend on mangrove creeks (Table-9). From the above analysis it can be interpreted that those having assets like net & boat go for river and sea fishing than canal and creek fishing.

Table 9: Percentage Distribution of HHs on the basis of Fishing Assets and Sources of Fishing

Fishing Assets	Sea	River	Pond	Canal	Mangrove Creeks
No Net & Boat	0.00	0.00	0.00	1.89	3.77
Only type 1 Net	1.89	7.55	67.92	49.06	28.30
Type 1,2,3 Net	18.87	22.64	16.98	18.87	13.21
Both Boat & All Net	16.98	18.87	13.21	16.98	11.32

Source- Field Survey

Note: # Type 1-Throwing net

* Type 2-Mono-fillament gill net of point (20-30)

@ Type 3- Mono-fillament gill net of point (60-80)

There can be a relation between the fishing assets one have and, average income from fishing. Those households who do not have net and boat have annual average income Rs1525/-, those households having only throwing nets have annual average income Rs6521/-, those households having all types of nets have annual average income Rs15267/- and those having both nets and boat have annual average income Rs15520/-. (Table-10) The above figure shows that when fishing assets holding of the households increase, the average income also increase. There is very small difference in the average income of the households having all types of nets and households having both boats and nets. This is because most of the villagers who possess three types of nets also possess the boat. Some of the villagers who do not have any net and boat go for catching prawn seedling, crabs from the creeks and canals. But annual average net income is Rs8083/-, which is higher than cultivation (Table-10).

Table: -10 : Average annual income from fishing by the HH with different fishing assets (Rs)

Fishing Assets	Avg Income(Rs)	No of HHs
No Net & Boat	1525	3
Only type 1 Net	6521.58	38
Type 1,2,3 Net	15266.67	12
Both Boat & All Net	15520	10

Source – Field Survey

Seasonality: The fishing amount caught by the fishers varies from season to season. Although all round the year fishes were caught, but in certain seasons like October and November, when winter season starts, the fishing amount increased tremendously both in sea and river. Whereas in summer season the amount goes down. So from September to march there is both sea and river fishing regularly. But from April to August, the fish catch was reduced and the occasionally there was fishing. From March to May due to breeding season of the olive riddle turtle, fishing within 12k.m. of the sea shore was banned. Even the type of fish catch differs according to the season. From August to October medium size fishes and prawns are found whereas from October to February big prawns and fishes are caught in the river and sea. Even in a month there is up and down season.

Large amount of fishes can be caught in the up season i.e. 15 days during high tide days of full moon light and full dark night. But during other days the catching is not so remunerative. So generally the fishermen go for fishing in up seasons and take rest in down seasons. Those having boats go to river and sea through the creeks to catch fish. They leave their home during the high tide from 2 to 4 p.m. and reach the destination after 2 to 3 hours. Then they involve in fishing from evening 6 o' clock to morning 6 o' clock. They come back to home in the morning and take rest in the day time and again go in the same time. Similarly catching of prawn seedling is done from February to May. Crabs are caught around the year with variation of quantity. Those who go for catching seedlings and crabs go during high tide twice a day for 6 to 8 hours a day.

Women and Fishing: In this Kalatunga village, women have active participation in fishing. Especially catching seedlings and crabs from mangrove creeks are specialization area for the women. They even catch prawn, fish by groping and bunding and throwing nets in the ponds and canals.

Table 11: Involvement of men & women in fishing from different sources from sample HH

Persons	Sea	River	Pond	Canal	Mang. Creeks
Women	0	0	10	11	15
Men	11	16	43	35	10

Source – Field Survey

Generally women do not go to river and sea for fishing. Involvement of women in creek fishing is higher than men (Table-11). It can be shown that 15 women go for creek fishing and 10 men go for creek fishing from the total sample households. But in all other cases, men involvement is more than women.

Vulnerability

The fishermen and women face a lot of problems in fishing .The vulnerability can be classified as due to(a) Injures while fishing (b)Natural Calamities while fishing (c) Disease because of fishing (d) Harassments in fishing. These are as follows

- **Injures while fishing:**-The fisher folks suffer injures in the legs and hands while fishing. Their legs and hands is cut by the snails and other sea fishes and crabs. While they are moving within the mud and water, even they could not know about the cutting and unlimited bleeding occurred. As a result they have to stop fishing up to the healing up to the injuries. The poor have to suffer a lot in the form of loss of man-days. As a result the condition of the poor further deteriorates.
- **Natural Calamities while fishing:**-The fisherman communities have to suffer a lot due to natural calamities. Natural calamities like cyclone, high wave and Tsunami destroy the life and assets not only when they are in the sea or river but also when they are in their home near the coast. Because of their occupation they can't go very far from the coast. They have to stay near the coast for watching their boats and fishing implements. So they have to bear the burden of natural calamities.
- **Disease because of fishing:**-Fishing occupation is also leading to certain diseases. Fisherman women have to stay a longer period in the water in an unhygienic condition. So the cold, cough fever diarrhoea are very much rampant. Due to irregular eating and sleeping habits, they also suffer from disease like gastroenteritis, weakness in the body.
- **Harassments in fishing:** - Although forest was under Joint Mangrove management but there was no specific rule for catching fishers, prawns and crabs within the mangrove creeks by the villagers. Village samiti is also stake holder in this forest; there even harassments of forest guard those who go for fishing into the mangrove creeks. The forest guard charges bribe of Rs 50-100/- per month who catches seedlings and Rs 50/-per month who catches crabs. Those who can not give the bribe are harassed in the way of abuse and confiscation of the net and container with the amount caught. Even the boat owners who go for fishing to river and sea have to give certain amount of rupees to the mafias such as in Paradeep they are called as bati.

Agriculture

Agriculture is one of the primary occupations for the villagers but they are able to cultivate only single crop paddy because of no irrigational facilities. Besides paddy some people also do potato but only for own consumption which is just equal to their investment in money term due to less market price in the market. The agriculture land in the villages can be divided into two parts. One is fertile which are away from the saline canal and saline bond. The other one is comparatively less fertile near to the canal and saline bond. From these lands there is always a problem of drainage due to flood during the rainy season. They have to desalt the land for further cultivation. Besides their own land, some of the people are cultivating in encroached land but they are not ready to reveal the exact size of the land. People generally cultivate the salt resistant paddy of local variety such as Valuki, Panikoili, Patani and Sworna. The most prominent use of variety is Valuki which generally gives produce 7 to 8 qu. in a normal year whereas Sworna gives 16 to 18 qu. in a normal year but because of high cost of in doing Sworna most of the people do Valuki. The cost of Sworna is almost double the cost of Valuki.

Most of the people also do share cropping within or near by the villages. For the share cropping both expenditure on agriculture and produce will be equally divided between the land owners and the share croppers. However the average net income from the cultivation by the villagers is Rs 6759 (Table-12). Although people generally tell their primary occupation as cultivation but actually the share cultivation to total income than other occupation is very low. Cultivation suffers the seasonality of employment as only single crop from June to December.

Table-12: Average AI (Rs), Average Persons and Average, Income per Person (Rs) on the basis of Occupation

Occupation	Avg Income(Rs)	Avg Persons	Avg Income per Person(Rs)
Cultivation	6759.43	1.64	4114.44
Fishing	8082.92	1.57	5143.68
Wage Labour	9350.94	2.2	4250.43
Others	2835	0.83	3402
All	26332.92	1.58	16666.41

Source – Field Survey

Wage labour

Seasonality in cultivation, lack of fishing opportunities, compels the villagers to go for wage labour activities. Certain people are permanently migrated to Delhi, Gujarat and Andaman for different works and annually send money back to their home. Other type of wage labour whose main occupation is cultivation or fishing also go for wage labour activities. According to the season skilled wage labours are there who are skilled in masonry, carpenter go for these works just after cultivation. Most of the wage labours go outside the village for 5 to 6 months starting from January to May for bricklean work just after harvesting. They go in group on a contractual basis. Their wage rate varies from Rs 180 to Rs 250 per day depending on their skills. During the agricultural period certain poor class families also go for agriculture wage labour activity for which they get Rs 150 to Rs 200. No women members go outside for wage labour activity. But the poor women go for agriculture wage labour activity within the village. Mostly women take care of the home and children and elder in the home when the male members go outside for wage labour activity. The average annual income from wage labour activity is Rs 9350 which is very high compare to other sources of income (Table-12). Even wage labour activity is treated as a coping mechanism when agriculture is failed due to various factors.

Other Occupation

Other occupation groups includes school teacher in the EGS School in the village, agents of Tubro, Boat driver, barber. Those who are doing business like hotel, brick lines, labour and goat rearer. Other occupation groups also involved in cultivation and fishing. But because of their regular work in this sector they do not go for wage labour activities. The percentage of other occupation group in the village is very less, who are doing hotel business in the nearest Jagatjore market are getting regular income out of it followed by up and down season. Even for bricklines business fishing business means acting as intermediary group and prawn from business and labour contractor also do their work on a seasonal basis. For all these groups rainy season as a drawn season when the involved in agricultural work and do their business in other season. Barber, boat driver and goat rearer school teacher and Tobro agents have to do their work irrespective of the season but with the agriculture work. The average persons involved in this sector can be given like 0.83 and the average income from this sector is Rs2835/-. (Table-22) This is due to less opportunity in the villages for other livelihood activities, although, some households get very good income from other livelihood activities.

V. SUGGESTIONS AND CONCLUSION

Conservation of any of the resources needs awareness and motivation of people to see the importance of the resources, the interest and will of the other stake holders like government, NGOs and private bodies. Conservation of mangrove is very crucial to sustain coastal biodiversity and protect people from natural calamities and to provide sustained livelihood to the people, of course in a regulated way. Looking at the seriousness of the problems in conservation of the mangrove following measures can be suggested.

- a) Involvement of people for conservation of mangrove forests is the most valid approach. But selection of villages for Joint Mangrove Management (JMM) is most the important. The coastal people who are directly or indirectly getting benefit from the mangrove forest should be included. It may be the case that the villagers at far distance places are exploiting the forest resources more than the nearer villages. All these villages should be incorporated with specific duties for forest protection according to their suitability and capacity. Conservational approach should be integrated with the developmental approaches. There need not be separate structure for the JMM. But it should be the structure of Gramsabha but a separate representative group from the Gramsabha can be empowered to meet the responsibility. Certainly the representative groups cannot be the political representatives. There should be self regulated rules and regulations regarding the use of mangrove forests in tandem with government rules and regulations. Along with other developmental issues protection of mangrove forest should be undertaken. In this way intra village conflict can be solved in the Gramsabha.

- b) Government should empower the gram sabha and panchayata level committees to solve the cases in the village and panchayata level. Looking at the seriousness of the case it should be referred to the forest department for proper legal enforcement.
- c) NGOs should be involved in the process as a capacity builder and enabler to address various issues arising out of the conservation. They can contribute in a big way in mobilising the public opinion and motivating local people towards protection of the forests. At any time if there is breach of law from any side of the stakeholder this group can really make a difference by filing Public Interest Litigation (PIL) and empowering people to fight.
- d) Legal enforcements should be streamlined to solve the cases regarding encroachments and violators of the forest laws as soon as possible.
- e) To address the encroachment issues there should be proper coordination among the various departments, viz., Revenue, Police and Forest, etc.
- f) From the study, it reveals that the provision of alternative supply of firewood and timber may reduce the dependency of people on the forest. Large scale agro forestry for meeting the firewood needs may be promoted. In the study villages, Gobar gas plants (cow dung) can be promoted because of high concentration of cattle. Furthermore, fuel efficient chullas should be promoted to economise fuel consumption. Whatever alternatives supplied that should be accessible to the villagers. In addition to it, Grazing land should be created in every village by evicting the people from encroached agricultural lands.
- g) Support for alternative livelihoods than fishing and agriculture can raise the socio-economic status of the villagers. When population pressure from these activities will be reduced, the engaged families can gain. Besides agriculture horticulture, apiculture can be a very good opportunity. Eco-tourism is a very good option to engage these people in hospitality, business and promotion of other traditional and modern handicrafts.
- h) Fishing activities should be conducted but in a regulated way by making federations. In this way the problems of the fishing communities can be addressed by creating a space for market by eliminating the intermediaries.
- i) Promotion of SHGs to strengthen the women for involvement in the conservation process. Addressing credit and vulnerability issues through microfinance and micro insurance with other support services is of great importance.

The study of the two villages clearly depicts the picture of dependency of people on the mangrove for life and livelihood in the coastal ecosystem. Mangrove forest has a direct effect on the livelihood of the people. Especially fishing is the main livelihood in these areas and fishing is influenced by the mangrove. But the deforestation is mainly for fuel and other household needs which goes against the mangrove concentration. The more the dependency on mangrove for grazing, fire wood, housing, the more will be the deforestation. Natural fishing which is for the local interest is not affecting mangrove but prawn farm which is against the local interest and for the large economic gain of the state and mafias is one of the main cause of deforestation. So mangrove forest not only protects human being and assets but also give livelihood to the local communities.

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Isolation And Identification Of Penicillin Acylase Producing Bacteria Originated From Cow Intestine

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Abstract: Bacterial resistance to penicillin antibiotics can be overcome by making semisynthetic penicillin derived from the 6-amino penicillanic acid (6-APA) raw material. 6-APA is the result of penicillin hydrolysis by the activity of penicillin acylase. Penicillin acylase is an enzyme that catalyzes the hydrolysis of penicillin into 6-amino penicillanic acid (6-APA). The use of penicillin acylase has reached 85% in the pharmaceutical industry in the world. The presence or absence of enzyme penicillin acylase produced by bacteria depends on the type and habitat of bacteria. This research was conducted with several stages, sample isolation, screening of bacteria, and bacteria identification. The purpose of this study was to isolate and identify bacteria producing penicillin acylase derived from cow intestine. Results of bacterial screening obtained 14 bacterial isolates and 3 isolates of penicillin acylase producing bacteria with the visible clear zone around of the bacterial growth. Biochemical identification of 13 bacterial isolates using several biochemical tests showed that bacterial isolates of 13 were classified into the genus *Bacillus* sp.

Keywords: isolation of bacteria, penicillin acylase, identification, *Bacillus* sp.

I. INTRODUCTION

Bacterial resistance to penicillin antibiotics can be overcome by making semisynthetic penicillin derived from the 6-amino penicillanic acid (6-APA) raw material. 6-APA is the result of penicillin hydrolysis by the activity of penicillin acylase. According to Torres-Bacete *et al.*, (2015) penicillin acylase is an enzyme that catalyzes the hydrolysis of penicillin into 6-amino penicillanic acid (6-APA). Penicillin acylase is produced by various microorganisms, such as fungi and bacteria (Nandy *et al.*, 2014). The use of penicillin acylase has reached 85% in the pharmaceutical industry in the world (Varshney *et al.*, 2013). The presence or absence of enzyme penicillin acylase produced by bacteria depends on the type and habitat of bacteria. Different habitats will cause genetic and phenotypic bacterial differences (Sabarly *et al.*, 2011). As well as the production of penicillin acylase, different habitats produce different amounts of penicillin acylase. Bacteria can be found in two different habitats, namely primary habitat (host) and secondary habitat (external environment) (Gordon *et al.*, 2002). The primary habitat of bacteria is in the vertebrate animal's intestines (cows), while the secondary habitats of bacteria are on soil and water. The number of bacterial isolates producing penicillin acylase is currently very limited as well as bacterial identification. It is therefore necessary to isolate the bacteria producing penicillin acylase from the cow intestine and bacterial identification. The purpose of this study was to isolate and identify bacteria producing penicillin acylase derived from cow intestine.

II. METHODS

This research was conducted with several stages, namely sample isolation, screening of bacteria, and bacteria identification.

Sample isolation

Samples of bacteria taken from the cow's intestines and put into sterile sample bottles are then taken to the laboratory. 1 g sample is inserted into a 10^{-1} dilution tube containing sterile 9 ml aquades and then diluting dilution to 10^{-8} . 0.1 ml samples from the last three

dilutions to be planted spread plate on Nutrient Agar (NA) medium and incubated at 37°C for 24 hours. The growing colony was purified to a new NA medium with quadrant streak technique and incubated 24 hours at 37°C.

Screening of bacteria

1 ml of a bacterial culture of the sample and *Serratia marcescens* were planted into NA medium and incubated at 37°C and for 24 hours. Observations were made by looking at the presence or absence of clear zones around the growth of bacterial samples. If a clear zone is formed then the bacterial sample is tested positive to produce penicillin acylase (Meevootisoom *et al.*, 1983). One bacterium with the largest clear zone was further identified by bacterial staining and biochemically.

Identification of bacteria

Bacterial identification was performed by bacterial staining and biochemical tests, such as Methyl Red and Voges Proskauer, SIM (Sulfide Indol Motility), Urea, Citrate, Sugar (glucose, lactose, sucrose, and maltose), Fermentation, Oxidation, and Nitrate test (Cowan, 1974).

III. RESULTS AND DISCUSSION

Results of bacterial screening obtained 14 bacterial isolates and 3 isolates of penicillin acylase producing bacteria with visible clear zones around bacterial growth samples (Table 1). The USS.13 bacterial isolates had the largest cleft zone of 6.33 mm and the bacterial isolate USS.12 had the smallest cleft zone of 3.55. The clear zone around the bacterial growth is formed because *Serratia marcescens* is sensitive to penicillin acylase produced by bacterial isolates.

Table 1. Clear zone of bacteria isolates producing penicillin acylase

No	Isolate code	Clear zone (mm)
1	USS.1	4.79
2	USS.2	-
3	USS.3	-
4	USS.4	-
5	USS.5	-
6	USS.6	-
7	USS.7	-
8	USS.8	-
9	USS.9	-
10	USS.10	-
11	USS.11	-
12	USS.12	3.55
13	USS.13	6.33
14	USS.14	-

Isolation of penicillin acylase producing bacteria has been done, namely *Acinetobacter* sp. AP24 originating from Lake Loktak, India (Philem *et al.*, 2015) and *Streptomyces lavendulae* (Torres-Bacete *et al.*, 2015). The difference of the clear zone produced by the three bacterial isolates is closely related to the type and habitat of the bacteria. Environmental and genetic variations have an effect on bacterial physiology. Different bacterial habitats will cause differences in genetic variation (genetic drift) and phenotype (Sabarly *et al.*, 2011). The phenotype of an organism is influenced by genetic drift and the environment. Genetic drift found in the secondary environment is more variable than that of the primary environment (Gordon *et al.*, 2002). The staining results on bacterial isolate USS.13 showed the sample bacteria belonging to Gram-positive bacteria (Figure).



Figure. Result of staining of bacterial isolate USS.13

Gram-positive bacteria characterized by purple cells, stem cell shape, and have endospores. According to Hadioetomo (1993), Gram-positive bacteria can withstand the primary dyes of violet crystals violet so that the cells appear purple, whereas Gram-negative bacteria cannot withstand the primary dyes of violet crystals and therefore, stained by safranin so that the cells appear red. Gram staining or differential staining is very important in its use in bacteriology. It can divide the true bacteria into two physiological groups, thereby greatly facilitating the identification of its kind (Volk & Wheeler 1993).

Biochemical identification of bacteria isolates USS.13 using several biochemical tests showed that bacterial isolate of USS.13 was classified into *Bacillus* sp. genus (Table 2).

Table 2. Biochemical test results of bacterial isolate USS.13

No.	Biochemical assay	Result
1	SIM	+
2	Urea	+
3	Citrate	+
4	Lactose	-
5	Glucose	+
6	Sucrose	+
7	Maltose	-
8	MR	-
9	VP	+
10	Oxidase	+
11	Fermentasion	+
12	Nitrate	-

Bacillus sp. capable secretion of proteins directly into the medium so widely used in industry (Lakowizt *et al.*, 2017). The results of Torres-Becete *et al.* (2015) showed that the penicillin acylase produced by *Streptomyces lavendulae* ATCC 13664 was able to be secreted into the medium. In *E.coli* penicillin acylase is not secreted to the medium but to the periplasmic space so it is necessary to solve bacterial cells to obtain penicillin acylase. *Bacillus* is motile (occasional nonmotil reaction), producing spores that are usually resistant to heat, aerobes (some facultative anaerobes), positive catalase, varying oxidation, and are Gram positive. The acid is produced from the hydrolysis of sucrose, lactose and mannose, but the gas is produced through positive tests on glucose, citrate, catalase and Voges-Proskauer.

IV. CONCLUSION

Three isolates of the bacteria producing penicillin acylase from the cow intestine belonging to the genus *Bacillus* sp.

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Islamic Economic As an Alternative to Economic System in Indonesia

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Abstract- Islamic economic and finance have shown progressive development in the world including in Indonesia. In Indonesia's context, the need for Islamic economic and finance has gained legitimacy as it is shown in the legislation and in the agreement by the National Shariah Council. Consequently, the integration of Islamic law to economy cannot be neglected. Therefore, the Supreme Court establishes KHES as a one of the materiality in the settlement of shariah economic disputes. The present study aims at discussing whether or not the Islamic economic system can be an alternative choice of economic system in Indonesia. Method used to examine this research question was doctrinal qualitative method with normative purpose. The source of data was mainly taken from a library research including the legal material of primary data, secondary legal data, and tertiary data. Interviews with the Islamic economic legal experts were also conducted to sharpen the analysis of the study. The study found that the economic development in the period of reformation can be fulfilled if Islamic economic system is studied further and intensively. It is also found that Islamic economic system must be adjustable in the period of reformation. Therefore, the economic sector includes Muamalah can be developed at any time. However, to achieve this several aspects need to be considered such as in terms of banking; the limitation of interest rates between usury interest rates and other interest rates which is not categorized as usury should be considered carefully.

Index Terms- Islamic Economic, Shariah Economic Law Compilation (KHES), Indonesia

I. INTRODUCTION

Economic is human beings behavior which is related to their activities to earn and spending money. These activities are based on people's needs and desires that impossible to acquire automatically. To fulfill both of them, people have to set aside half of their desires or setting priority, which one is important. Unfortunately, there are several people who cannot hold their desire which leads them to persecute, either to human beings or other creatures.

'Need' can be defined as a person's desire that require to be fulfilled and be satisfied. Based on the intensity of usage, need is divided into three types, namely, primary needs, secondary needs, and tertiary needs. Primary needs are the main demand that must be fulfilled in order for people to live such as food, clothing, and shelter. While the last two demands, in which, secondary and tertiary needs are varied and can be diverged from an individual to other. Related to Islam's perspective, Qur'an

explicitly mentions it in Surah Thaha Verse 117-119 about the primary needs. In the context of food, there is a sentence about 'making an effort', in which, people have to work to fulfill their needs in order to live while in heaven, people no need to work to fulfill their needs as it states 'nor being hungry and being thirsty'. In relation to clothes, it is illustrated with 'unclothed', while the shelter is illustrated with 'you will not be hot from the sun'.¹ Moreover, Shihab explained that the demands of foods, clothes, and shelter are primary needs of man and woman, husband and wife. Therefore, husband obligates to make an effort in getting all of them. These demands encourage people to endeavor in fulfilling both goods and service.

Islamic economic system can be divided into three main sectors; the public sector, the private sector, and the social welfare sector which has its own Shariah's function, institution, and foundation. These sectors lie in various economic activities as the capital market activity, in which one of the economic activities that directly related to those three sectors.² Islam emphasizes economic activity as a realization on one of the responsibilities of human beings as the Caliph in this world in order to live in balance. Islamic economics or known as shari'ah economics is grounded upon the ethical teachings within the Qur'an. Muhammad bin Abdullah al-Arabi defined shari'ah economic³: '*Islamic economic is a set of general principles of economic which is derived from Qur'an and Sunnah, and it should consider the situation and environment*'.

The notion of Islamic economic in legal perspective is rarely found because the origin of Islamic economic study is not derived from legal perspective but it is derived from the economic studies but these two points are part of *muamallah*. The need of Islamic economic is along with the need of dispute settlement, both in adjudication and non-adjudication.⁴ After

¹ Quraish Shihab, *Wawasan Al-Qur'an* (Bandung : Mizan, 1996), p.408.

² Muhammad Syafi'i Antonio, *Bank Syariah dari Teorik Praktik*, (Jakarta: Gema Insani, 2001), p.7.

³ Abdullah Abdal-Husain al-Tariqi, *Ekonomi Islam: Prinsip, Dasardan Tujuan*, Terjemahan, (Yogyakarta: Magistra Insania Press, 2004), p.14.

⁴ Bambang Sutiyono, *Hukum Arbitrase dan Alternatif Penyelesaian Sengketa*, (Yogyakarta: Gama Media, 2008), p. 5, & p. 11-12. See also Eman Suparman,

enacted Law no. 3 of 2006 regarding amendments to the Law no. 7 of 1989 regarding Religious Judicature; Religious Judicature obtained an expansion authority in solving an economic shariah dispute. The expansion of this authority then get legitimacy in the provisions of shariah economic in which obtain the legal standard of law no. 21 of 2008 regarding shariah banking.

Based on the above background, the study has three objectives. The first is to address Islamic economic system. The second is to discuss to what extent the importance of Islamic economic system can be as an alternative economic system. The third is to highlight the implication of Islamic economic in Compilation of Shariah Economic Law (KHES).

II. RESEARCH METHOD

The method of this study was doctrinal qualitative with normative purpose⁵. The qualitative study explored deeply and comprehensively the issue(s)-related the present study. Therefore, the result of this study was more valid. The objects of this study were primary data, secondary legal data, and tertiary law material. To obtain these data, library research was conducted. It is a method of obtaining data (e.g. legal materials) by searching, recording or writing, inventorying, reviewing books, literature, legislation, result of previous studies, and documentation related to the present research issue(s), and interviewing people about the present research issue(s)-related such as the expert(s) of Islamic economic legal and the practitioner(s) who interest and is currently developing the theory of Islamic economic.

III. THEORITICAL BACKGROUND

Islamic economic system is established as the middle ground between the system of Capitalism and Communism. The major principle of Islamic economic system is to provide the human rights related to the balance of the wealth sharing. Islam grants an individual's rights on how he treats his wealth. On the other hand, Islam regulates an individual regarding his rights and action to his wealth by morals intrinsically and law extrinsically, with the aim that the wealth is not hoarded but it circles to one individual to other until they obtained their wealth legitimately and properly.

1) *Islamic economic*

Islamic economic system assumes that the bond of society-interest between both parties is intimately associated. Both parties are required to build harmony and not competition nor conflict. Related to this concept, in this research, Islamic economic system is viewed as an alternative choice to replace the role of capitalism and communism economic system which had failed in prospering the society. Islamic economic system should

Arbitrasedan Dilema Penegakan Keadilan, (Jakarta: Fikahati Aneska, 2012), p.7.

⁵ Soerjono Soekanto & Sri Mamudji, *Penelitian Hukum Normatif Suatu Tinjauan Singkat*, (Jakarta: Rajawali, 1990), p. 15.

be the only option of Muslims that can be used as a guide to counting on, to act, and to stand forth in order to build the Muslims' economy.

According to Halide, Islamic economic is a set of economic principles that are derived from Qur'an and As-Sunnah which related to the economic matter.⁶ Meanwhile, Al-Arabi defined Islamic economic as a set of economic principles which is derived from Al-Qur'an and As-Sunnah and they become a fundamental of the economic development which adjustable with the change of age and environment.⁷

These two definitions imply that Islamic economic system is the fulfillment of human beings' needs system to achieve prosperity which is based on Islamic teachings within Qur'an and As-sunnah and it is developed by human' thought. Furthermore, the definitions above emphasize onto two ideas of Islamic economic as follow: First: it refers to 'a set of economic principles which is derived from Al-Qur'an and As-sunnah and related to economic matters.' Second: it refers to 'an economic which is based on Al-Quran and As-Sunnah that must be adjustable to the change of age and environment'.

The second point related to the way of the experts in an Islamic country to reconcile or solving economic issues by implementing the principles from Al-Qur'an and As-sunnah. It is also related to the principles which can be adjusted to the change of age and environment.⁸ Meanwhile, the first idea implies that the principles that are derived from Al-Quran and As-sunnah are fixed, or the experts called it "Mazhab Islamic economic". Moreover, Prawiranegara⁹ defined Islamic economic system is an economic system in which the economic principles are affected and restricted by Islamic teachings.¹⁰ It is derived from the Al-quran and the hadiths and is developed by the human thought that qualifies for ijtihad. Therefore, it can be applied in society. Based on the concepts above, Islamic economic system must be built through a set of values and morals that enable to develop an economic activity organizational based on the specific aspects, include: the philosophy of Islamic economic, the value of Islamic economic principles, and the value of Islamic economic instrumental¹¹. Islamic economic is characterized by triangulation concept, God-Man-Nature. This concept

⁶ Moh. Daud Ali, *Sistem Ekonomi Islam Zakat dan Wakaf*, (Jakarta, UI Press, 1988), p.3, First Published.

⁷ Gemala Dewi, SH.LLM; *Aspek-Aspek Hukum Dalam Perbankan Perasuransian Syaria' ahd Indonesia*. (Jakarta, Prenada Media, 2004), Second Published, p.33.

⁸ Prof. HA. Djazuli, MA, *Fiqhi Syari'ah, Implementasi, Kemaslahatan Umat dalam Rambu-Rambu Syari'ah*; (Jakarta, Prenada Media 2003), pp.411-412.

⁹ Syafruddin Prawiranegara, *Sistem Ekonomi Islam* (Jakarta : Publicita, t.t.), pp. 10-15.

¹⁰ Muhammad Daud Ali, *Sistem Ekonomi Islam, Zakat dan Wakaf*. (Jakarta: Universitas Indonesia Press. 1988), p.20

¹¹ A.M. Saefudin, et. al. *Solusi Islam Atas Problematika Umat (Ekonomi, Pendidikan dan Dakwah)*. (Jakarta: Gema Insani Press, 1998), p.34

distinguishes it from other concepts such as Capitalism and Marxism.

Generally speaking, the post-independence's economic system strategy in Indonesia tends to use the model or system of neo-Keynesian economics¹². It emphasizes the importance of the economic growth by "strong impulse" and is planned through the market mechanism (liberal). Due to the factor of "external impulse", Indonesia has the highest debt in the world. The capitalistic policy causes Indonesia become a victim of the capitalist international system¹³. Related to the concept, the fundamental values of Islamic economic may result to the antagonistic-relationship. It is related to the Islam which emphasizes the value of wealth or other economic resources' ownership, mainly those that affected the life of the people, the value of justice, and the value of equilibrium which is implemented on the product of Islamic economic, namely, social security through the concept of Zakat, profit-sharing system (non-riba'), Al-musyarakah (cooperation), and hisbah.

2) Tithe (Zakat)

Zakat (tithe) is an obligatory form of giving based on shariah. Zakat must be paid by every Muslim, man or woman, who reached a nisab (the required amount of wealth)¹⁴. Nisab is the minimum amount of wealth or property that must be owned by Muslim before being obliged to Zakat. Zakat plays an essential role in the allocation of property and wealth and has an effect on an individual's consumption behavior. According to Saefudin¹⁵, in the context of society-economy, Zakat can create peace and security in society and avoid the gap of society level class because of unequal income differences. In addition, the implementation of Zakat by the government can aid the growth of economic stability, in which, an increase of productivity followed by equitable distribution income as well as the increase of vocation for the citizen. Todaro (1995) stated that Zakat is a form of social security which is earned proportionally (through nisbah Zakat mechanism) from the upper-classes' income through the policy of progressive taxation wealth and income.

3) Musharakah

Musharakah is a joint agreement in which both parties (partners) or more (capital owners) agree to defray a business, sharing the profit based on the agreement both parties. Furthermore, both parties can have the different amount of investment because the party investing the capital shares equally

¹² Saidi, Zaidi. *Soeharto Menjaring Matahari*. (Bandung-Jakarta: Mizan bekerjasama dengan PIRAC, 1998). p.74

¹³ Mubyarta. 1999. "Ekonomi Indonesia Korban Kapitalisme". in *Bulletin PIMNAS XII*. Edisi 2/26 Februari. Jakarta: pp.2-3

¹⁴ A.M. Al-

'Assal, and Fathi Ahmad A.K. *Sistem Ekonomi Islam, Prinsip-Prinsip dan Tujuan-Tujuannya*. Translated by Abu Ahmadi and Anshori Umar Sitanggalin *An-Nidzaamul Iqtishaadi Fil Islam Mabaadi-Uhu Wahdaafuhu* (N.Y). (Surabaya: Bina Ilmu, 1980). pp.110

¹⁵ A.M. Saefudin, et al. *Solusi Islam Atas Problematika Umum (Ekonomi, Pendidikan dan Dakwah)*. (Jakarta: Gema Insani Press, 1998). p.46

in both the profit and loss. There are two kinds of *Musharakah* in Islamic Fiqh; *Amlak Syirkah* and *Uqud Syirkah*. *Musharakah Uqud* is divided into five kinds of agreement: 1) *'Inan Syirkah*, 2) *Mudlarabah Syirkah*, 3) *Wujuh Syirkah*, 4) *Abdan Syirkah*, 5) *Mufawadah Syirkah*.

4) Hisbah

Hisbah is an intervention form by government or state in the functionalization of Islamic economic, as the government is the owner of the products and its benefits, a producer, a distributor, as well as the economic supervisory agency. According to Saefudin¹⁶, Hisbah is a state institution which has existed in the age of Prophet Muhammad SAW. It has a role as an economic market auditor in which guarantee the absence of rape and violations of moral rule in the monopoly market, the protection of consumer's rights, security and economic health life. This institution is independent from judicial authority and executive authority. The role of government or state here is needed for the instrumentation and functionalization of Islamic economic values in legal aspect, in planning and supervisory in the allocation of resources and funds, the even distribution of income and wealth as well as an economic growth and stability.

IV. RESULTS AND DISCUSSION

1) Islamic Economic System

The growth of Islamic economic in Indonesia nowadays has become an interesting and exciting phenomenon for Indonesian whose majorities of religion are Islam. The practical of Conventional economic activity such as the capital market activities which is characterized by its venture seems to become a psychological barrier for Muslims to actively engage in investing, at least, in the capital market or shariah capital market. Mutual funds is one of the capitals market's products. It is an agreement that pools money from many investors and usually managed by the fund manager. It is a unit of investment which is set up for specific objectives. On the Article 1 number 27 regarding Law on Investment "a collective investment scheme pooled by a Fund Manager from investors to be managed."

The concept of buying in a mutual fund and saving are mostly similar. The difference between both of them is the passbook cannot be traded while mutual funds can be traded. There are two kinds of mutual fund, namely, open-end fund and close-end fund. A collective investment scheme that can re-trade the shares to the Fund Manager is called open-end fund. Meanwhile, close-end fund is a mutual fund that can be traded to other investors through a secondary exchange market. These varieties of investment products lead to the comprehensive capital exchange market as a means of investment. Investors have a variety of investment product choices based on their investment's goal. Furthermore, for those who need funds (issuer), they can sell a variety of investment

¹⁶ A.M. Saefudin, et al. *Solusi Islam Atas Problematika Umum (Ekonomi, Pendidikan dan Dakwah)*. (Jakarta: Gema Insani Press, 1998). p.56

product to the investor. Besides funds, an issuer can also sell the bond, or combining between share and bond, or bond with other options.¹⁷The trading of mutual fund can be done in the Shariah capital exchange market or conventional capital exchange market. If the trading is done in shariah capital exchange market, then an agreement as a legal instrument which is used in the trading must be based on the principles of Islamic law.

The development of Shariah capital market in Indonesia shows several advancements such as the issuance of six Fatwa(s) (instruction/guidance) which are published by National Shariah Council of Ulama Indonesia (DSN-MUI) during 200th until 2004th. The six Fatwa(s) are :

1. No.05/DSN-MUI/IV/2000 regarding share trading;
2. No.20/DSN-MUI/IX/2000 regarding guidelines for the implementation of shariah mutual fund investment;
3. No.32/DSN-MUI/IX/2002 regarding shariah bonds (Sukuk);
4. No.33/DSN-MUI/IX/2002 regarding Shariah bonds Mudharabah (Sukuk Mudharabah);
5. No.40/DSN-MUI/IX/2003 regarding capital market and the general guideline of the implementation of shariah principle in the capital exchange market
6. No.41/DSN-MUI/III/2004 regarding Ijarah Shariah bonds (Sukuk Ijarah)

These fatwa(s) regulate the Shariah principles in the capital market which include: the shares are considerably satisfied the Shariah principles if it has obtained a decree of Shariah compatibility in written-form by DSN-MUI. There are several steps that must be done to obtain the shariah decree of DSN-MUI; first, the issuer-candidate must present the structure of profit sharing between investors, the transaction structure, the form of agreement such as the trust agreement and others. As a follow up of the fatwa(s) DSN-MUI, BAPEPAM-LK through the decree of the chairman of BAPEPAM-LK Number Kep-131/BL/2006 dated November, 23rd 2006 issued a regulation of No.IX.A.14 regarding the agreements which are used in the issuance of Shariah shares in the capital market and decree of the chairman BAPEPAM No.Kep 130/BL/2006 dated November, 23rd 2006 issued the regulation No.IX.IX.A.13 regarding the issuance of Shariah shares.

The development of Shariah capital market in Indonesia is generally characterized by several indicators. One of them is the considerable amount of Shariah capital market players who issuing shariah shares besides the shares in Jakarta Islamic Index (JII). Moreover, the development of the transaction of Shariah shares in Jakarta Stock Exchange (BEJ) can be illustrated based on the attachment of Jakarta Stock Exchange Announcement No.Peng499/BEJDAG/U/12-2004 dated December 28th, 2004 regarding the list of sharesowner's names that recorded in the

Jakarta Islamic Index (henceforth, JII) from January 3rd, 2005 to June 2005 as follows: Astra Agro Lestari, Adhi Karya (persero), Aneka Tambang (Persero), Bakrie & Brothers, Barito Pacific Timber, Bumi Resources, Ciputra Developmen, Energi Mega Persada, Gajah Tunggal, International Nickel Ind, Indofood Sukses Makmur, Indah Kiat Pulp & Paper, Indocement Tunggal Prakasa, Indosat, Kawasan Industri Jababeka, Kalbe Farma, Limas Stokhomindo, London Sumatera, Medco Energi International, Multipolar Perusahaan Gas Negara (Persero), Tambang Batu Bara Bukit Asam, Semen Cibinong, Semen Gresik (Persero), Timah, Pabrik Kertas Tjiwi Kimia, Telekomunikasi Indonesia, Tempo Scan Pacific, United Tractors, Unilever Indonesia¹⁸.The activity of Shariah stocks as listed in JII has increased quite well. It was identified by the increment of shares about 37,90% , from 118,952 points at the end of 2003 to 164,029 points at the end of 2004. So does the increment of capitalization value of Shariah' shares that listed in JII around 48,42%, starting from Rp.177,78 Trillion at the end of December 2013 to Rp.263,86 at the end of December 2004.¹⁹

In the context of shariah bonds (Sukuk) recently, the development of shariah bonds is obviously shown by the increasing numbers of initial public offering of Shariah bonds in Ijarah contract. The other sign that shows the development of Shariah bonds in recent years is characterized by the increase of the shariah bonds issuance in the Indonesia stock market. It illustrated by the achievement of the shariah bonds issuance at the end of 2004 Rp.1424 trillion comparing to the shariah bonds issuance around Rp.740 billion at the end of 2003. It implies that there is a significant improvement of shariah bonds issuance around 92,43%, however, the percentage of shariah bond issuance is only 1,72% in the amount of the bonds issuance in the Indonesia stock market which achieved Rp.83.005,349 trillion in 2004.Such as, there are only six issuers whose offering Shariah bonds in The Indonesia Capital Market since up to end of 2003 with a number of emission Rp. 740 billion, whereas in 2004, the number of issuersincreased from six to seven issuers that have received an effective statement from Bapepam. Thus, from the earlier to end of 2004, there are thirteen issuers whose offering Shariah bonds comparing in 2003 that only consist of six issuers or the increment is around 116,67%.²⁰

The other sign that shows the development of Shariah bonds in recent years is characterized by the increase of the shariah bonds issuance in the Indonesia stock market. The shariah bonds issuance achieved Rp.740 billion at the end of 2003 while at the end of 2004, it achieved Rp1.424 trillion. It implies that there is a significant improvement of shariah bonds issuance around 92,43%, however, the percentage of shariah bond issuance is only 1,72% in the amount of the bonds issuance in the Indonesia stock market which achieved Rp.83.005,349 trillion in 2004.²¹

In the midst of the increasing number of investment products under the name of Shariah, it should be noted that the lack of legal regulation that covers every Shariah transaction activities in the stock market implies that the protection toward

¹⁷Wahana *Investasidan Alternatif*
Pembiayaan Perusahaan,

<http://pasarmodal.blog.gunadarma.ac.id>,retrieved onJanuary, 31st2018

¹⁸*Ibid.*

¹⁹*Ibid.*

²⁰*Ibid.*

²¹*Ibid.*

investors or customers in the Shariah stock market context remains unclear.

2) The Importance of Islamic Economic

To elaborate the importance of Islamic Economic in Indonesia economic system, the history of Islamic economic from Islamic figures' thought should be shown firstly. Along the Islamic history, the Islamic thinkers, as well as the political leaders, have developed their ideas in the economic field. Their contributions to the economic field allow them to be regarded as the founder of the origins Islamic economic, unfortunately, they are not notably well-known. It is caused by Islam is viewed as an Ardhi religion, and Muslims did not do colonization and imperialism to the area which is controlled. The great thinkers of Islamic who contribute in economic field are Abu Yusuf (W. th. 182 H), Yahya bin Adam (W. th. 303 H), al-Ghazali (W. tahun 505 H), Ibnu Rusyd (W. th. 595 H), al-'Izz bin 'Abd al-Salam (W. th. 660 H), al-Farabi (W. th. 339 H), Ibnu Taimiyyah (W. th. 728 H), al-Maqrizi (W. th. 845 H), Ibnu Khaldun (W. th. 808 H), dan many others. They have studied about the methodology of Islamic economic, in which western writers used their ideas as references in their work such as the Muqaddimah's ideas from Ibnu Khaldun.²²

The development of Islamic economic will be characterized by three factors: a) First, the development of theological studies and discourse of renewal which introducing the Islamic values as a basis of work ethos and Islamic entrepreneurship ethos. b) Second, the development of a small business, a home business, and informal sector which become a fundamental basis of Muslim economic as well as the development of Muslims' industry in the modern large-scale sector. c) The third, the development and the achievement of the experiment in Islamic economic system, particularly in the Islamic finance. Such as the fastest-growing of shariah banking system in Indonesia, Malaysia, Sudan, England, Egypt, Turkey, etc. However, the legitimacy of Islamic economic system not only depends on the achievement of the system which is grounded by the teachings of Islam but also it depends on the achievement of its system in expanding the power of Islamic economic.

The nature of Islamic economic is Rabbani and Insani. It is called Rabbani because it is loaded with divine guidance and values. Meanwhile, it is regarded as Insani if the implementation of economic system is intended for human prosperity. Faith is essential to Islamic economic because it directly affects the individual's perspective toward personality, attitude, preferences, attitude to people, resources and the environment.²³ These values of faith turn out to be the binding rules, in which every human action must have the value of moral and worship. In vertical-view, each individual must have a good moral character while in horizontal-view, it must have a benefit for human beings and the other creatures. Islamic economic emphasizes on human beings as the center of circulation of the economic benefits which is taken from available various resources. It is contrast to the naturalist

concept which set on resources as an essential factor or monetarist ideas which put on finance capital as an essential factor.²⁴

Rahardjo stated that there are three possible interpretations related to the terminology of "Islamic economic". The first, economic emphasizes the values and the teachings of Islam. The second, Islamic economic system is related to the regulation that binding the economic activities in a particular way. The third is Islamic economic. This notion is interpreted as it is developed in Islamic organization (henceforth, OKI). OKI is the organization that contributed to the growth of Muslims' economic and at the same time, they also develop the theory of Islamic economic.

In the study of finance, Islamic economic clearly distinguishes between money and capital. In the context of Islam, money is a flow concept while capital is a stock concept. Therefore, in economic perspective, the quicker money-go-round then the better economic is. Within in this frame, Islam suggested qadr and alms that enable the money turn-over fast in economic activity. Furthermore, money in the Islamic context is seen as a public good, owned by society while capital is a personal good. Hence, hoarding money implies reducing the amount of money in economic circulation. If it is presupposed as a blood, then the economic will lack of adequate blood or economic stagnation. Therefore, it is forbidden to hoard money. Meanwhile in the context of capital, the capital is seen as private assets. Therefore, capital is the object of Zakat. Logically, capital must be productive. For those who cannot do it, Islam recommended to do Musharakah or Mudharabah, that is profit-sharing business.

Antonio explained several advantages in implementing Islamic economic as follow:

1. A Broad-based economic. Islamic economic is not intended for Muslims but it is intended for all people. Implementing Islamic economic encourage people to work hard in earning wealth and needs in certain ways by following the regulations that has been created.

2. The justice and brotherhood of man; Islam aims to form a society in a 'solid-form'. Each individual is bounded by the brotherhood and affection as a family. In the Islamic context, justice can be referred to:

- a. The social justice. Islam regards each mankind is equal in front of Allah.

- b. the economic justice. The equality of human beings in society as well as the equality before the law which must be balanced with economic justice. Without economic justice, social justice will be pointless.

3. The justice of income distribution: the income inequality and the natural resources which is contrary to the spirit and commitment of Islam on brotherhood man and socio-economic justice. The income gap should be overcome in Islamic way, such as abolish the monopoly with government's exception in the particular fields; ensuring parties' rights and chance to actively involved in economic process either in production, distribution, circulation, or consumption aspect; ensuring the fulfillment basic needs of each individual; implementing the trusteeship of At

²²Zainul Arifin, *Memahami Bank Syariah: Lingkup, Peluang, Tantangan dan Prospek*, (Jakarta, Alfabeta, 1999), p. 7

²³Mustafa

Edwin Nasution et al., *Pengenalan Eksklusif Ekonomi Islam*, (Jakarta, Kencana, year 2006), p. 12-13.

²⁴*Ibid.*

takaaful al Ijtimai or social economic security insurance in which enable to indemnify and help the poor people.

4. The individual freedom in social welfare context: the fundamental of Muslim faith is 'mankind is created by Allah'. It implies that since human was born, he has a freedom. Therefore, nor individual or state do not have rights to revoke human's independence and making human's life bonded.

In implementing Islamic economic activity, there are several legal principles that must be followed:

1) Freedom on effort

Almighty Allah SWT has given the guidance in order human beings utilize the gift from Allah which is the earth and everything in it. Allah SWT says:

"He is the one who hath made the earth subservient unto you, so walk in the paths thereof and eat of His providence." (Q.S. 26 :15)

Islam does not restrict an individual to try varieties of effort/business based on their abilities, proficiency, and skills such as agriculture, fisheries, plantation, trade, etc. to obtain his own property/wealth. Islam views property which is got from an individual's effort or work as a commendable wealth. This statement was mentioned by Prophet Muhammad SAW when he was being asked about the best job of human being. Then, He answered that what best is the effort from their own hands and all the Mabrur trading (the most lawful and the most memorable) (H.R. Ahmad, Thabrani dan Ibnu Umar); (Sayid Sabiq ; Fiqhi Sunnah).

2) The prohibition of Riba' (Usury)

Riba in Arabic word 'Az-Ziadah', literally means increment, addition, or excess while in Islamic Fiqh the term Riba is an unjustified increment of fund in trading or business, (either an excessive addition or lower addition). The prohibition of Riba in Al-Quran is consist with three stages:

a. The first stage on Riba was revealed in Mecca period. Allah says:

"And whatever you give for interest to increase within the wealth of people will not increase with Allah. But what you give in zakah, desiring the countenance of Allah - those are the multipliers" (Q.S.30:39)

b. The second stage on Riba was revealed in Madinah. Allah warns Muslims from dealing with Riba clearly by saying:

"O you who have believed, do not consume usury, doubled and multiplied, but fear Allah that you may be successful." (Q.S. 3:130)

c. In the last stage, Prohibition of Riba is completely clear and firm. Allah SWT says:

"O you who have believed, fear Allah and give up what remains [due to you] of interest, if you should be believers. And if you do not, then be informed of a war [against you] from Allah and His Messenger. But if you repent, you may have your principal - [thus] you do no wrong, nor are you wronged. And if someone [debtor] is in hardship, then [let there be] postponement until [a time of] ease. But if you give [from your right as] charity, then it is better for you, if you only knew." (Q.S.2: 278-280)

In Quran Surah Al-Baqarah verse 278-280, it affirms that Riba is prohibited if there is an interest (however the amount is) in the process of trading or business. Allah clearly says that the amount of money or property must be payback as how much it borrows without addition or interest.

3) The prohibition of Gharar (uncertainty) or the possibility of fraud trading (Ba'iu Al-Gharar)

Al-Gharar means uncertainty (truth or untruth). Bai'u Al-Gharar means trade which leads to the uncertainty results, either it's a success or unsuccessful, happened or not happened. Such as: the trading of a drop (seed) of an animal which is in its womb, birds that are flying, fish that are still in the water, and the unripe fruits unless it is picked immediately on the tree.

4. The prohibition of abuse on authority to gaining wealth

Islam prohibits human beings to gaining wealth by abusing their authority or power. It is illustrated by the story from Imam Buchari about Ibn Al-Lutaibh who comes to Rasulullah SAW to show the result of his work which is assigned by Rasulullah SAW to take Zakat from Bani Sulaiman and he divided the Zakat into two parts; for other people and for himself by saying "this Zakat is for all of you and the other is mine that given for me as a gift." Rasulullah SAW who hear it, then stand up and says, Amma Ba'du: I have assigned some of you to take on duties that Allah mandated me. Meanwhile, you come and said this [Zakat] is for people and the rest of it [Zakat] is a gift for you. Then, why don't you just sit down at his/her house and waiting for a gift?. For the sake of Allah that given me trusteeship, no one have a rights to take this [Zakat] except he will carrying it on the nape of neck on the judgment day. Later, the prophet of Muhammad SAW takes those entire gift that given for Ibn Al-Lutaibah and put it in accumulation storage.

5) The prohibition of lavishness

Islam has made the regulation of how people spend wealth/property as it shown in Al-Qur'an Chapter 17 Verse 27 and Verse 16:

"Indeed, the wasteful are brothers of the Satan, and ever has Satan been to his Lord ungrateful." (Q.S.17:27)

"And when We intend to destroy a city, We command its affluent [obey to Allah] but they defiantly disobey therein; so the word comes into effect upon it, and We destroy it with [complete] destruction." (Q.S. 17:16)

These verses of Qur'an imply that Islam forbids people to live lavishly because it leads people to live lazily and possibly encourage people to do a bad thing. Lavish-living shows the economic-gap between the rich and the poor and cause other people being envious.

6. The prohibition against the hoarding of wealth

It refers to the collecting large amounts of something by holding it or avoiding it away from the market. Hoarding of wealth has been condemned by Islam with threats of severe punishment. Here is the statement which highlights the view-point of the forbidden of wealth hording:

“And those who hoard gold and silver and spend it not in the way of Allah, give them tidings of a painful punishment. On the day when gold and silver be heated in the fire of Hell and seared therewith will be their foreheads, their flanks, and their backs [it will be said]; “This is what you hoarded for yourselves, so taste what you used to hoard.” (Q.S. 9:34-35)

Wealth-hoarding has the disadvantage to the economy as it makes the asset away from the market circulation. It also applies to the hoarding of basic needs as it makes the price of the goods increases when the goods are reduced in the market. This provision is illustrated below:

Narrated by Abu Dawud, At-Tirmidzi and Muslim from Muammar reported that the Prophet (S.A.W) said “those who do wealth hoarding are guilty (sinful)”

Narrated by Imam Ahmad and At-Thabrani from Ma'qol bin Yasar reported that Prophet SAW said ‘those who interfere in the price of a good for the aim to increase it excessively will be put on the fire on the judgment day.’

The ideas that have been described above are the principles in implementing economic activity in which related to the principle of the religious-valued in law and it becomes a good deed if it's obeyed. The principle of law in the implementation of Islamic economic reflects the importance of law status in Islamic economic activity. Furthermore, the implementation of Islamic economic reflects the mission of Islamic economic to achieve its status in society. There are several missions of Islamic economic in supporting the societies' economy, as follows:

a. *Fulfilling human needs*

As explained above, Qur'an and As-Sunnah are sources of law and Muslim's guidance in doing business to fulfill their demands in their life as well as in the Hereafter. As Allah says:

‘But seek, through that which Allah has given you, the home of the Hereafter; and [yet], do not forget your share of the world. And do good as Allah has done good to you. And desire not corruption in the land. Indeed, Allah does not like corrupters.’(QSAIQashash:V.77).

It clearly seen that Islamic economic mission is aimed to guide people to fulfill their life's needs as it is a major aspect in human's life. One thing that should be considered is the intention to fulfill the needs must be seen as a devoted to Allah S.W.T. Therefore, the needs of fulfillment must be done in a good way. Therefore, Islamic economic regulates people on the way they fulfill their needs by providing rules which affect on the act of people in doing business as well as in producing goods, such as the the production must be halal.

b. *Eliminating poverty*

Eliminating poverty or at least decreasing poverty in society is the major mission of Islamic economy. By decreasing or eliminating poverty, it assumes that the piety to Allah S.W.T will be increased, and vice versa, poverty caused people feeling insecure in society as well as close to kufr. A prophet S.A.W. says: ‘purity (poverty) nearly causes to kufr’

Allah says:“and give them half of the wealth which He has given you“(Q.S. AnNur:33).

“Believe in Allah and His messenger and spend out of that in which He has made you successors“(Q.S.AIHadiid:7).
“and from their properties was given the right of the [needy] petitioner and deprived” (Q.S. AdzDzariyat:19)

Those verses above show that Islamic economic system consist of the teachings related to *infaq*, *shodaqoh*, and the obligation to pay *Zakat* as the fifth pillar of Islam. These Islamic teachings lead people to eliminate or reducing the poverty or closing the economic gap between the rich people and poor people.

3) Implication of the implementation Islamic Economic in Compilation of Economic Shariah Law (KHES)

In order to establish guidelines in solving the Shariah economic dispute in the Religious Court, The Compilation of Economic Shariah Law (usually abbreviated as KHES) is issued. However, KHES is being questions by particular people and it isalso compared with the existence of other Compilation of Islamic Law which has been established earlier and has beenused in the religious court. They argued that the legal standard of KHES is still using the regulation of Supreme Court. Considering at the development of Islamic law in Indonesia's economic and Shariah finance field, the implementation of KEHS must coincide with civil law and business law which is based on the legislation as well as the shariah economic provision in the Fatwa of DSN MUI which has been provided by Indonesian Bank regulation on UU No.21 year 2008 regarding Shariah banking.

- 1) The history of the compilation of Economic Shariah Law (KHES) cannot be separated from the Article 49 of Law No.3/2006 regarding Amendments to the Law No.7/1989 regarding Religious Court. This Article emphasizes on the authority expansion to Religious Court to solve the Shariah Economic disputes. The enactment of Law No. 3/2006 led the Supreme Court to arrange the variety of policies such as creating formal law and material law as guidance for judges to resolve shariah economic disputes in Religious Court.²⁵The article 49 Law No.3/2006 regarding amendment on Law No.7/1989 about Religious Court mentions that: ‘Religious court is obligated and is authorized to examine, deciding, and resolving Muslim's case at the first level related to: a. Marriage; b. Heritage; c. Will; d. Grant; e. Waqf; f. Zakat; g. Infaq; h. Shadaqah; and i. Sharia Economic.’ Referring on the Article 49 Law No.3/2006 shariah economic is ‘an act or business activity which is implemented based on shariah principles, include: a. Shariah Bank; b. Islamic Micro-finance institution; c. Shariah Insurance; d. Reinsurance Shariah; e. Shariah mutual funds; f. bonds; g. Shariah securities; h.

²⁵BagusAhmadi, “Akad Bay, Ijarah dan Wadi'ah Perspektif Kompilasi Hukum Ekonomi Syari'ah (KHES)”,*Epistime*,Vol.. No.2,December2012,p.315.

Shariah financing; i. Shariah pawnshop; j. Shariah pension funds; dan k. Shariah Business.²⁶

According to the decree of Supreme Court No.KMA/097/SK/X/2006 about Supreme Court that form the team to create KHES which was led by Manan and be reported to the chief of Supreme Court. There are several stages that KHES team done: The first stage was the KHES team united their legal opinion by asking for different groups' opinion such as National Sharia Arbitration Board. The next stage was to find the ideal format (united the legal framework) which was taken from Indonesia Bank employee. And the last stage, the team sought information through the study of literature and comparing it with other countries. The arrangement of KHES which includes 21 members comes from various fields: economic experts, university, DSN-MUI, *Basyarnas*, Bank practitioners either from Bank of Indonesia, state-owned bank, or private bank, as well as the parties in the foreign financial institution.

Specifically, the team arranges the draft of KHES based on the book of Majallah Al-Ahkam (*The Islamic civil code of the Ottoman Empire in the 18th century*). The currently used of KHES draft consist of 796 Articles. Meanwhile, the initial draft of KHES consists of 5 Chapters and 1040 Articles include legal prowess, capability and compulsion, wealth, agreement, *Zakat*, and grant; The last draft consist of 4 chapters and 849 Articles, in which the four chapters of Compilation Shariah Economic Law (KHES) consist of Book I regarding on the subject of Law and *Amwal*, Book II regarding on agreement, Book III regarding *Zakat* and grant, and Book IV regarding on Shariah Accounting. To complete the draft of KHES, new item were included. It was derived from the contemporary jurisprudence books and the result of scientific studies conducted by the center of International Islamic Economic Studies. The draft of KHES was discussed about a year (two years include the formation of team by Supreme Court) until KHES was issued in the decree of PERMA No.02/2008 date September 10th, 2008.²⁷

There are Eighty percents or 653 Articles of 796 Articles (Article 20-674 KHES) regarding to Agreement's regulation in

²⁶Ifa Lathifa Fitriani, *Kompilasi Hukum Ekonomi Syariah dalam Pemaknaan Hukum Islam dan Sistem Hukum Positif Di Indonesia*, *Supremasi Hukum* Vol. 5, No. 1, June 2016. pp.56-57

²⁷Bagus Ahmadi, "Akad Bay, Ijarah dan Wadi'ah Perspektif Kompilasi Hukum Ekonomi Syari'ah (KHES)", *Episteme*, Vol. 7, No. 2, December 2012, pp.314-316. See also AbdulMughits, "Kompilasi Hukum Ekonomi Syari'ah (KHES) dalam Tinjauan Hukum Islam", *Al-Mawardi*, XVII edition year 2008, pp. 142-145. See also "Menguntit Jejak Kompilasi Hukum Ekonomi Syari'ah" retrieved in www.hukumonline.com, on Mei, 3rd 2016. See also Ifa Lathifa Fitriani, *Kompilasi Hukum Ekonomi Syariah dalam Pemaknaan Hukum Islam dan Sistem Hukum Positif Di Indonesia*, *Supremasi Hukum* Vol. 5, No. 1, June 2016. p. 57

KHES.²⁸The term of agreement in Islamic law perspective is a contract while *iltizam* refers to engagement or commitment. Anshori described the meaning of agreement from the perspective of Al-Quran is *al-aqdu* (contract) dan *al-ahdu* (commitment).²⁹The term of *aqdu* can be linked with the term of *verbinten*is KUHPer, meanwhile *al-ahdu* can be linked with an agreement.³⁰An agreement or contract is an agreement between two or more parties which consist of two elements, *Ijab* and *Qabul*, as legal statement between both or more parties. In the Book II of KHES, it elaborates about the general principles of contract or agreement (principle, harmonious, terms, legal consequences, etc.) as well as the types of contract (*syirkah dansyirkah milk, mudharabah, muzara'ah dan musaqah, khiyar, ijarah, kafalah, hawalah, rahn, wadi'ah, gashband itlaf, wakalah, shulh, bonds of Mudharabah Shariah, capital exchange market, Shariah mutual funds, SBI Shariah, Shariah bonds, multi-financial service, qardh, Bank account of Shariah, and shariah pension funds*).³¹

Despite the adaptation from the literature studies by scholars as the Islamic law sources for KHES, the regulations in KHES are also mostly adopted from DSN MUI guidance³². DSN MUI guidance cannot be neglected since the MUI in Indonesia is viewed as the perspective representation of Indonesia's Muslim scholars, and it is also emphasized by the enactment of law No.21/2008 regarding the legitimacy of Shariah bank which

²⁸Samsul

Anwar, *Hukum Perjanjian Syariah: Studi Tentang Teori Akad dalam Fiqh Muamalat*, (Jakarta: Raja Grafindo Persada, 2010), p.47 & p.68. See also Ifa Lathifa Fitriani, *Kompilasi Hukum Ekonomi Syariah...Ibid...* p. 57

²⁹AbdulGhofur Anshori, *Hukum Perjanjian Islam di Indonesia: Konsep, Regulasi, dan Implementasi*, (Yogyakarta: UGM Press, 2010), pp.22-23. See also Ifa Lathifa Fitriani, *Kompilasi Hukum Ekonomi Syariah...Ibid...* p. 57

³⁰AbdulGhofur Anshori, *Hukum Perjanjian Islam di Indonesia: Konsep, Regulasi, dan Implementasi*, (Yogyakarta: UGM Press, 2010), pp.22-23. See also Ifa Lathifa Fitriani, *Kompilasi Hukum Ekonomi Syariah...Ibid...* p. 57

³¹See *Kompilasi Hukum Ekonomi Syari'ah*, Mahkamah Agung Republik Indonesia 2008, pp.1 5-183. See also Ifa Lathifa Fitriani, *Kompilasi Hukum Ekonomi Syariah dalam Pemaknaan Hukum Islam dan Sistem Hukum Positif Di Indonesia*, *Supremasi Hukum* Vol. 5, No. 1, June 2016. p. 57

³²Ridawan HR, *Fiqh Politik: Gagasan, Harapan, dan Kenyataan*, (Yogyakarta: FH UII Perss, 2007), pp. 84-98.

brings to the recognition of MUI by the government.³³The following guidance of DSN MUI which is adopted by KHES are: guidanceNo.5/DSN-MUI/IV/2000 regarding shares trading, guidanceNo.6/DSN-MUI/IV/2000regarding “Ba’i Al-Istisna” in the Article 56-155 related to sale and purchase, guidanceDSNNo.48/II/2005 regarding the reschedule of *Marabahah* claim, guidance DSNNo.49/DSN-MUI/II/2005 regarding *Murahaah* agreement conversion, guidance DSNNo. 47/DSN-MUI/II/2005 in KHES Article 116-113 regarding to the settlement of *Murabahah* receivables for those who are unable to pay.Guidance DSNNo.09/DSN-MUI/2000in the Article 295-372 regarding *Ijarah*.Guidance DSNNo.12/DSN-MUI/2000in the Article 362-372 regarding *Hawalah*.Guidance No.32/DSN-MUI/IX/2002 in the Article 575-580 and 605-608 regarding Shariah bonds and other provisions.

Related to the Islamic law sources, KHES is divided into two sources³⁴: 1)Islamic law sources areAl-Quran, Ijma, and Qiyas. These sources had been agreed by Muslim scholars (Jumhur scholars).2) *Istihsan, istislah, urf,istishab, mazhabshabat*, etcwhich still being questioned.

KHES in the perspective of Islam may refer to ³⁵one of *Ijtihad jama’i*’s products (collective).³⁶*Ijtihad*is defined as the effort of *Faqih* in implementing the teachings of Islamic law in certain ways(*istinbat*). *Ijtihad* is done by Muslim scholars and Ulil Amri which clearly emphasize to the Islamic law sources that recognized by Muslim scholars as it is shown in Q.S. An-

³³Article26UUNo.21year2008regarding Shariah banking, Verse (1): “Kegiatan usaha sebagaimana dimaksud dalam pasal 19, pasal 20, dan pasal 21danatauproduk danjasasyariah,wajibtundukkepada ketentuan prinsip syariah.Verse(2):“Prinsip syari’ah sebagaimana dimaksud pada ayat (1) difatwain oleh Majelis Ulama Indonesia”.Verse (3): Fatwa sebagaimana dimaksud pasal 26 ayat (2) dituangkandalamPeraturanBankIndonesia.DalamRangkapenyusunanPeraturanBank Indonesiasebagaimana dimaksudpadaayat(3),BankIndonesiamembentuk komite Perbankan Syari’ah”.See also Ifa Lathifa Fitriani, *Kompilasi Hukum Ekonomi Syariah...Ibid..* p. 59

³⁴AbdulMughits, “Kompilasi Hukum Ekonomi Syari’ah (KHES) dalam Tinjauan Hukum Islam”, *Al-Mawardi*,XVII editionyear2008,p.153.SeeSainulandMuhammadIbnuAfrelian, “Aspek Hukum Fatwa DSN-MUI dalam Operasionalnya di Indonesia”, *Jurnal Hukum dan Ekonomi Syariah*, Vol.03, No.02, September2015, pp.187-188.

³⁵HasbiAsh-Shiddieqi, *Pengantar Hukum*, (Jakarta: Bulan Bintang, 1975), p.29,

³⁶Akh. Minhaji, “Sejarah Sosial Pemikiran Hukum Islam: Sebuah Pengantar”, dalam *Antologi Hukum Islam*, (Yogyakarta: Program Studi Hukum Islam, 2010), p.27. See also Abdul Wahab Khalaf, *Sumber-Sumber Hukum Islam*, (Bandung: Risalah, 1984), pp.1-2.

Nisa (4): verse 59. *Ijtihad* is divided into several methods³⁷: a. Interpretation linguistic method focuses on Al_qur’an and Hadits’s interpretation. This interpretation related to the text in Al-Qur’an which states that the status of law are either clearly (*Zahir nass, mufassar, and muhkam*) or unclearly (*khafi, mushkil, mujmal and mutashabih*). b. Causation method which aims to construct law cases which the legal text-form is unavailable. *Qiyas* and *Illat* are used by Muslim scholars to construct this legal case. c. Allignment refers to match the legal propositions which may contrast to each other. Such as the theory of *Nasakhand Tarjih* which frequently recited by *Abdul Wahab* related to the study of *ushul fiqh*.

The definition of Islamic law is indefinite because there is no exact definition of Islamic law either in the Islamic law literature studies or within Al-Qur’an. Al-Quran only shows the term of *syari’ah, fiqh, Allah’s law*, and other terms of Islamic law. Islamic law is derived from the western legal thought and related to *Roman law*. Non-Muslim scholars used the term of Islamic law as the translation of *fiqh* or Islamic *fiqh*.³⁸ According to Ash-Shiddieqi, Islamic law is a set of law scholar’s efforts to implementing shariah in a society.³⁹This implies that Shariah and *fiqh* in Islamic studies are differentiated based on their meaning.⁴⁰Other perspective of Islamic law is proposed by Anwar. He defined it based on the law interpretation of the subject. First, the jurisdiction which emphasizes in Shariah law is formal and binding.⁴¹ The perception of judge as a state apparatus in Islamic perspective is similar with the government perspective that related to the theory of modern Triassic politics consist of judiciary, executive and legislative. Second, *Ifta’* (guidance), which is interpreted as non-formal and unbinding, then the apparatus is *Mufti* and the institution is formal.⁴²

Based on the statements above, it can be concluded that KHES is derived from the product of *Fiqh* which is used as guidance. Additionally, it may also derive from the judge jurisprudence which is used by International Islamic Economic Studies Center and it is adopted in KHES. KHES is formal and unbinding (persuasive) because it consist a set or compilation of guidance (*fatwas*). Therefore, following Rahman’s idea, he suggested to insert the result of *ijtihad* which has become

³⁷Munawir Haris, “Metodologi Penemuan Hukum Islam”, *Ulumuha*, Volume 16 No.1, Juni 2012, p.7-14.

³⁸Moh.Dahlan, *Abdullah Ahmed An-Na’im: Epistimologi Hukum Islam*, (Yogyakarta: Pustaka Pelajar, 2009), p.91.

³⁹M.Hasbi Ash-Shiddieqi, *Filafat Hukum Islam*, (Jakarta: Bulan Bintang, 1975), p.44.

⁴⁰Abdul Wahhab Khallaf, *Ilmu Ushul Fikih*, (Jakarta: Pustaka Amanah, 1974), p.11.

⁴¹Miriam Budiardjo, *Dasar-Dasar Ilmu Politik*, (Jakarta: Gramedia, 2008), pp.281-287. See also Ifa Lathifa Fitriani, *Kompilasi Hukum Ekonomi Syariah dalam Pemaknaan Hukum Islam dan Sistem Hukum Positif Di Indonesia*, *Supremasi Hukum* Vol. 5, No. 1, June 2016. p. 60

⁴²Syamsul Anwar, *Studi Hukum Islam Kontemporer*, (Jakarta: RMB Books, 2007), pp.304-305.

the *ijma'* of Islamic jurists in *Qanun* by legislative decree who has an authority in creating *qanun*.⁴³

By neglecting the different perceptions from Muslim scholars toward the boundary of *ijtihad*, *Ijtihad* in the modern life context plays an important role in the study of *ushul fiqh*.⁴⁴ Such as Muhammad Sahrur explained the *ijtihad* which can be and cannot be done. The *ijtihad* which cannot be done is elaborated in two ways: *ash-sha'a'ir* (ritual of faith), he further explained that it is forbidden because it is *bid'ah* and *heresy*. The second is *al-akhlaq* (ethical space) and *al-muthul al-ulya*. Meanwhile, the *ijtihad* that can be done is in *at-tashri* (legislation).⁴⁵ Abdul Wahab Khallaf explicitly stated that when the legal problem is firm and clear, then *ijtihad* cannot be done (*qathi'i nashnya*). while when the legal issue is *Zhanni* or implies a double meaning, then it is possible to do *ijtihad* by *tarjih* (choosing).⁴⁶ Other perspective comes from As-Shiddiqi who stated that law (*fiqh*) is adjustable within the age and environment as it states *infiqh* rule "*taghayyirual-ahkam bitaghayyiru al-azmanwa al-amkan*". This statement is grounded by several major arguments: first, the rules within *fiqh muamalat* which shows 'the nature of *Muamalat legalis* 'all actions are permitted, except there is a rule that forbidden it'. Second, it is based on *hadith* of the Prophet S.A.W. "you know more about your world".⁴⁷ This concept is more adjustable because it emphasizes on the legal form that adjustable on the change of society as well as the customary change.

Despite the divergence of Muslim scholars' perspective toward *ijtihad*, the existence of KHES is one of *Ijtihad* which done by Muslim scholars' to develop a law in order to fulfill the needs of society. The method which is used in the formation of KHES may refers to *ijma'*. In the modern age, the implementation of *ijma'* can be done as it is shown in Abduh and Iqbal.⁴⁸ In the writer's perspective, the methodology which is

implemented by *Mujtahid* (led by Abdul Manan Kala) to create KHES refers to the method which is always used by Islamic thinkers, such as Hasbi As-Shiddiq.⁴⁹ Meanwhile, the method which is implemented toward the issues that has been listed by DSN MUI and the earlier *ijma'* in KHES is a comparison of elective thinking system method. Other method is by comparing shariah economic law which is implemented in other country and their relation to the Indonesia's civil law system.

As it describes above that the draft of KHES involves various parties (*ijtihad collective*) and it assumes that the parties who involves in the arrangement of KHES draft are *Mujtahid*. Moreover, Al-Qur'an, *Hadiths* as well as other sources of Islamic law that have been agreed upon by *jumhur* and vice versa, are the major guidelines in arrange the KHES.

KHES in the perspective of Islamic Law in Indonesia may also be referred to *fiqh* because it satisfies the nature of Islamic *fiqh*. Zuhaili defined *fiqh* as a set of law *Syara'* which regulate the act of human being through the detailed arguments. While Ash-Shiddieqi supported the definition of Al-Khitib who defined *fiqh* as a set of law *syara'* which is cited from several of Mazhabs either four mazhab or other mazhab.⁵⁰ It characterized by: the practical of *fiqh* is based on the divine; impulse of faith and morals; collective, and accepting the change of context (i.e. environment and age). Other perspective mentions that KHES can be categorized as *fiqh* because it satisfies its aspects such as; Islamic law, related to *mukallaf*, *ijtihad* and *istidal*, the sources are derived from Al-quran and *hadiths*.⁵¹ Moreover, KHES can also be referred as an Indonesian-*fiqh*. The term of Indonesian-*fiqh* is used to refer an Islamic law provision which characterized by Indonesian-sense.⁵² Generally, Indonesian-*fiqh* is used by Muslims figures who initiated *fiqh* (Islamic law) based on Indonesia's characteristics. The notion of Indonesia-*fiqh* began to discuss by Hazairin.

V. CONCLUSION

Based on the above discussion, it can be concluded that:

1. the economic development in the period of reformation can be fulfilled if Islamic economic system is studied further and intensively,
2. Islamic economic system must be adjustable in the period of reformation. Therefore, the economic sector includes *Muamalah* can be developed at any time. To achieve this, it should consider several aspects such as

⁴⁹ *Ibid.*, p.69-70.

⁵⁰ Abdul Wahhab Khallaf, *Ilmu Ushul Fikih*, (Jakarta: Pustaka Amanah, 1974), p.11. Wahbah Az-Zuhaili, *Ushul Fiqhal-Islami*, Juz1, (Beirut: Dar Al-Fikr, 2001), p.25. Hasbi Ash-Shiddieqi, *Pengantar Hukum*, (Jakarta: Bulan Bintang, 1975), p.29.

⁵¹ Abdul Mughits, "Kompilasi Hukum Ekonomi Syari'ah" p.151.

⁵² See also the study of Hasbi Ash-Shiddiqi in Nourouzaman Shiddiqi, *Fiqh Indonesia: Pengagasan dan Gagasannya*, (Yogyakarta: Pustaka Pelajar, 1997), pp.234-241.

⁴³ Abdul Manan, *Reformasi Hukum Islam di Indonesia: Tinjauan dari Aspek Metodologis, Legalisasi dan Yurisprudensi*, (Jakarta: Raja Grafindo Persada, 2006), p.235.

⁴⁴ Akh. Minhaji, "Sejarah Sosial Pemikiran Hukum Islam: Sebuah Pengantar", in *Antologi Hukum Islam*, (Yogyakarta: Program Studi Hukum Islam, 2010), p.27.

⁴⁵ Muhammad Shahrur, *Metodeologi Fiqih Islam Kontemporer*, (Nahw Usul Jadidah Li Al-Fiqihal-Islami), (Yogyakarta: eLSAQ Press, 2004), pp.212-213.

⁴⁶ Abdul Wahab Khalaf, *Sumber-Sumber Hukum Islam*, p.4.

⁴⁷ Nourouzaman Shiddiqi, *Fiqh Indonesia: Pengagasan dan Gagasannya*, (Yogyakarta: Pustaka Pelajar, 1997), p.78. See Shahih Muslim Hadis No.4358. Lihat juga Ibnu Taimiyah, *Al-Qawa'id al-Nuraniyah al-Fiqhiyah*, Juz II, (Riyadah: Maktabah al-Ruysd, 1422H/2001M), p.306.

⁴⁸ Ali Sodikin, *Ushul Fiqh: Sejarah, Metodologi dan Implementasinya di Indonesia*, (Yogyakarta: Beranda Publishing, 2012), pp.85-86.

in terms of banking, the limitation of interest rates between usury interest rates and other interest rates which is not categorized as usury should be considered carefully.

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Huge hopes for a Clean Air City: Lessons from Ulaanbaatar City Air Quality Problems and Prospects for a Sustainable Socio-Economic Development

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Abstract- Poor air quality has profound adverse effects on human health and ecosystems with further negative implications on future generations. Excessive urban air pollution in Ulaanbaatar city poses huge threats to a sustainable development in Mongolia. Worsening air quality problems in Ulaanbaatar city of Mongolia was concerned in this study. The state of air quality in Ulaanbaatar City was updated by reviewing lots of literature. Thereafter, implications for a sustainable development are drawn. Further, the state of the problem in terms of main pollution sources, effects and abatement approaches is compared and contrasted with air pollution cases in history (e.g. London fog of 1952 and Los Angeles photochemical smog) and even with cases in emerging economies of Africa and Asia. From the review, it is evident that relevant authorities in Ulaanbaatar city are on track in terms of the mix of the current pollution abatement strategies they already put in place in fighting pollution. This is mainly because the same measures currently in place yielded success in other urban cities worldwide. However, air quality is still problematic in the city. Therefore, there is a need to scale-up measures by investing more in pollution abatement technologies, financing activities and ensure commitment from various stakeholder i.e. public-private partnerships in pollution abatement. More so, there is a need for a continuous cycle of monitoring and evaluation of progress, taking corrective measures where necessary. This and only will raise positive prospects for a sustainable development

Index Terms- Air quality, urbanization, sustainable development; review; Mongolia

I. INTRODUCTION

Rapid population growth in most Asian countries including Mongolia has resulted in rapid urbanization, which in turn have come with increasing air pollution problems (HEI 2004). The same trend is evident in Mongolian cities including Ulaanbaatar city where air quality for most of the times is very poor (Nicolaou et al. 2005). To date, Ulaanbaatar is ranked amongst the top 5 cities in the world with worst air quality (Guttikunda et al. 2013). Guttikunda et al. (2013) reported that the annual average particulate matter concentrations between

2010-2013 were $136 \pm 114 \mu\text{g}/\text{m}^3$ which was significantly higher than those regulated by the World Health Organization (WHO) guideline for PM10. Moreover, average air quality index for Ulaanbaatar in 2017 averaged above 150 which is considered unhealthy for sensitive groups (US Embassy Mongolia 2018). More so, recordings for air quality index for the winter season in 2018 have been shown to reach above 200 which is considered hazardous to humanity (US Embassy Mongolia 2018). Increasing vehicular population, energy demands (e.g. cooking and heating) and growing industrial sector in Ulaanbaatar city could have aggravated local air pollution. Among all of the factors, the growing demand for energy is mainly contributing to the air quality problem (Batjargal et al. 2010). According to Guttikunda (2008), high rate of urban population growth is mainly attributed to in-migration. People are moving from the village to the cities due to increased income and employment opportunities in cities. For instance, such income and employment opportunities are evident in the growing construction and mining sectors. The major pollution sources in Ulaanbaatar city according to an article by Guttikunda (2008) indicated that the major pollution sources in Ulaanbaatar city were: coal combustion, burning of biomass such as wood within households, burning of agricultural waste in farming areas, vehicular emissions, road dust from construction sites, and use of inefficient technologies in cooking and heating in Ger residential areas in Ulaanbaatar city.

Very cold winters in particular, has resulted in increasing demand for energy for heating and generated lots of particulate matter with a diameter less than 2.5 or 10 micrometres (PM2.5 or PM10) in the city, which has been illustrated by many researchers (Davy et al. 2011; World Bank 2011; Nicolaou et al. 2005). For instance, PM10 concentrations in winter were found to be at least double than that in summer in 2006 reported by National University of Mongolia (NUM) (Nicolaou et al. 2005). Furthermore, use of coal for various purposes in the domestic sector also aggravated particulate matter concentrations. For instance, in the domestic sector, the growing population residing in Gers have also contributed to the air quality problem. The government's restrictive policies on in-migration have largely contributed to the growth of Ger areas (residential areas) in Ulaanbaatar city (Guttikunda 2008). In Ger (residential areas), residents use traditional cooking stoves and boilers which are low efficiency, and hence elevated air quality problems in

Ulaanbaatar city. Overall, the different sources of air pollution in the city are worrying as poor air quality has its own negative effects on the human health.

Air pollution poses serious health risks to people exposed to it. Ulaanbaatar city is not an exception to the World Health Organization (WHO) listed the city among the top five cities with the worst air quality in the world recently (Guttikunda et al. 2013). Within Mongolia, poor air quality has been linked to various health related problems including abortions (Enkhmaa et al. 2014), mortality (Hoffmann et al. 2012) and various other acute health effects (Pope III and Dockery 1992; Smith 1993). In other words, exposure to fine particulate matter with an aerodynamic diameter $2.5 \mu\text{m}$ ($\text{PM}_{2.5}$) generated by combustion maybe especially damage to human health (Schlesinger et al. 2006).

This and other reasons have made air quality an issue of major concern in the city. Despite a number of plans and interventions were implemented to control air pollution in Mongolia, including: particulate matter monitoring, improved cooking stoves technology, pollution control at power plants, introduction of solar water heating among others (Guttikunda 2008; Guttikunda et al. 2013), air quality is still a major problem up to now.

Given this background, the aims of this study were 1) intended to analyze closely the state, extent, and effects of urban air pollution; 2) identified potential pollution abatement actions possible through a massive review study; 3) proffered implications for a sustainable socio-economic development in Ulaanbaatar city. The rest of the article is organized as follows: section 2 outlines the motivation of study while section 3 gives a synthesis of the state of urban air pollution in Ulaanbaatar. Section 4 expansively synthesis literature on the wider socioeconomic and environmental effects of poor urban air quality. Section 5 outlines some of the pollution abatement actions tried by the Mongolian government and also suggest possible more effective abatement actions the government can adopt for significant improvement in air quality. Moreover, section 6 gives the implications of excessive air pollution on prospects of a sustainable socioeconomic development in Mongolia. Sections. Review summaries and conclusions are given in section 7.

II. STATE OF AIR QUALITY IN ULAANBAATAR CITY AND COMPARED WITH OTHER MEGACITIES WORLDWIDE

2.1. Air pollution in Ulaanbaatar city

Ulaanbaatar is the capital of Mongolia and it is highly populated and has much of industrial activity. To date, it is the main political, economic, cultural, scientific and business center of the country (Amarsaikhan et al. 2011). In addition, the city is also home to the central government and main public and private institutions of higher learning and best medical service. The concentration of industrial activity amongst other covariates is the most important reason for so much poor air quality. This section gives a brief overview of the state, main factors contributing to poor air quality in the city.

- a) State of air quality in Ulaanbaatar city during 2011-2016

Although the concentrations of $\text{PM}_{2.5}$ and PM_{10} showed a declining trend in the city after 2011, the improvement still is not sufficient for population and ecosystem health in the city (Fig.1 & 2

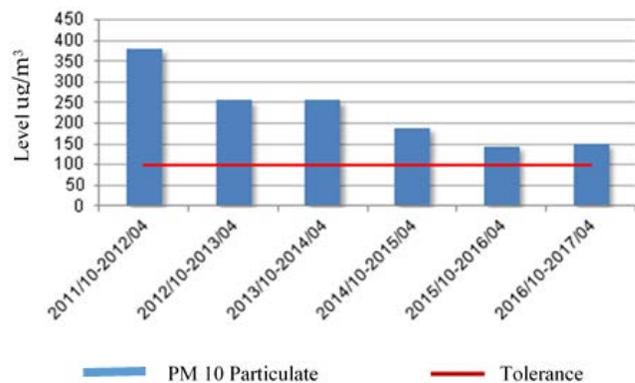


Figure 1: Average concentration of PM_{10} for the period 2011-2017 in UB, (Gov M 2018)

Compared the trends of concentrations of $\text{PM}_{2.5}$ and PM_{10} (Fig. 2), a similar trend in air quality was observed for the period 2011-2017. However, it should be noted that the average air quality index for both $\text{PM}_{2.5}$ and PM_{10} were still classified as hazardous for the human health in the city. Concentrations of $\text{PM}_{2.5}$ and PM_{10} during 2011-2016 were still above the red line and ranged between 140 and 370 AQI for PM_{10} which was considered lightly to pollute by air quality standards classification. This showed that air quality remains a problem in Ulaanbaatar city.

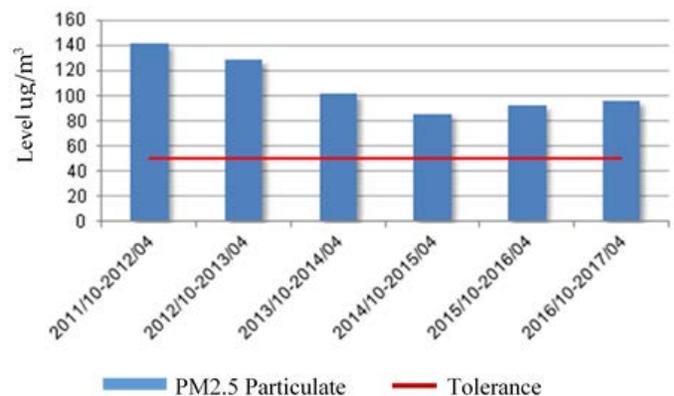


Figure 2: Average seasonal concentrations of $\text{PM}_{2.5}$ particulate matter, 2011-2017 (Gov M 2018).

For $\text{PM}_{2.5}$, the concentrations of $\text{PM}_{2.5}$ shown in figure 2 were all above 60 ug/m^3 which by standard air quality standard classifications for $\text{PM}_{2.5}$ air quality is still very poor.

- b) Background to the air quality problem and major causes.

A study by Allen et al. (2013) gave a very useful brief background to Mongolia and Ulaanbaatar city's air quality problem. Rapid urbanization and population growth are reported to increase largely since the mid-1990s. To date, Ulaanbaatar

(the capital city) is home to over 1.11 million people, a figure which represents more than 40% of the total population in Mongolia (2.74 million people) (Allen et al. 2013; Mongolia 2010). This growth in industrial activity and population has led to a serious deterioration in the city's poor air quality. As highlighted earlier in the introduction, much of the growth in population is evident in low-income areas (Ger areas) which are dominated by the use of coal for heating (Bank 2004). According to the Asian World Development Bank, more than 50% of Ulaanbaatar's population live in Ger areas (Asian Development Bank 2006). There are approximately 160,000 Gers in Ulaanbaatar and each was believed to consume or burn an average of 5 tons coal and 3 m³ of wood per year (Guttikunda 2008). In addition, various other sources as highlighted also contribute to air pollution. The vehicular increase which mainly uses leaded gasoline as fuel (HEI 2004), coal-fuelled heat and power plants, heat only boilers and wind-blown dust are some of the main noted sources (Allen et al. 2013).

However, many studies pointed that reliance on coal for energy was the prime source of poor air quality in the Ulaanbaatar. Davy et al. (2011) indicated that much of the particulate matter (PM_{2.5}) in Ulaanbaatar city was from coal combustion. Moreover, geographical location of the city also worsens the poor air quality in Ulaanbaatar. The city is located in a valley surrounded by mountains to the north and south (Asian Development Bank 2006). The topography also combined with extensive emissions, and temperature inversions are believed to cause very high and toxic pollution concentrations in winter periods (Davy et al. 2011) (why?pls explained in details). This brief background of the city enhances understanding of the nature of air quality problems in Ulaanbaatar. The results of comparison urban air pollution in this city with megacities of the world and other major cities in Asia were given in the next sub-section.

2.2. Urban air pollution in Asian cities and megacities of the world

2.2.1. Air pollution and urbanization

How does poor air quality compare to other major cities in the world particularly in Asia? Nearly 50% of the world's population now resides in urban areas because of more and better income, employment and quality of life in general (Molina et al. 2004). The proportion of people living in urban cities now is even higher and continues to increase. Several of such urban centers may be defined as metropolitan areas with inhabitants of more than 10 million people. The higher concentration of people in such small areas exerts pressure on the ecosystem. There is obviously higher demand for things like energy and other goods and services. Recently, air pollution has become one of the most important concerns and a problem for most megacities (Fang et al. 2009; HEI 2004; Kanakidou et al. 2011; Mage et al. 1996; Parrish et al. 2011). Growing use of coal for burning usually escalates the level of degradation of air quality. Industrial activity in such cities, traffic, mining and other related sectors chiefly adds to air quality problems. Resultantly, a number of health-related concerns posed by poor quality have also been raised in mega-cities. It is, therefore, an area of serious concern that needs action from various stakeholders to try and improve the situation.

2.2.2. Comparing air quality in Ulaanbaatar with other cities in Asia and the rest of the world

The major question to ask is "How does poor air quality in Ulaanbaatar city compares to that of main cities in Asia and megacities of the world? For a quick sight on the severity of the poor air quality problem in Ulaanbaatar as compared to some cities worldwide see Figure 3. With data shown in figure 3, it is evident that PM₁₀ concentration was highest in the Ulaanbaatar city when the comparison was made of another city with the Ger areas only. The maximum PM₁₀ concentration for UB Ger city areas was at around 700 ug/m³ which was way above average for the rest of the cities listed. Even the average PM₁₀ concentration for the main city areas is lower than that of the city Ger areas, it is still high than that of all the cities shown in the figure. This again shows the bad state of air quality in UB compared to other cities.

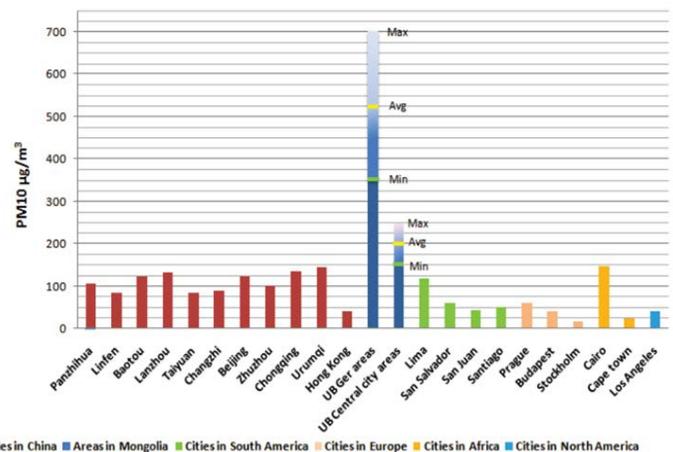


Figure 3: Comparing state of air pollution in UB PM10 concentrations in Chinese and other World cities (World Bank 2011)

Take into consideration of the development dimension into question, air pollution in the city still cannot be justified with the level of development. It was understandable that air pollution was getting worse mainly because of energy demand in the city which are mainly being met through the burning of coal. However, neighboring cities Beijing with higher levels of industrial activity and development, air quality was poor but at much lower levels than that of UB city. As highlighted earlier some other factors could be explanations i.e. poor city planning which exacerbate the air quality problem.

2.2.3. Situation in World's megacities History of air pollution and industrialization

It was said that air pollution issues have often been associated with industrialization in now well-developed cities such as Los Angeles. Los Angeles has been subject to air pollution since the 1950's (Parrish et al. 2011). Photochemical smog was first recognized a severe environmental hazard in Los Angeles due to extensive air pollution from industrialization activities. Since then, photochemical smog has been the subject of extensive air pollution control efforts since the 1950's (Cox et al. 2010).

Although several other kinds of smog occur or have occurred elsewhere, photochemical smog (or Los Angeles-type smog) was a yellow-brown haze produced by the reaction of sunlight with exhaust from automobiles and power plants that burn coal (Bailey et al. 2002). Ozone, nitrogen dioxide, and other volatile organic compounds that make up this smog irritate eyes and nasal passages. These are particularly dangerous to people who have heart disease, asthma, or other respiratory illnesses, and to anyone who exercises or does manual labor outdoors when smog is heavy.

Related, we have another significant cause of urban air pollution often cited in Literature-London smog. In December 1952, a heavy, motionless layer of smoky, dusty fumes from coal stoves and local factories settled in London basin (Davis 2002). The thick sulfurous smoky fog affected traffic and a lot of other activities in the city that day. More recently, more cases of significant air pollution have been noticed in developing and developed cities across the world. For instance, air pollution has become a

major concern in megacities of China. Beijing, Shanghai, and Guangzhou are some of the cities with significant cases of air pollution. Rapid industrial growth, urbanization and heavy reliance on coal are some of the major reasons behind air quality problems in these aforementioned cities. Coal accounts for more than 70% of total energy consumption and emissions from coal combustion are the major anthropogenic contributors to air pollution in the country (Chan and Yao 2008). Urbanization, in particular, has been rapid in China. From 1980 to 2005, urban

III. EFFECTS OF HEAVY AIR POLLUTION ON HUMAN HEALTH, ECONOMIC AND ECOSYSTEM IN UB

3.1. *Ecosystem effects*

Air pollution in UB city also leads to various other ecosystem health and or related effects. For instance, visual impairment (poor visibility) is one major effect on the ecosystem caused by air pollution. Mostly in the winter season, visibility could be very poor which negatively affect traffic movement and sometimes resulting in traffic congestion and road accidents. The connection between pollutants and visibility impairment was related to fine particulate matter $PM_{2.5}$ but it was also accompanied by high levels of other pollutants such as soot and dust (Watson 2002). Urban haze in Beijing is one example of the commonly perceived effect of excessive concentrations of PM. In Ulaanbaatar city, urban haze is also a major phenomenon, especially in the Ger areas.

Other noticeable impacts on the ecosystem in the UB city include acid and nitrogen deposition which enormously affects forestry and vegetation in and around the city. The detrimental impacts of acids formed from SO_2 and NO_x emissions on waterbodies, forests, and farmlands have been documented in the literature (Cáceres et al. 1980; Ortiz et al. 1982; Trier 1984; Trier and Firinguetti 1994). In addition, Photochemical Oxidant Damage was also a major effect of air pollution on ecosystems noted in the literature. Photochemical produced oxidants and their precursors frequently produce high levels of O_3 and other oxidants that transport from one major city to the next, subjecting the intervening suburbs, forests, and agricultural areas to high oxidant exposures (Guttikunda et al. 2003). Exposure to O_3 and

population increased from 19.6% to 40.5% (Chan and Yao 2008). In addition, a number of cities increased and over 170 cities have over 1 million inhabitants as of 2004. These trends highlight the rate and intensity of urbanization in the Asian country. This, however, has come with excessive air pollution which is evident to date.

In addition, this study also cited air pollution problems in developing cities such as Istanbul, Cairo, and Athens. All the three cities experienced heavy pollution from the transportation sector with more than 2 million cars in Athens and Greece and more than 1 million in Cairo (Kanakidou et al. 2011). Older cars were found in Cairo when compared to the other two cities. For instance, urbanization and industrial growth could be attributed to air quality issues in Cairo. Cairo's air pollutants mainly come from residential combustion and industries. The main pollutants are CO and NO_x and non-methane volatile organic compounds from road transport (Kanakidou et al. 2011). In Athens and Istanbul, on-road traffic is the major contributor to CO, NO_x and non-methane volatile organic compounds. Resident combustion and cargo shipping are also significant pollution contributors. A lot of other megacities in different parts of the world not mentioned in this brief review experience air pollution problems today. For instance, Dhaka (Bangladesh), Karachi (Pakistan) etc. were among the developing countries with poorest air quality (Gurjar et al. 2010).

related photochemical oxidants is known to damage both native and agricultural vegetation. This also has been reported in UB city although current literature confirming the phenomenon is still scarce.

Also, Photosynthetically Active Radiation (PAR) especially in Asian megacities including UB city, have also been found to have effects on plant processes. Recent model analyses demonstrate the impact of Asian megacity SO_2 emissions on regional pollution. High SO_2 and other gaseous precursors can result in high levels of fine PM, with absorption and scattering properties that significantly influence both the direct and diffuse components of photosynthetically, active radiation (PAR) (Cohan et al. 2002).

3.2. *Human Health effects*

Megacities tended to be at risk and their inhabitants were vulnerable to air pollution-induced adverse health impacts (Gurjar et al. 2010; Molina and Molina 2004). For instance, Gurjar et al. (2010) reported that poor air quality linked to mortality and morbidity in selected world megacities. This was also the case in Mongolia as a number of studies have linked poor air quality to human health problems in the city (Nakao et al. 2017). A recent study for Mongolia showed that investigated the lung function in Ulaanbaatar city subjects aged between 40 to 79 years found the crude prevalence of airflow limitation of about 11.5%. The study, however, showed that the health effects of poor air quality were worse in older subjects (the Aged), and

in those with lower body mass indexes (BMI) and also in those subjects who smoke (Nakao et al. 2017).

In support of the observed health effects of poor air quality on the health of city inhabitants in Ulaanbaatar city, a number of the studies from different parts of the world have also related poor air quality to human health. A number of studies have associated air pollution with specific health and health-related effects. For instance, WHO estimated that urban air pollution contributed to about 800 000 deaths and 4.6 million lost life-years yearly worldwide (WHO 2002). More so, according to HEI (2004), airborne particles have been of particular concern because of epidemiological study findings linking diseases like lung cancer and cardiopulmonary mortality to fine particulate matter. Excessive air pollution especially in the form of Polycyclic aromatic hydrocarbons (PAHs) originating mainly from motor vehicle emissions, oil refineries, forest fires, and cooking if inhaled, may cause changes in human development (Perera et al. 2003). Other studies have also shown that elevated air pollution might cause DNA damage in male sperm cells (Selevan et al. 2000). It, therefore, entailed that air pollution affects not only contemporary but also future generations (Somers et al. 2004). Considering that residents in Ger areas burned coal for heating directly in their houses particularly in winter, such health effects could be true for UB residents. However, no specific study for UB was found to have analyzed such effects at the time of this study.

Health studies in Mexico have also indicated that a 1% change in daily mortality could be attributed to 10 g/m³ increase in PM₁₀ (Molina and Molina 2002). This compares to 0.6% per 10 g/m³ increase derived from a meta-analysis of epidemiological studies conducted around the world. In New Delhi, India, an increase of more than 20% in chronic obstructive pulmonary disease and acute coronary events attributed to air pollution were found in a study reported by Pande et al. (2002). More so, a significant positive association between PM pollution and daily non-traumatic deaths, as well as other deaths (e.g. respiratory diseases and cardiovascular diseases) in India (Cropper et al. 1997). In China, a significant association between sulfur dioxide levels and daily mortality were found throughout the year in Beijing (Xu et al. 1994). Precisely, the mortality risk was estimated to be elevated by 11% with each doubling in sulfur dioxide concentrations. In South America, Santiago, Chile a strong association between premature mortality and PM₁₀ (Sanhueza et al. 1999). In Sao Paulo, Brazil, significant effects of PM on respiratory functions in children were found (Saldiva et al. 1994). Increased mortality in elderly people associated with high PM levels has also been documented (Braga et al. 2001; Saldiva et al. 1995).

3.3. Effects of air pollution on economy

Air pollution could also negatively impact the economy. However, no specific study for Mongolia that analyzed the effects of air pollution on the economy. However, given the noted impacts of poor air quality on urban ecosystems and on human health, it was possible that the excessive air pollution was burdening the Mongolian economy in a number of ways. Firstly, poor health due to excessive air pollution could burden the Mongolian through the increased budget on the health sector. With more sick patients, the government will definitely budget

more on health. Secondly, with a sick population which happens to be laborers in the country, their poor health could reduce productivity as they work less and spent most of their time seeking medical attention. This could negatively impact on the economy. Finally, since poor air quality has been linked with poor urban ecosystem health, it was plausible that slow traffic, accidents and other related problems which slow business in the city negatively affects the economy too. More research is, however, needed in quantifying the effects of poor air quality on the economy in Mongolia.

IV. POLLUTION ABATEMENT ACTIONS PRESENT, CHALLENGES AND SUCCESSES

Pollution abatement success stories are what every inhabitant of Ulaanbaatar hopes for. There is a need for serious action to improve air quality in that beautiful city of Mongolia. It is important to review what the current actions are and recorded successes before suggesting further improvements in abatement action. In the next sub-section, current pollution abatement actions in UB are discussed.

4.1. Main pollution abatement actions adopted in Ulaanbaatar City.

a) Approaches to implementing pollution abatement actions

With excessive pollution in the recent past, responsible authorities have tried to use a number of strategies to curb the excessive air pollution in the city of Ulaanbaatar. Current action has mainly focused on finding the various ways of reducing emissions, especially from the Ger areas. Ger area heating, heat only boilers and suspended dust has been the three main targets for reducing emissions in Ulaanbaatar city. Air pollution abatement programs in the city have followed a structured approach to a continuous strict cycle of planning, implementing, evaluation and corrective measures in abatement strategies (World Bank 2011). Research, government action and action from the private sector including non-governmental organizations have included a number of measures with the aim of improving air quality in the city. Some of the measures include: (a) improved assessment of air quality, its distribution and variation in order to understand pollution levels, (b) evaluation of the environmental damage caused by air pollution, (c) assessment of the most feasible pollution abatement actions, (d) evaluating the cost and benefits of possible abatement strategies, (e) prioritizing abatement options based on cost-benefit analysis outcomes and other considerations, (f) implementation, monitoring and evaluation of abatement strategies.

b) Policy Actions

Policy actions in UB yielded establishment of the Air quality division under the Nature Environmental Protection Department of the Capital City in 2006, which was later upgraded to Air Quality Department of the Capital City in February 2009. Recently, a number of the project from non-governmental organizations have been undertaking projects for the same cause "improving air quality in Ulaanbaatar City". For instance, the

“Capacity Development Project for Air pollution control in Ulaanbaatar City Mongolia” by the Japan International Cooperation Agency (2013) and another project by World Bank (2011) which was mainly evaluating air quality conditions in the city and the health implications.

c) Specific pollution abatement actions in place

Some of the specific actions evident from literature which were mainly based on an in-depth understanding of the pollution sources, effects and related factors (see Figure 4) include the following: exploring use of alternative fuels and efficient technologies, setting long-term strategies for emission prevention and reductions, developing low and cost-effective alternative technologies in cooking and heating, cleaner vehicle technologies, emission standards, improved inspection programmes and exhaust and promoting change of lifestyle i.e. public transport use as opposed to private transport. Specific measures and impact (including expected long-term impacts are given in table 1.)

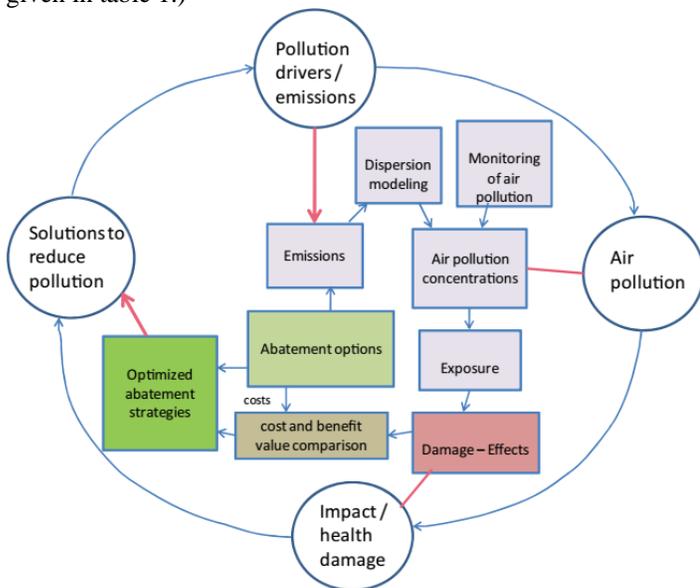


Figure 4: Concept for developing effective air quality abatement strategies in Ulaanbaatar city adapted from (World Bank 2011).

In the table, two a number of pollution abatement actions in Ulaanbaatar city are given and their impacts including future expected impacts. Shown are actions already in place and whose impacts are already shown by the slight reductions in pollutant concentrations (as measured by PM2.5 & 10).

Table 1: Pollution abatement strategies in Ulaanbaatar city and their expected long-term impacts.

Action	Anticipated impact	notes
Adoption of Improved cookstoves	Immediate reduction in particulate matter in the atmosphere.	Projects supported by government incentives (50% subsidy) are in place to improve adoption of improved cookstoves. More so, Programs are in place for scaling up.

Pollution control at power plants and promoting energy efficiency at heat only boilers

Improving efficiency of existing boilers, replacement of old heating boilers or connecting to new centralized district heating facilities will have an immediate 30-40 percent reduction in heat only boilers' contribution to ambient air pollution.

This intervention can reduce dispersed pollution by abolishing small-scale boilers and upgrading them to district heating system

Controlling fugitive dust on paved and unpaved roads

Intervention is expected to reduce spring and summertime on-road fugitive dust source. Reduction in particulate matter concentration in the atmosphere

A larger intervention for capture of fugitive dust via wet sweeping and conversion of a large section of unpaved roads to paved roads will have the largest impact in the Ger areas

Solar water heating systems for new housing complexes

Impact on air quality will be immediate due to reduction in demand for district heating when possible

Initial costs are normally high hence success is hugely determined by government support.

Public transport system

Reduction in vehicular emissions

Effectiveness will depend on the extent of improvements in public transport infrastructures and by growth in the passenger vehicles and barriers.

Garbage collection and gasification of urban waste

Impact of this intervention on air quality is immediate, but small in proportion compared to other actions e.g. improved cooking stoves technologies.

Collectively, a positive measure with fruitful impacts on air quality despite their minimal expected impact.

Fuel substitution

clean technology briquettes for cooking stoves and industrial heat only

This intervention has the largest impact on the cookstoves and heat only boilers, for not

	boilers are expected to have a high impact on the ambient particulate matter.	only emissions are reduced from scattered low-lying sources, but also a single point source offering better control options		includes industry, fuel providers, and nongovernmental organizations
Awareness and education	Improvement in institutional capacity for regulation and enforcement	An essential part of the campaign to promote energy efficiency at the household and industrial level.	<i>Education and publicity of air quality information</i>	Publish and broadcast Air Quality Indices, Promote a regular media outlet for air quality stories to keep up interest, Offer environmental education in primary schools and agricultural extension services
Particulate pollution monitoring	Enhances the Institutional capacity of air quality division in identifying the pollution hot spots.	Air quality monitoring is essential to evaluate the impact of air pollution reduction measures.	<i>Road, traffic and transport management</i>	Make public transportation affordable or even free for downtown destinations, Train and bus drivers know about air pollution and fuel use, Promote fuel efficiency for cars and industry, Establish one-way traffic with synchronized signals, Pave roads, including access roads

Notes: list not exhaustive but it shows some of the most common actions in place: more can be found in the following sources:(Guttikunda 2008; Guttikunda et al. 2003; Guttikunda et al. 2013; World Bank 2011).

4.2. What can be done for the future? : Lessons from successful pollution abatement actions in other cities.

What does the future hold for Ulaanbaatar city's air quality? Based on some success stories on air pollution abatement, a number of actions can be effective in further improving air quality in the city. Future actions will need to reinforce/upscale current actions and where necessary new actions are to be taken for improved air quality and hence human and ecosystem health in the city. Some recommendations for further improvements in air quality in Ulaanbaatar are given in table 2. Important to note is, however, that the same measures currently in implementation in Ulaanbaatar are the most noted factors for successful improvement in air quality in big cities. The only important thing to stress is that ultimate improvement in air quality will depend on the level of commitment, investment, effective cooperation from the various stakeholders (from residents to policymakers) and prioritization. Successful air pollution control in various other urban areas in the world is attributed to actions shown in table 2. From policy, education, and awareness, institutional measures, enforcement actions, and technical measures.

Table 2: Air pollution control measures in urban cities

Action categories	Actions types
<i>Enforcement initiatives</i>	Identify and target gross polluters, Provide complaint phone or text message numbers for visual sighting of polluters
<i>Institutional measures</i>	Identify and encourage champions for change, Formulate a Clean Air Group that

Technology related measures
Eliminate refuelling leaks, Reduce sulphur content of diesel fuel and gasoline to 500 ppm or lower, Require new gasoline-powered vehicles to have operational catalytic converters, Mandate inspection and maintenance for commercial vehicles, Design and disseminate better stoves for coal briquettes, wood pellets, and other solid fuels, Focus on less-polluting, better-ventilated kitchens, Promote more efficient agricultural burning methods.

Notes: Summary of the measures adapted from (Chow et al. 2004; Jain and Khare 2008).

Recommendations are given based on success factors of urban pollution control in megacities around the world. However, important to note is the fact that there is no universal response to everything. What may have worked in one city does not necessarily mean it will work elsewhere. Measures must always be implemented in ways that suit current and local conditions. Jain and Khare (2008) give a pictorial view (Figure 3) of how the various pollution abatement actions interlink to effect on improved air quality.

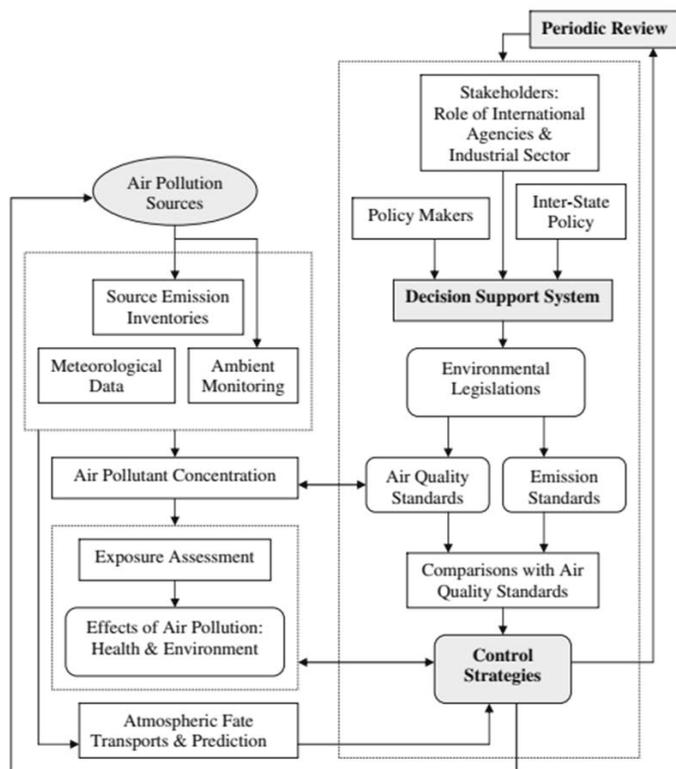


Figure 5: Air quality management in big cities a pictorial view

The next sub-section gives some implications of urban air pollution, effects and abatement efforts for a sustainable socio-economic development in Ulaanbaatar and other cities in Mongolia.

V. IMPLICATIONS FOR A SUSTAINABLE SOCIO-ECONOMIC DEVELOPMENT

First of all, poor air quality is known to have serious health implications both human and ecosystem health. Excessive air pollution assuming a business as a usual approach (zero abatements) will jeopardize the well-being of residents of the city. A number of chronic health diseases like Asthma, lung diseases, DNA damages, and various other pulmonary, respiratory and cardiovascular diseases will have far-reaching harming effects on the active labor force now and for the future (the young). Given the importance of an active and healthy labor force on the economic development of the country zero abatement actions will cripple hopes of a sustainable development in Mongolia. Same applies, poor air quality has devastating effects on the urban ecosystem. Urban farmland, forests and tourism activities which support livelihoods of the urban people will be crippled. Again this has far-reaching implications on prospects of attaining a sustainable socio-economic development in the country. It, therefore, implies that pollution abatement in the different sectors housing, transport, waste management, energy, and construction are not an option for the Mongolian government. Achieving a sustainable socioeconomic development will only be achieved if the government with the help of other stakeholders (NGOs, the private sector, residents of the city) if serious actions on the

environments are implemented. Upscaling on current measures will be critical. More so, strict monitoring and continuous evaluation of abatement actions underway will be utmost important too.

VI. CONCLUSION

This study reviewed reports, scientific publications, and grey literature to develop a deep understanding of the problem of poor air quality in Ulaanbaatar city of Mongolia and implications for a sustainable development. Precisely, the article touched on the nature and causes of urban air pollution in Ulaanbaatar city. From the review, it is evident that the main contributing factor to pollution is related to energy demands in the city of which coal is the main source of energy. However, contributions to pollution from the use of inefficient technologies such as the Ger in households, vehicular emissions, burning of biomass and dust from constructions cannot be ignored. The extent of pollution in the city is comparable to what has happened in other big cities in the world and even current experiences in some other cities today. In literature, famous examples of problematic air quality problems include the London Smog of 1952, Photochemical smog in Los Angeles in the 20th century. However, in the recent past, it has also become a common problem in both developed and the developing world as we have cases like Beijing, Shanghai, Athens, Mumbai, Cairo and Istanbul just to name a few. Poor air quality is a major barrier to a sustainable development in Mongolia as it comes with serious adverse human health and ecosystems' health effects. In Ulaanbaatar city and generally in literature excessive air pollution has been linked to various diseases especially cardiovascular, respiratory and pulmonary diseases. More so, excessive has been linked to mortality too. Important to note is also that poor air quality not only affect current generations but future generations are also hugely affected. Apart from human health problems, poor air quality also implicates negatively on urban environment ecosystems which affect livelihoods and even pose further human health problems.

It is also evident from the review that the only way to keep hopes of achieving a sustainable development is to mitigate/reduce/control air pollution being guided by the main sources of pollution. A number of measures are already in place to curb air pollution in Ulaanbaatar to include: policy and institutional measures, improved technologies adoption, enforcement actions, transport management, continuous research and education and awareness campaigns. However, urban air pollution is still a major problem in the city. There is a need to scale-up measures by investing more in pollution abatement technologies, financing activities and ensure commitment from various stakeholder i.e. public-private partnerships in pollution abatement. More so, there is a need for a continuous cycle of monitoring and evaluation of progress, taking corrective measures where necessary. Controlling pollution to acceptable levels will be the only option available for achieving a sustainable socioeconomic development in Ulaanbaatar city and Mongolia at large.

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Dynamic Simulated Annealing for solving the Traveling Salesman Problem with Cooling Enhancer and Modified Acceptance Probability

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Abstract- In this paper, a dynamic (i.e. self-adaptive according to the number of nodes) Simulated Annealing Algorithm is presented to solve the well-known Traveling Salesman Problem (TSP). In the presented algorithm, the temperature parameter is adjusted on the basis of the number of nodes. To achieve dynamicity, a new parameter named “Cooling Enhancer” is introduced to control the cooling rate, thereby, regulating the temperature. Additionally, an enhanced version of acceptance probability has been used. The efficacy of Dynamic Simulated Annealing with Cooling Enhancer & Modified Acceptance Probability (DSA-CE&MAP) is compared against the basic simulated annealing algorithm (SA) [2] for some benchmark TSPLIB instances [1]. Experimental results illustrate that the new dynamic simulated annealing algorithm performs better than the basic simulated annealing algorithm for solving TSP. It has been observed that the quality of solutions (i.e. minimum total cost or distance) is significantly increased as compared to earlier method.

Index Terms- Traveling Salesman Problem, NP-complete, Simulated Annealing Algorithm, Acceptance Probability, Temperature, Cooling rate, Cooling Enhancer.

I. INTRODUCTION

The Traveling Salesman Problem (TSP) is one of the archetypes and archaic problems in Computer Science and Operations Research. It can be stated as:

A network with ‘n’ cities (or nodes) with ‘node 1’ as ‘source’ and a travel expense (or distance, or travel time etc.,) matrix $C = [c_{ij}]$ of order n associated with ordered node pairs (i, j) is given. The problem is to find a least cost Hamiltonian cycle.

On the basis of the structure of the cost (or expense) matrix, the TSPs are classified into two groups – symmetric and asymmetric. The TSP is symmetric if $c_{ij} = c_{ji}$, $\forall i, j$ and **asymmetric otherwise. For an n-city asymmetric TSP, there are $(n-1)!$ possible solutions, one or more of which gives the minimum cost. For an n-city symmetric TSP, there are $\frac{(n-1)!}{2}$ possible solutions along with their reverse cyclic permutations having the same total cost. In either case, the total number of solutions becomes extremely humongous for a moderate number of nodes, making the exhaustive search non-viable.**

TSP has captivated the attention of many researchers and remains an active research area. It is a proven NP-Complete problem [3]. A large number of real-world problems can be modeled by TSP. Some of them are:- Drilling of printed circuit boards and threading of scan cells in a testable VLSI circuit [4], X-ray crystallography[5], Overhauling gas turbine engines [6], Computer wiring [6], Vehicle routing [6], Mask plotting in PCB production [6], Warehouse automation system [6].

All practical applications require solving larger problems, hence emphasis has shifted from the aim of finding exactly optimal solutions for TSP to the aim of getting, heuristically, ‘better solutions’ in a reasonable time and ‘establishing the degree of goodness’. Several intelligent algorithms are available to solve the TSP, some of them are:- artificial neural network [7], genetic algorithms [8], simulated annealing algorithm [9], ant colony optimization algorithm[10], particle swarm optimization [11], consultant-guided search algorithm [12] and many more. Simulated Annealing Algorithm (SA) is one of the metaheuristic search algorithms that have been

used widely to solve the TSP instances. The basic version of SA algorithm is not good in terms of quality of solutions (i.e. minimum total cost or distance). Therefore, an improved simulated annealing algorithm has been presented in this paper. It uses a new parameter, "Cooling Enhancer" to control the cooling rate in order to regulate the temperature (i.e. system energy) and also employs a modified acceptance probability. The presented algorithm has been found to produce better quality of solutions.

The paper is structured as follows: Section 2 provides a background about the simulated annealing algorithm. In Section 3, the related work in the sphere is propounded. Then, the proposed approach to solving the TSP is proffered in Section 4. The experimentation and results are given in Section 5. Finally, the paper is concluded in section 6.

II. BACKGROUND STUDY

The SA algorithm is one of the efficient methods for the continuous and discrete optimization problems. It is derived from the simulation of the cooling schedule of metals. The cooling process is controlled by a defined function which is convenient to implement. The word "Annealing" is referred to as tempering certain alloys of metal, glass, or crystal by heating above its melting point, holding its temperature, and then cooling it very slowly until it solidifies into a perfect crystalline structure. This physical/chemical process produces high-quality materials. The simulation of this process is known as simulated annealing (SA) [16]. There is an analogy of SA with an optimization procedure. The defect-free crystal state corresponds to the global minimum energy configuration (for TSP, tour with the minimum cost). The physical material states correspond to problem solutions (for TSP, all possible tours), the energy of a state to cost of a solution (for TSP, the tour cost), and the temperature to a control parameter.

The SA algorithm is not used for initial solutions and has been discerned to have a bad performance and slow convergence when applied to the complex TSP.

III. RELATED WORK

In this section, the earlier work related to the field is discussed. The Basic Simulated Annealing Algorithm [2] has been improved by several researchers for solving the TSP. Liu et al introduced SA integrated with the Tabu search in order to achieve better solutions. The temperature was reduced adaptively with a temperature control function [13]. Based on most of the edges in the best circuit linked by neighbor cities, the probabilistic neighborhood model was introduced by Li [13] and merge into the optimization process of the BSA algorithm. The SA algorithm was also integrated with the ant colony optimization [14] to utilize their advantages together. In order to speed up the convergence of the BSA and obtain the better approximate solutions (i.e. Hamiltonian cycles), the four vertices and three lines inequality was merged into the optimization process of the BSA using the four-point conditions for symmetrical TSP which has been summarized by Vladimir [15]. When the Hamiltonian circuits are generated with the BSA, the inequality are applied to the local Hamiltonian paths in the Hamiltonian cycles.

The algorithm for Basic Simulated Annealing[2] for solving TSP is as follows:-

Step 1: Initialize cooling_rate with a small value such as 0.001.

Generate an initial random tour x.

Step 2: Initialize T with a large value such as 100000.

Step 3: Repeat:

- i. Generate next tour $(x + \Delta x)$ by applying some operations on the current tour x.*
- ii. Evaluate $\Delta E(x) = E(x + \Delta x) - E(x)$, (i.e. neighborTourCost - currentTourCost):*
if $\Delta E(x) < 0$, keep the new state (i.e. new path distance less than current distance);
otherwise, accept the new state with acceptance probability $P = e^{-\Delta E/T}$.
- iii. If $E_{bestSoFar}(x) > E(x + \Delta x)$, then set $E_{bestSoFar}(x) = E(x + \Delta x)$.*

iv. Set $T = T - \Delta T$, $\forall \Delta T = T \times cooling_rate$.
until T is small enough.

One of the issues with the basic SA is that it is not adaptive to the problem size i.e. the temperature change is independent of the number of nodes (or cities). On running the basic SA for different TSPLIB instances, it is observed that if the temperature is decreased fast or slowly for small number of nodes, then, in either case, the results are almost similar; however, if the number of nodes is large (say more than 100), then it gives better results on decreasing the temperature slowly. Moreover, the basic SA will run

for almost the same time for problems of all size and hence produce the good results for a small size of nodes and bad results for problems with a moderate or large number of nodes. Moreover, it would be the duty of the operator to decide concerning how much time the algorithm should be run to get best result in a feasible amount of time, which could be cumbersome.

IV. PROPOSED APPROACH

The proposed approach, Dynamic Simulated Annealing with Cooling Enhancer & Modified Acceptance Probability (DSA-CE&MAP) is developed by enhancing the parameters of the basic simulated annealing algorithm, temperature, cooling rate and acceptance probability to produce better solutions.

For the algorithm to adapt and adjust itself to the number of nodes, a parameter named as “Cooling Enhancer” is introduced which controls the “cooling_rate”, thereby controlling the decrease in temperature according to the number of nodes (or cities) after each iteration.

Additionally, for accepting the less good solutions (i.e. solutions with somewhat high total cost or distance), the acceptance probability is modified to engender Modified Acceptance Probability (MAP) which significantly contributes to the better results and prevents the solutions in getting caught in local minima. Modified acceptance probability helps in reducing the acceptance probabilities of the tours that have cost much larger than the current best tour cost.

The algorithm for Dynamic Simulated Annealing with Cooling Enhancer and Modified Acceptance Probability (DSA-CE&MAP) for solving TSP is as follows:-

Step 1: Initialize cooling_rate with a small value such as 0.001.

Generate an initial random tour x.

Step 2: Initialize T with a large value such as 100000.

Step 3: if totalCities < 30, then set coolingEnhancer = 0.5.

else if totalCities < 150 then set coolingEnhancer = 0.05.

else if totalCities < 750 then set coolingEnhancer = 0.005.

Otherwise, set coolingEnhancer = 0.0005.

Step 3: Repeat:

i. Generate next tour (x + Δx) by applying some operations on the current tour x.

ii. Evaluate $\Delta E(x) = E(x + \Delta x) - E(x)$, (i.e. neighborTourCost - currentTourCost):

if $\Delta E(x) < 0$, keep the new state (i.e. new path distance less than current distance);

otherwise, evaluate $\Delta E' = E_{bestSoFar}(x) - E(x + \Delta x)$, (i.e. bestTourCost - neighborTourCost) and then accept the new state with

acceptance probability $P = \frac{e^{-\Delta E'/T}}{e^{-\Delta E'/T} + 1}$.

iii. If $E_{bestSoFar}(x) > E(x + \Delta x)$, then set $E_{bestSoFar}(x) = E(x + \Delta x)$.

iv. Set $T = T - \Delta T$, $\forall \Delta T = T \times coolingEnhancer \times cooling_rate$.

until T is small enough.

The effects of Modified Acceptance Probability (MAP) parameter for DSA-CE&MAP algorithm can be illustrated on br17(an Asymmetric TSPLIB instance) as follows :

For each iteration, the values for three parameters are evaluated:- (i) currentTourCost (the total tour cost of the current path), (ii) bestTourCost (the total tour cost of the smallest path found till now), and (iii) neighborTourCost (the total tour cost of the next considered path). The acceptance probability is calculated only if, $\Delta E(x) = (neighborTourCost - currentTourCost) > 0$. For a random iteration, let the current path be (1,4,8,17,14,10,6,11,2,12,9,3,5,16,13,7,15) with tour cost 241 and the best tour path be (1,9,15,8,17,12,7,4,5,16,10,14,11,6,13,3,2) with tour cost 85 and temperature be 1000. Now, let the neighbor path under consideration be (1,9,8,2,17,7,14,6,11,16,12,10,5,3,4,13,15) with total cost 406 and another neighbor path be (1,4,8,17,13,16,5,3,9,12,2,11,6,10,14,7,15) with tour cost 260. Then, the acceptance probability of these paths with basic SA and DSA-CE&MAP is obtained as given in the following table:

TABLE I: Acceptance probability as calculated by the Basic SA and DSA-CE&MAP for a given instance

br17 (a TSPLIB instance)	Basic SA	DSA-CE&MAP
Case (i) neighbourTourCost = 406	0.8478	0.6150
Case (ii) neighbourTourCost = 260	0.9811	0.8236

It is evident from the table that when the neighbourTourCost is substantially greater than the bestTourCost (as in case (i)), then its probability of acceptance decreases considerably as compared to the case when the neighbourTourCost is moderately greater than the bestTourCost (as in case (ii)). Hence, by modifying the acceptance probability in this way, the tours with the higher cost will have lower probability of acceptance, even though these tours may be close in cost to the current tour. As a result, the search is confined to explore the tours which are close in cost both to the current tour and best tour found so far.

V. EXPERIMENTATION & RESULTS

The basic simulated annealing and the proposed DSA-CE&MAP algorithms have been coded in Javascript and executed on an Intel core i7 personal computer with clock-speed 3.0 GHz, 8 GB RAM, 4 MB L3 cache via the bash(ubuntu) command-line interface of Microsoft Windows 10 for some TSPLIB instances. Initial population was generated randomly. Following values were taken for the parameters- (i) initial temperature equals 10^5 , (ii) cooling rate equals 0.001. The programs were executed 10 times for each instance. The solution quality is measured by the percentage of excess above the optimal solution value reported in TSPLIB website, as given by the formula.

$$Excess(\%) = \frac{Solution\ Value - Optimum\ Solution}{Optimum\ Solution\ Value} \times 100$$

The tables II and III shows the Excess percentage of best solution values and average solution values over the optimal solution values in 10 runs and the average time of convergence (in second(s)) for each TSPLIB instance . In the tables, the best value, average value and average time is calculated by applying the basic SA and DSA-CE&MAP to the same TSPLIB instance. Furthermore, the excess percentage is calculated as per the above formula in order to compare the solution obtained with the optimal solution. Table II gives the results for fifteen asymmetric TSPLIB instances of size from 17 to 171 and table III gives the results for sixteen symmetric TSPLIB instances of size from 17 to 1379.

TABLE II: Summary of the results by the Basic SA and DSA-CE&MAP for Asymmetric TSPLIB instances

			Basic SA			DSA-CE&MAP		
Tsplib instances	n	Optimum Value	Best Val(Excess %)	Avg Val(Excess %)	Avg Time(s)	Best Val(Excess %)	Avg Val(Excess %)	Avg Time(s)
br17	17	39	39 (0.00)	39.1(0.25)	0.0214	39(0.00)	39(0.00)	0.0361
ftv33	34	1286	1657(28.85)	1900.7(47.79)	0.0254	1449(12.67)	1626.8(26.50)	0.3357
ftv35	36	1473	1815(23.21)	2126.2(44.34)	0.0259	1709(16.02)	1904.2(29.27)	0.3819
ftv38	39	1530	2130(39.21)	2398.7(56.77)	0.0269	1757(14.83)	1896.4(23.94)	0.384
p43	43	5620	5639(0.33)	5652(0.56)	0.0247	5620(0.00)	5623.4(0.06)	0.3805
ftv44	45	1613	2547(57.90)	2743.3(70.07)	0.0238	1811(12.27)	2295.5(42.31)	0.3404
ftv47	48	1776	2834(59.57)	3182.5(79.19)	0.0286	2380(34.00)	2582(45.38)	0.3443
ry48p	48	14422	16042(11.23)	16697.9(15.78)	0.0383	14853(2.98)	15391.2(6.72)	0.3712
ft53	53	6905	11302(63.67)	13218.7(91.43)	0.0337	9570(38.59)	10781.9(56.14)	0.3601
ftv55	56	1608	2855(77.54)	3242(101.61)	0.0353	2363(46.95)	2638.1(64.06)	0.3609

ftv64	65	1839	3948(114.68)	4286.9(133.11)	0.0406	2761(50.13)	3223.5(75.28)	0.3968
ft70	70	38673	52781(36.48)	54218(40.19)	0.0347	47656(23.22)	49393.4(27.72)	0.474
ftv70	71	1950	4102(110.35)	4569.5(134.33)	0.038	3207(64.46)	3646(86.97)	0.422
kro124p	100	26230	56543(115.56)	61449.2(134.27)	0.0346	43424(65.55)	47762.2(82.08)	0.4572
ftv170	171	2755	13937(405.88)	14622.3(430.75)	0.0487	7578(175.06)	8037(191.72)	6.3129

TABLE III: Summary of the results by the Basic SA and DSA-CE&MAP for Symmetric TSPLIB instances

Tsplib instances	n	Optimum Value	Basic SA			DSA-CE&MAP		
			Best Val(Excess %)	Avg Val(Excess %)	Avg Time	Best Val(Excess %)	Avg Val(Excess %)	Avg Time(s)
gr17	17	2085	2085(0.00)	2088(0.14)	0.0403	2085(0.00)	2088(0.14)	0.0374
gr24	24	1272	1272(0.00)	1322.5(3.97)	0.0285	1272(0.00)	1273.4(0.11)	0.0406
hk48	48	11461	11661(1.74)	12145.4(5.97)	0.0375	11461(0.00)	11682(1.92)	0.3545
eil51	51	426	472(10.79)	512.4(20.28)	0.0339	431(1.17)	441(3.52)	0.3994
berlin52	52	7542	8140(7.92)	8369(10.96)	0.0326	7542(0.00)	7739.2(2.61)	0.4014
eil76	76	538	737(36.98)	790.8(46.98)	0.039	545(1.30)	562.3(4.51)	0.453
pr76	76	108159	116230(7.46)	120795.4(11.68)	0.0383	108817(0.60)	110474.8(2.14)	0.467
kroA100	100	21282	27253(28.05)	29094.9(36.71)	0.0384	21378(0.45)	22086.3(3.77)	0.5173
kroC100	100	20749	27776(33.8)	29286.7(41.14)	0.0423	20852(0.496)	21585.4(4.03)	0.5212
eil101	101	629	1023(62.63)	1059.4(68.42)	0.335	659(4.76)	670.1(6.53)	0.5046
lin105	105	14379	18983(32.01)	21302.7(48.15)	0.037	14545(1.15)	14874.4(3.44)	0.5319
gil262	262	2378	8067(239.23)	8626.9(262.77)	0.0629	2484(4.45)	2519.2(5.93)	9.928
a280	280	2579	9963(286.31)	10326.6(300.41)	0.0676	2708(5.00)	2760.5(7.03)	10.369
lin318	318	42029	147149(250.11)	153334.2(264.82)	0.0727	43997(4.68)	44589.4(6.09)	11.204
pa561	561	2763	16791(507.70)	17680.3(539.89)	0.1198	3197(15.70)	3256(17.84)	19.568
nrv1379	1379	56638	656923(1059.86)	670889.3(1084.52)	0.400	61309(8.24)	61873.5(9.24)	580.5851

It is observed that the quality of solutions of the algorithms is insensitive to the number of runs. From the tables it is discovered that a greater number of solutions (or tours) with optimum cost can be obtained using DSA-CE&MAP as compared to the basic SA. For example- the asymmetric TSPLIB instances br17 and p43 with optimum values 39 and 5620 respectively, could be solved exactly by DSA-CE&MAP at least once in ten runs, while only br17 with optimum value 39 could be solved exactly by basic SA. Similarly, the symmetric TSPLIB instances gr17, gr24, hk48 and berlin42 with their optimum values 2085, 1272, 11461 and 7542 respectively, could be solved exactly by DSA-CE&MAP at least once in ten runs, while only gr17 and gr24 with optimum values 2085 and 1272 respectively, could be solved exactly by basic SA. In addition, the best values and average values for DSA-CE&MAP are better than the basic SA and their corresponding excess percentages are less. Though, basic SA surpasses DSA-CE&MAP in terms of time of convergence, it is noted that, on the basis of the quality of solutions, DSA-CE&MAP outshines basic SA for all the instances, especially for those with the larger number of nodes.

The following figures 1 and 2 depict the graph between the temperature (x-axis) and tour cost (y-axis) for an asymmetric and symmetric TSPLIB instances respectively. It is clearly observed from the figure 1 that DSA-CE&MAP has tour cost (14954) much lower than that of basic SA (16228) and very near to the optimum value (14422). Similarly, it can be identified from the figure 2 that the proposed algorithm has tour cost (21604) much lower than that of basic SA (30674) and very near to the optimum value (21282).

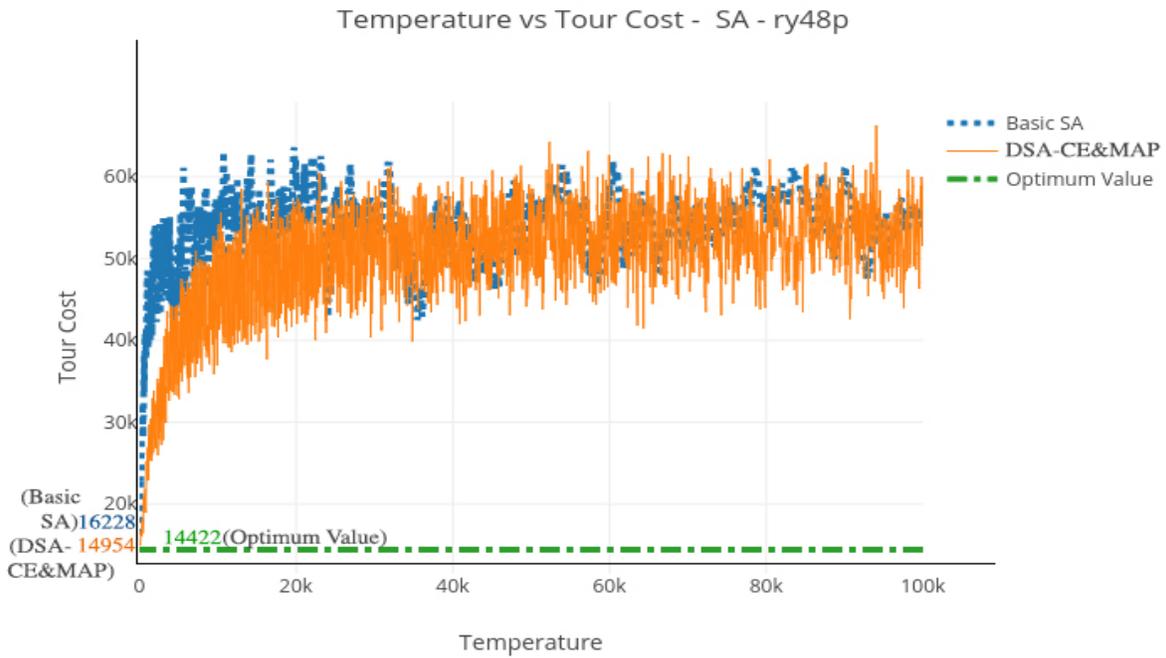


FIGURE 1: Performance of Basic SA and DSA-CE&MAP on Asymmetric TSP instance ry48p(48 nodes)

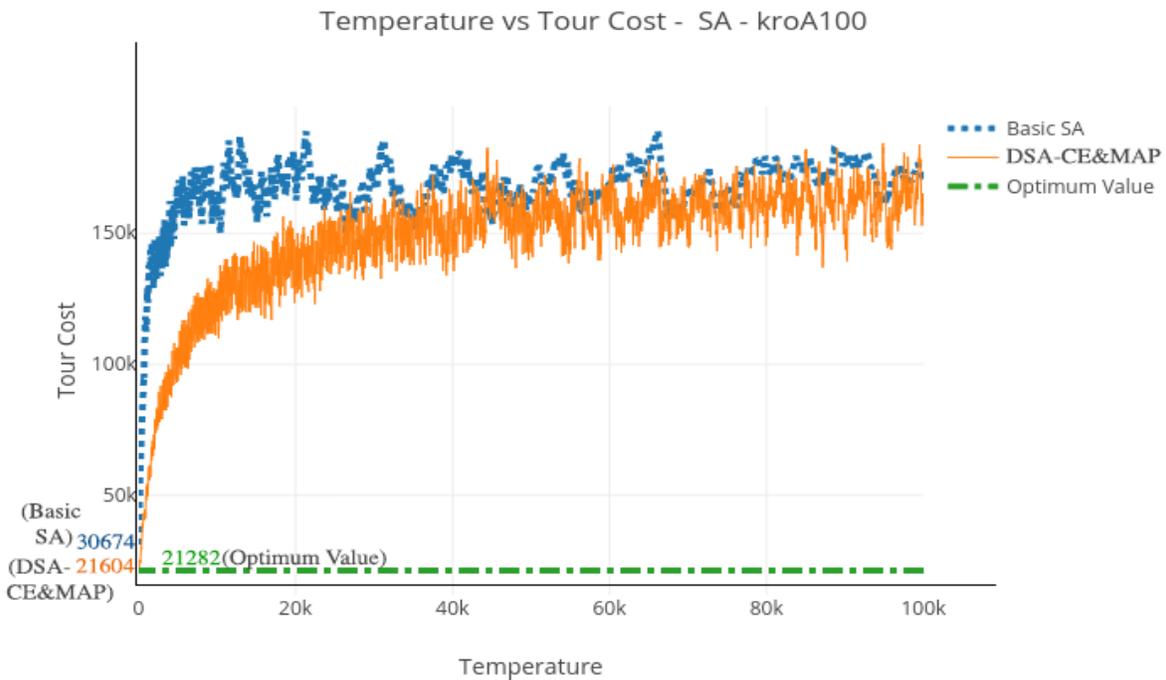


FIGURE 2: Performance of Basic SA and DSA-CE&MAP on Symmetric TSP instance kroA100(100 nodes)

VI. CONCLUSION

In this paper, a refurbished simulated annealing has been proposed by introducing new parameters named “Cooling Enhancer” and “Modified Acceptance Probability” (MAP). It is observed that DSA-CE&MAP provides us with better quality of solutions as compared with the basic SA for all the instances. Moreover, more symmetric and asymmetric TSPLIB instances can be solved exactly using the proposed algorithm. For example- two asymmetric (br17 & p43) and four symmetric (gr17, gr24, hk48 & berlin52) TSPLIB instances could be solved exactly using the proposed approach. On the other hand, only one asymmetric (br17) and two symmetric (gr17 & gr24) TSPLIB instances could be solved exactly using the basic approach. Basic SA outdoes DSA-CE&MAP in respects of time of convergence, since time of convergence is observed to be low for the basic SA.

In future, by making certain changes to the parameters, namely, temperature and cooling rate of the simulated annealing, it is possible to achieve better results and reduce convergence time.

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HSI Color Component Ratio for Compact Object Representation

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Abstract- A feature extraction method is proposed for discriminative features on segmented moving objects and these compact set of color feature for object representation tend to handle the large amount of local features in feature correspondence and high accuracy in object classification in challenging sequences. Test sequences from the Caviar Test case scenario dataset and online benchmark tracking dataset are used in experiment to prove the robustness of proposed method.

Index Terms- Caviar Test Case scenario, Online Benchmark tracking dataset

I. INTRODUCTION

The research trend of Object tracking and Identification still remains as the most interested field in visual application systems. Identified objects in moving object is very difficult task because a number of challenges comes in practical condition that demand to be concerned with, by the robust feature representation approach. Challenges in moving video sequences may be containing change in illumination, shadows, partial occlusion, Scale Variation, Occlusion, Deformation, Fast Motion, and Background Clutters etc. Object Representation become critical factors and how one defines the object highly impact to the difficulty level of this challenging factors.

The development of vigorous vision is still a general concern for industry and service area applications in real time. Industrial vision sensors are commonly exposed to significant noise and yield a prosperity of data. Hence, a select number of features are has been chosen to measure a number of properties of the mission, for example, the corner portion, edge length. Feature extractors are historically linked pattern recognition and refer to plotting to reduce and condense the dimensions of the patterns. And also feature extraction increase generalization capability and computational requirements for classification and recognition. Thus feature extraction got a lot of awareness in the recent two decades. Important changes in spatial, temporary conditions in real-time situation tends to the task robust and reliable feature extraction very challenging. The most important requirements for robust visual measurements that is speed, accuracy and reliability in the study [9].

Classification and recognizing objects is the process of tracing the interested objects in video sequences. Its research trend still remains as the most interested field in visual application systems. To accomplish in handling all challenging scenarios with one single approach will not be possible. If a robust target representation can be developed that can be adaptive with variations, the accuracy of classification and tracking result can improve significantly. The most important requirement for visual extraction is that the image quality parameters are reliable, accurate and rapid measurement, despite the relatively important factor and image position changes due to the relative motion in reality.

II. RELATED WORKS

S. Kim et al. [4] introduced a method of classifying objects focused on surface labeling in the real world background. They could reduce the outcome of entropy based codebook surface marks. Furthermore, the identification codebook is selected from a codebook specific to that category controlled by the entropy of the field codebook. High entropy books are deleted first because they give ambiguous class labels. Finally, they evaluated those codebooks using multiple classifier namely NNC (Nearest Neighbor Classifier) and SVM (Support Vector Machine) classifiers in order to different distance measurement. They could get better performance with visual word frame bags with the best set of features, codebooks, and classifiers. This work are useful for the selecting and classifying codebooks with other complex classification methods. P. Chang et. al [1] describes the general occurrence of color in detail The histogram (CH) is a valid way to embody objects for image recognition. By tracking pairs of pixels you can add a variable amount of geometry to a common color histogram. They also analysed the algorithm to approximate false alarm values and used some of them to set some algorithm parameters. These results show that the algorithm works despite confusion background disruption and logging and bending of a small amount of objects.

A. F. Otoom et. al [6] evaluated the performance of the various function sets to determine the optimal set of elements that

seemed more useful in accurately classifying abandoned objects. By the experimental result, this approach to classification based on statistics of geometric element elements is higher than the approaches based on the other two scale invariant image transformation (SIFT) using different classification and evaluation methodology they concluded. Classification based on statistical geometric primitives that performs ten-fold cross validations gave an average 22% higher recognition accuracy with 7% lower false alarm associated to the second best access based on SIFT key histogram. The experimental analysis showed that geometric primitive statistics maximizes separation between classes and then it make simpler the classification process.

R. Rean et. al [7] introduced a shape context, a color histogram, and a completed local binary pattern (CLBP) approach to classify various object category classes . Shape context provides 93% accuracy with ETH - 80 database. They proved this approach is better than the other approaches. The result found can be further enhanced by using a better function extraction and using a combination of shape and color descriptions, shapes, and structure descriptors. Mokjiet. al [5] details the new gray level co-occurrence matrix (GLCM) based on the Haar wavelet transform. GLCM based on Haar wavelet transform has the function of reducing the computational load of pixel input by 62.5% at maximum. As far as performance measurement is concerned, Haar wave transformation not only reduces the computational load and also improve the accuracy of classification of Brodatz texture images equalled to the original calculation. L. Yang et. al [8] proposed a new structure to unify visual codebook generation with classifier training for object category recognition. Two important features performed this task from existing object recognition methods. First, unlike the cluster approach where individual image functions are combined with a single visual word, each image function is encoded using a visual bit vector. Second, unlike the standard practice of separating visual codec generation process and classifier training, the proposed approach uses these two processes with a single optimization framework under one objective function Integrate. Iterative algorithms are introduced that effectively identify optimal visual bits and associated weights. Experiments in the PASCAL 2006 data file showed that their proposed approach was an important step in the classification of object categories compared to the latest approaches.

III. PROPOSED FEATURE EXTRACTION

The HSI color space represents a color similar to the scan color of the human eye, so this type of color representation is a very important and attractive color model for recent image processing applications [3]. The HSI color model stands for each color with three color components: Shade (H), Saturation (S), Intensity (I) [2]. The following figure describes how HIS color model symbolizes the corresponding color value.

HSI color component ratio for target recognition of moving objects from the challenging tracking sequences. Figure3 shows the basic structure of the proposed architecture using in the work.

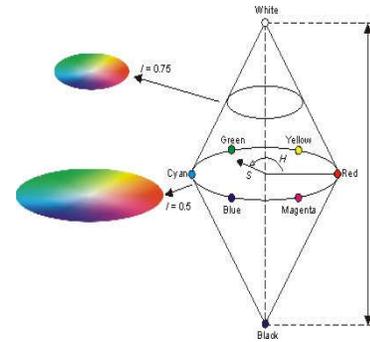


Fig. 1 HSI Color Model Representation

The work contains three processing steps for the moving object tracking and identification system as in figure2. Object segmentation is the pre-processing step for the detection moving object in video sequences. In the pre-processing stage, segmenting the moving object from video scene of each frame with the help of Gaussian Mixture Model.

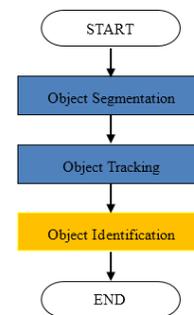


Fig 2: Processing Steps of the Object Tracking and Identification System

The next step is the object tracking. Object tracking is the process of tracing the interested objects in video sequences. In this work, these segmented object will be used in object tracking method to visualize the usability of proposed feature and to get the more accurate tracking results. To tracking the object, Kalman Filter was used in this work. The visualization of tracked object and growth truth portion can be seen in figure4.

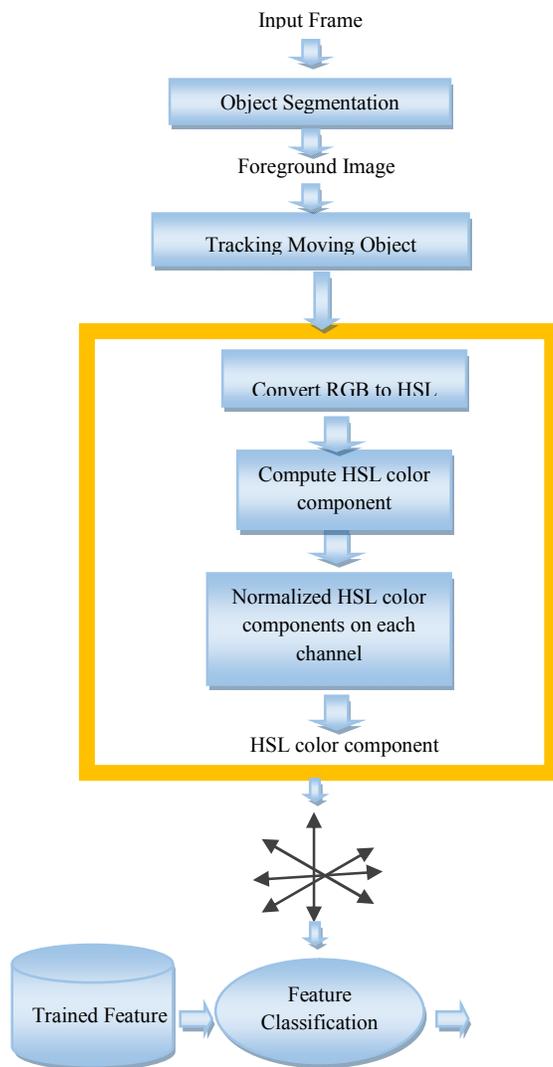


Fig 3: Architecture of the Proposed Feature Extraction Method

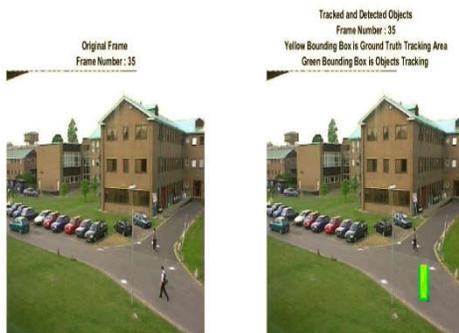


Fig 4: Visualization of Overlap Ratio on the Tracking Result for Walking Sequences

To classify and identify the moving object as labelling object in the video frame, normalization of HIS color feature on segmented moving object is used. These features are extracted from separated channel namely hue, saturation and normalize them to get the compact structure. Firstly compute the HIS Color Component from the segmented RGB objects by eq (1), (2) and (3).

$$H(\text{Hue}) = \begin{cases} \theta & \text{if } B \leq G \\ 360 - \theta & \text{if } B > G \end{cases} \quad (1)$$

$$S(\text{Saturation}) = 1 - \frac{3}{(R+G+B)} [\min(R, G, B)] \quad (2)$$

$$I(\text{Intensity}) = \frac{1}{3}(R, G, B) \quad (3)$$

Then the three color moment are applying on the extracted color channels separately by this ways (4), (5) and (6).

$$\mu = \frac{1}{N} \sum_{i=1}^N A_i \quad (4)$$

The variance deviation is one kind of normal distribution of the particular color channel.

$$V = \frac{1}{N-1} \sum_{i=1}^N |A_i - \mu|^2 \quad (5)$$

Where, **Tracked Labeling Object**
 μ = Mean of distribution
 N = number of observations
 A_i = current color channel value
 V = variance of distribution

Skewness can be understood as a measure of the degree of asymmetry of distribution.

$$S = \frac{E(A-\mu)^3}{\sigma^3} \quad (6)$$

Where, μ = the mean of x
 S = skewness of normal distribution
 E(t) = the expected value of the quantity t.
 σ = the standard deviation of x

The compact feature length in this work is only 9 features.

- Feature 1 to 3: mean to HSI color channels
- Feature 4 to 6: Variance to HSI color channels
- Feature 7 to 9: Skewness to HSI color channels

IV. EXPERIMENTAL RESULT

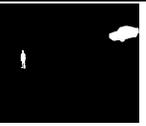
The image pre-processing or image segmentation stage is performed before other processes. The original image, ground truth and segmentation result (foreground image) of three video sequences namely walking2, crossing from Online Benchmark dataset and also two video sequences namely walk1 and walk2 from CAVIAR Test Case Scenario dataset are shown in Table 1 respectively. Segmentation result for detecting moving part is evaluated on the pixel level common segmentation criteria. The result for the object segmentation result are shown in Table2.

TABLE I
 Attributes of Challenges and Relative Sequences

Dataset	Sequences	Resolution	Challenges	Number of Frames
Online Bench Tracking	Walking 2	576*768	Scale Variation, Occlusion, Deformation	412
	Crossing	240*360	Scale Variation, Deformation, Fast Motion, Background Clutters	120
CAVIAR Test Case Scenario	Walk1	288*384	Scale Variation, Illumination Variations	541

TABLE II

Detection Result of Moving Parts from Sequences

Sequences	Original Frame	Ground Truth	Segmentation Result
Walking			
Crossing			
Walk1			

Tracking result with the overlap ratio concerned with bounding box of the three challenging test sequences are shown in Table3.

TABLE III

Overlap Ratio of the Tracking Sequences

No.	Sequence	Overlap Ratio
1.	Walking	0.67813
2.	Crossing	0.61662
3.	Walk1	0.78540

Object Classification result on three different challenging sequences are described in Table4. To be avoid the data bias, ten fold cross validation is used with three classifier namely support vector machine (SVM), k-nearest neighbor (KNN) and Boosted Tree . Accuracy and time of the proposed feature extraction of HIS color component portion on challenging sequences can be seen in Figure 5 and Figure6.

TABLE IV

Classification Result with HSI Color Component on Three Challenging Sequences

Sequence	SVM		KNN		Boosted Tree	
	Accuracy (%)	Predict Time % (s)	Accuracy (%)	Predict Time	Accuracy (%)	Predict Time
Walking	91.3	4.8576	90.7	0.92825	89.0	5.500
Crossing	92.1	2.1384	93.3	0.98408	41.6	1.0194
Walk1	94.9	2.2821	89.1	1.0475	91.7	12.428

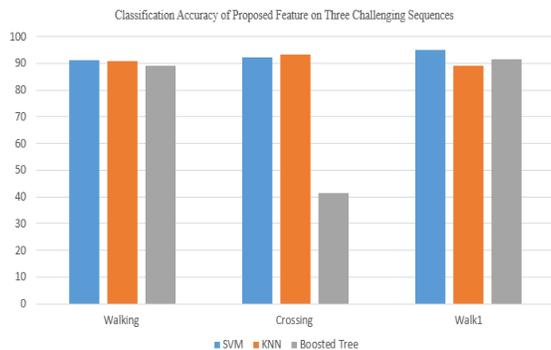


Fig5: Classification Accuracy of Proposed Feature on Three Challenging Sequences

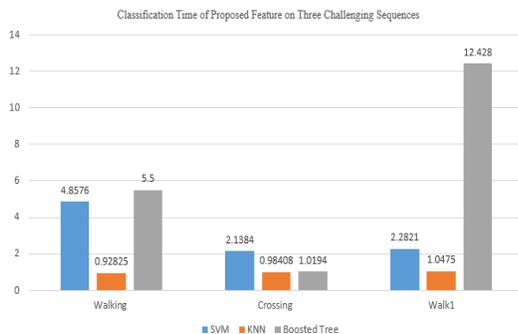


Fig6: Classification Time of Proposed Feature on Three Challenging Sequences

V. CONCLUSION

This work presents the overview design and step by step implementation of the identification and detection of tracked moving objects from the video sequences. The accuracy and time of the proposed feature extraction methods was tested by using multiple classifier and these the identification results were reported. Intensive experimental shows the proposed feature extraction are compact and effectiveness on challenging sequences for object tracking and identification.

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PRESUMPTION OF INNOCENCE, A DISCUSSION EVERLASTING

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ABSTRACT

This basic principle of civilization is the result of a guaranteed option to protect the immunity of the innocent, even if the price is the impunity of any culprit. "It is enough for the social body to punish offenders in their entirety," wrote Lauze Peret, "but his great interest was that all innocent people, without exception, be protected."¹ It is this option on which Montesquieu established the link between freedom and security of citizens: "Political freedom consists in security, or at least in the belief that everyone has for their own security," and "this security is not placed at greater risk than under public or private accusation"², consequently, when the innocence of the citizens is not guaranteed, nor is their freedom to be. Consequently, if it is true that the rights of citizens are threatened not only by crimes but also by arbitrary punishments, then the presumption of innocence is not only a guarantee of freedom and truth, but also a security guarantee or even social security, that specific security ensured by the rule of law and expressed by the trust of citizens in justice and the specific protection offered to them against punitive arbitrariness. For this reason, the unmistakable sign of the political legitimacy of the loss of jurisdiction, and its rise to irrational and authoritarian power, is the fear that justice causes to citizens. It is out of the logic of the rule of law every time an innocent defendant has reason to fear a judge: "fear, and even unbelief or insecurity of the innocent, signal the failure of the function of criminal jurisdiction and the breaking of political values that legitimize"³. Although it is true that in Roman law, the principle of the presumption of innocence until proven guilty was weakened or overturned by the Inquisition practices developed in the Late Middle Ages⁴. Suffice it to recall that in the medial criminal trials the inadequacy of the evidence, even if there was a suspicion or a shadow of suspicion of blaming, was equal to a half - test, which included a semi - guilty verdict and a half - punishment with light sentences. It was only at the beginning of the modern period that it was reaffirmed by the decision: "I do not understand," wrote Hobbes, "How can you talk about crime without a decision being made, and how is it possible, always without a previous trial, to be punished". And if Pufendorf included in the definition of the "point" itself the imposition of the "post cognition en delictis", Beccaria affirmed that "a person can not be held guilty before a judge's decision, nor may the company remove public protection unless it is decided that he has violated the agreements he has agreed to"⁵. The presumption of innocence of the defendants was definitively sanctioned by Article 8 of the Constitution of Virginia and Articles 7 and 9 of the Declaration of Human Rights of 1789⁶.

Key words: presumption, individual guarantee, punishment, innocence, principle, etc.

INTRODUCTION

The presumption of innocence of the accused is effectively determined by Paulesu's "guarantee of interesting backgrounds and major problematic horizons"⁷. It is true that if we look at the principle in its current formulation, it constitutes a rule so rooted in social consciousness that can be presented as a synthesis of the entire procedural system, rather than a principle a simple guide, for which, in fact, are basic direct warranties, how to protect the accused as to protect the fairness of the process.

This result is almost impossible, if referring to the fascist period in Italy, when Justice Minister Alfredo Rocco labeled the presumption of innocence as a "surplus from those forbidden concepts in the Report on the Preliminary Draft of the Criminal Procedure Code of 1930, based on the principles of the French Revolution, where the most exaggerated and incompatible individual guarantee guarantees arise"⁸. In order to capture the present value that has assumed the presumption of innocence in our procedural rules we can not in fact overlook these "problematic horizons", all the difficulties that marked the fate of the principle in question since its inception and that we still perceive its effects today, especially in relations with Europe. We can allow ourselves to receive absolutely absolute and indisputable what Cordero writes: "We are all exposed to the power to punish, guilty or not," which clearly

¹ Lauzè Di Peret P.I., Individual Guarantee Treaty, Paris, 1884, P. 39

² Pagano F.M., Considerations on the Criminal Process, Laterza, Bari, 1972, p. 29

³ "Let the clear, simple laws and all nation forces be condensed to protect them ... Make people fear them and them. Fear of the laws is healthy, but fatal and productive for crimes is that of man in man. The slaved men are more courageous, cheaper, more cruel than the free men ". Beccaria C., Dei delitti and Peniche, Milan, Mondadori, 1991, P. 97.

⁴ Cordero F., Plague Factory, Laterza, Bari, 1984, p. 217

⁵ Beccaria C., Dei delitti e Peniche, Milano, Mondadori, 1991, P. 38

⁶ "No one can be deprived of liberty, except under the law of the country and after the judgment of his peers. "Virginia's Declaration of Human Rights, Sect.8" No one can be charged with being arrested or detained unless specified by law and according to the forms he has described. "The French Declaration, Article 7, 1789

⁷ M.p. Paulesu, Prejudice not guilty to the accused, Torino, 2009

⁸ A. Rocco, Report on the Preliminary Draft of the Criminal Prosecution Code, Preparatory Work on Criminal Code and Criminal Procedure Code, Rome, vol. VIII, 1929, p. 22

makes us think that we can not give one the procedural assumption of the matter even if we are based on Article 27, paragraph 2 of the Italian Constitution. But precisely on this clarity, unfortunately only apparently, that the main exponents of the classical and the positive schools were "clashed", this eternal discussion was begun by the imitation of Cesare Beccaria, who wrote in early 1764 in the criticism of his most extensive torture case that was able to bring the innocent into a worse condition than the guilty one, in a presumption of innocence until the conviction of the accused. The overwhelming view at the time, he wanted an indictment process based on a presumption of guilt, and therefore the principle of no punishment without trial seemed to be dramatically overturned without trial, no punishment, making it necessary and immanent to punish during trial. This was confirmed by the lack of a clear distinction between the accused and the culprit in the framework of the indictment process, the gathering of procedural functions (judges and prosecutors) with the same judge, lack of oratory and publicity, abuse of a detention that was considered torture and used *et corporis dolorem to erundam veritatem*⁹. The theories of the liberal and classical schools had a divisive influence on the models of thought-provoking type: they appeared for a long time in the form of a direct controversy against the procedural system of the ancient regime. A prominent Tuscan lawyer, Giovanni Carmignani, theorized the presumption of innocence as a result of a probabilistic assessment, sure that "the basis of the presumption is what happens normally: but more often people are leaving the perpetration of a crime, rather to commit the crimes. So law sanctifies and protects the presumption of innocence for all citizens"¹⁰. Nicolini, however, retains the principle of classical tradition¹¹, referring to an expression of a familiar passage of Digesto "satis ata impunitum relinqui facinus nocentis, quam innocentem damnare"¹². In this turbulent assessment, the relativity of the value attributed to the formula becomes even more unclear, but it is clear from Carrara's view that he saw the presumption of innocence as a precursor principle of a wider principle of due process. This, Carrara specifies, should not be used to stop the accusation and punishment movements, but rather "to limit these moves to the ways that relate to a series of rules which hinder arbitrariness, errors, and thus protect that individual"¹³. According to the author, the criminal process has its basis and impulse to a "suspicion" that sees as a potential participant an "individual" protected by the presumption of innocence which will be used to limit the movements of those who conduct investigations without using the initiative of the process. Bearing this in mind, Francesco Carrara raised the presumption of innocence in a fundamental postulancy of the criminal proceedings, merging all the conditions of the legitimacy of the proceedings. However, it is necessary to add that, beyond the usual stereotyped formulas known by all, it can be suspected that different perpetrators, even contradicting each other, intend exactly the same when they speak of the presumption of innocence¹⁴. "Lack of solid legal references in support of such reformist aspirations"¹⁵ did not allow the presumption of innocence to develop significantly and effectively, apparently confirmed by the lack of clear reference to the guarantee as in the Albert Albert Statue of 1848, as in the first Italian single code¹⁶. This explains the lack of regulatory action outside the classroom ideologies, because in Italy the work of renewal had to operate in view of Napoleon's mixed system, lacking a rights charter that would seal the guarantee or an accusatory law that in the fact was present in the French tradition. It was in contrast to the ideals of the classical school that had a different view from the positive school, which relies on an idea that crime is like a social pathology and accusing classical liberal doctrine to support a fair process instead of excessive protection of the accused. With Lucchini the controversy escalated to the point of denouncing the rule of Doubt that the crime was committed in terms of the "inventive ability of a supposed criminal who is disguised as a lawmaker," and therefore considered the presumption of innocence as a principle "paradoxical"¹⁷. "He considered the process of uncivilized, non-coherent and unobtrusive legality a process that was not designed to provide the innocent, "basically founded to investigate and punish criminals, not to distinguish and to ascertain honesty"¹⁸. Very reactionary was shown to Raffaele Garofalo, one of the most famous "alarming" or "disturbing" school of crime¹⁹. He had the idea that the principle weakened the state's punitive actions and confirmed it by saying, "Those who repeat the same old, empty and absurd phrase of the presumption of innocence until the final judgment, say that many times the judgment is foreseen, and the punishment given by the court of public opinion"²⁰. Less drastic was the position of Hell in favor of a re-dimensioning, though apparent, of the principle, and he knew some "truths" unless it was the case for people repeating the crime or people caught in flagrancy²¹. The common thread in the ideologies of these different authors can easily find the common purpose of drastically canceling or limiting the principle of crime in favor of the proceeding and of combating the excessive guarantee of the liberal individualistic era in favor of the prevalence of rights of the society for individual interests. These multiple and conflicting beliefs created an environment of insecurity in general for the principle and the recognition of the presumption until a formal treatment takes place without real practical applications. Alessandro Stoppato, for example, believed that the presumption of innocence should be "rationally understood, because favored overrun is just as risky as excessive opposition", then denying in practice this cautious and formal recognition, and declaring contrary to all the most famous canoes of the prosecution process²². However, he continued to perceive the relationship between the principle of consideration and the dualistic theory of the process, which saw the criminal procedure as a citizen's guarantee against abuse of power, at a time of clear disagreement between the interests of the state in the crime of crime and that of citizens unfairly accused. The controversy over the principle in question and its

⁹ Ulpiano, nē D. 47.10.15.41

¹⁰ G. Carmignani, Elements of Criminal Law, vol. I, Malta, 1848, p. 249

¹¹ N. Nicolini, From criminal proceedings in the kingdom of two Sicilies, II, Livorno, 1843, p. 895

¹² D., 48.19.5

¹³ F. Carrara, Criminal Procedure Criminal Law, Criminal Justice Brochures, Vol. V, Prato, 1881, f. 17

¹⁴ See G. Illuminati, Presumption of innocence of the Accused, Bologna, 1979, p. 15

¹⁵ M.p. Paulesu, op. cit., 2009, p. 42

¹⁶ This legislative silence F. Carrara (outlines the criminal law practice, Rome, 1874, p. 47) to make a comparison between Italy "nowadays live under the presumption of guilt" and "he life of Tuscany in the presumption of innocence" thanks to the Code Leopold (1786) who have proved the value of the collateral by providing compensation in the case of unfair imprisonment for those who "no purpose or negligence of some (...) but only for certain fatal or miserable combinations will be judged, will be punished, and then be declared innocent, and as such released

¹⁷ L. Lucchini, The simplists of the criminal law, Turin, 1886, p. 246

¹⁸ L. Lucchini, Elements of Criminal Procedure, Florence, 1908, p. 12

¹⁹ R. Garofalo, Preventive Detention, at the School of Vocation, vol. II, Turin, 1892, p. 199

²⁰ Ibid

²¹ E. Ferri, Criminal Sociology, IV ed., Torino, 1900, p. 728

²² A. Stoppato, Report of the Chamber of Deputies Committee, in Code Commentary, vol. III, Turin, 1915, p. 192

wording was also developed during the preparatory work of 1913 of the procedural code, where the ones that define the principle "one of those rhetorical formulas that are destiny to satisfy a larger number are emphasized because they give emphasis and worth the discussion", adding more diligently" that the code of criminal procedure is not the law that protects the innocent, but, in essence, a social protection against crime²³". The ruling opinion judged the presumption of innocence as "a vulgar, dangerous mistake" which had pushed "to see every defendant a potential victim of wrongdoing and wickedness, thereby calming the criminal justice and lack of effectiveness from all its organism and its action against the expansion and advancement of criminality". Vincenzo Manzini outlined the ideas that were later formalized in the 1930 Code, where it was easy to determine the principle of presumption of innocence as "paradoxical and contradictory" before the facts of some procedural institutions of the inquisitive era, such as preventative arrest, secrecy of the pre-trial stage, or the lawsuit itself. He believed that, as for all the presumptions, it should be considered "a means of indirect evidence that raises a certain absolute or relative conviction from common experience" and, thus doing so, was seen the full contrast to the reality of facts in it which most of the defendants are considered to be guilty, and not the opposite²⁴. Clearly, it is the character of this reasoning that considers the presumption of innocence from a purely phenomenological point of view, as the Illuminati notes, regardless of the true nature of the principle, the informative criterion, potentially capable of leading the judge towards justice more sensitive and able to assess and respect the difference between the defendants and the accused. This Manzini theory depends on what is the central point of his thought: criminal laws are not directed at protecting the innocence, but in the repression of the crime, by which he fully implies the purpose, if we consider that for the author "the lawsuit [...] constitutes [...] necessarily a presumption of guilt". A prominent lawyer, Mortara, who with Manzini divided the ideological bases, expressed in terms that would have great luck: "Another is to say that the accused should not be considered guilty, and another is to say that they should be considered innocent. It is clear the exaggeration of the second formula, which violates the first concept²⁵".

CONCLUSIONS

This particular aspect has traditionally been considered as a result of a dual origin. In fact, the presumption of innocence, as a rule of thumb, comes from the Anglo-Saxon tradition (from a Common Law system), and as a treatment experience of the accused under European continental (or Civil Law) dates back to the Enlightenment and the French Revolution. However, taken in a simple and schematic manner, this type of position means shadowing the entirety of the guaranteed needs expressed in the presumption of innocence and that, however, engaging in significant changes within individual systems, though it must consider the specificity of the normative realities of different countries, which compare these guarantee needs.

In conclusion, it can be said that if, on the one hand, the presumption of innocence attracts the enrichment and support of a number of structural values of "regular proceedings", such as the right to recognize the accusation, the right of evidence, the right to taciturn, the accused's right to confront the accuser, impartiality of the court, opposition as an epistemological technique, and on the other hand, the same presumption should be met with two values, the efficiency of the process and the involvement in the game, to con in the "regular process" area, which, as we will see, appears sensitive to reviewing the boundaries and core values. Once a contextual framework has been defined, it is necessary at this point to describe the individual thematic fields of current research. Based on the ideological debate that accompanied the evolution of the presumption of innocence in our system, first of all we are discussing the actual space-time dimension of this guarantee, understood as a rule of treatment.

What current weight plays today, the presumption of innocence in the dynamics of the application, and how much remains rhetoric, routine, virtual, gimmick, in access to this guarantee²⁶". In fact, it can not be denied that the presumption of innocence constitutes such a "challenging" principle that is sometimes hard to manage at a concrete level. But the fact remains that the gap between law in the books and the law in action still seems to be very important in this matter, to the point that the presumption seems destined to remain trapped in some oblivion, suspended two ways between being and it must be²⁷.

The phenomenon of the phenomenon is complex. Some problems have long strained and there are also cultural limitations, a constant and chronic difficulty from the principle rooted in collective conscience, media distortions, exaggerations, and cyclical justice pulps over the particular cruelty of some crimes. Other problems are of recent, but not least, uncomplicated procedural solutions, the construction of a sort of "double path" in terms of being cautious and evidence-processing the criminal case structured in a risk of lack of evidence at the expense of the accused, up to the last limits, which are articulated in the tendency to increasingly predict the type of state intervention through the use of preventive mechanisms to address the most complex and dangerous forms of crime, which may have significant consequences at the level of jurisdictional guarantee. In short, a number of factors that can not agree with the idea of protecting the allegedly innocent person. These brief summaries would suffice to convince that the application of the presumption of innocence constitutes an issue open to question.

²³ The expression is contained in the Senate speech L. Mortara (March 5, 1912), in the Commentary of the Criminal Procedure Code, directed by L. Mortara and Others, vol. III, Turin, 1915, p. 153

²⁴ V. Manzini, Italian Criminal Procedure Manual, Turin, 1912, p. 53 s. 20 See G. Illuminati, op. Cit., P. 18

²⁵ Mortara, op. cit., p 153

²⁶ Illuminati G., Presumption of the Innocent of the Accused, Zanichelli, Bologna, 1979, p. 21

²⁷ "However, those who look across the border will be disappointed, hoping to find only consensus with the guarantee. The convictions suffice to report the skepticism of those who, after assessing the value of" the fundamental right", then recognize in it a fraud and in The allegation of this assumption is cited by the legal presumptions against Reum provided for in English law and French law, unmotivated convictions issued in different jurisdictions, the limitations of personal liberty provided for the person to be considered innocent. Koering R., The presumption of innocence, a fundamental right? In La presumption d'innocence en droit comparé, Paris, 1998, p. 19

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Problems and Prospects of Teaching and Learning Islamic Studies in Primary and Post-Primary Schools in Nigeria: An Overview

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Abstract- Islamic Studies (ISS) is one of the religious studies undertakings in Nigerian primary and post-primary schools up to the higher institutions for decades. However, there are myriads of problems facing its development in both teaching and learning for decades. In response to these and with adoption of descriptive and analytical methods, this study investigates the content of Islamic Studies as Prepared by Nigerian Educational Research and Development Council (NERDC), briefly chronicles the introduction of Islamic Studies into Nigerian schools, enumerates the factors (Problems) affecting the subject such as interest, parental and teachers factors, pedagogy and so on . Recommendations were made to ameliorate these problems and charter a new prospect for Islamic Studies in Nigerian primary and post-primary schools in order to nurture and produce vibrant, religious and productive Muslim children.

Index Terms- Education, Islamic Studies, Primary Schools, Problems, Teaching and Learning.

I. INTRODUCTION

Education is an essential ingredient for human development, social justice, equity and religious harmony; and in all facets, Islam as a religion enjoins its adherents to seek useful knowledge from cradle to grave. Islamic studies on the other hand trains the sensibility of students in such a manner that their attitude to life, approach to all kinds of knowledge and decisions are all regulated by the value of Islam.

On these premises, Muslims of all ages have strived and contributed meaningfully to human development, educational advancement, world civilization and culture (Adeyemi, 2016). In Nigeria, Muslims in both northern and southern parts of the country have been the victims of colonial inequity in term of western educational adventures amidst the British policy of non-interventionism towards the Muslims especially in the North (Rosalind,2001:539-541), while their southern counterparts were forced to change their faiths and names in exchange for biblical-inclined education. This, according to Rosalind has resulted in a lasting and destabilizing dichotomy that is firmly imprinted in the historical memory of Nigerian Muslim (Rosalind, 2001)

However, the establishment of schools modeled in western ways by Muslim Missionary Organizations (such as Ansar-u-

deen Society of Nigeria, Ahmadiyyah Movement and others) in addition to schools established by colonial government as the result of series of appeals and protests by the discontent Muslims ushered in a new lease of life of educating Muslim children. In furtherance of this new development, the teaching and learning of religious studies (which included Islamic Studies-ISS and Christian Religious Studies-CRS) were inculcated into the Nigerian Educational Curriculum by the Nigerian Educational Research and Development Council in both primary and post-primary schools. But, unmistakably, the teaching and learning of ISS have been confronted with plethora of problems that have been identified and discussed by numerous researchers, writers, speakers and academia in different publications and conferences. The Subject today is a mere and elective subject in schools not as a compulsory discipline needed to enrich the faith, demeanour and intellectual capability of Muslim pupils and students; and even recently to exacerbate these problems, the Federal Ministry of Education in actualizing its aims of reducing the number of subjects taught in primary and post-primary schools merged ISS with other so-called related disciplines. This and other factors without mincing words have compounded the problems of ISS in Nigerian elementary schools and aided eroding of its values and efficacy in the lives of Muslim children. This Study analyses these trends and suggests some solutions that can obliterate ISS conundrum in Nigerian primary and post-primary schools.

II. OBJECTIVE OF THE STUDY

It is the objective of this study to:

- i. Briefly trace the emergence and content of ISS as a subject in Nigerian primary and post-primary schools
- ii. Highlight the problems and prospects in the teaching and learning of ISS
- iii. Recommend the preferable solutions to the problems highlighted

III. RESEARCH METHODOLOGY

Descriptive and analytical methods would be adopted for this research in which secondary sources such as books, journals, articles and others served as major resources.

IV. CLARIFICATION OF KEY TERMS

4.1 Islamic Studies: This is an inter-disciplinary programme that is designed on the diverse range of textual traditions of Islam which is the bedrock of Islamic education; and this include Language Studies(*ad-Dirāsāt al-Luqah*) and Lexicology (*‘ilm al-Luqah*), Literature(*al-Adab*), Religious and Natural Sciences(*‘ulūm ad-dīn wa tabī‘iyah*), History (*tarikh/sīrat*), Jurisprudence (*ahkām al-Dīn/ al-Fiqh*), Theology and Monotheism (*ilm al-Fiqh wa at-Tawhīd*), Apostolic or Prophetic Tradition (*hadīth*) Morality (*‘ilm al-akhlāq*) and so on. However, according to Oloyede and Alli Mazrui as cited by Opeloye and Salisu (2015), Islamic Studies as a discipline possesses an all-encompassing nature, versatility, wideness and opulence, hence, the nomenclature “Islamic Studies” needs to be changed to “Islamic” to convey the proper and huge credence of the subject in the comity of disciplines.

4.2 Problem and Prospect: Problem means a thing that is difficult to deal with or understand. (Oxford Dictionary, 1999). It's usually created by human beings and in most cases the process of tackling is always sought for. While a prospect means the chance or hope that something will happen.

4.3 Primary and Post-Primary Schools: In Nigerian context, primary schools are the basic and elementary stage of formal academic cadre in which pupils of young ages are enrolled usually from class one to six within six academic Sessions; while post-primary schools are colleges and secondary schools which has two stages; Junior Secondary Schools(JSS) and Senior Secondary Schools(SSS). Students are expected to pass through each stage for a complete three sessions each.

V. BRIEF HISTORICAL BACKGROUND OF THE EMERGENCE OF ISLAMIC STUDIES IN NIGERIAN SCHOOLS.

In chronicling the Introduction of Islamic Studies into Sub-Saharan Africa and indeed Nigeria, Sanni(n.d: 1) posits: The history of Islamic studies in sub-Saharan Africa is as old as the history of Islam in the region itself, and this dates back to the 4th/5th AH/10th/11th CE –century. Barring some minor variables, the philosophy, curricula, institutions, and goals of Islamic studies had historically remained the same in all Muslim societies; the discipline is intended to produce spiritual guides, moulders of public morality, and custodians of the intellectual tradition of Islam’

It is believed that Islam entered into Africa through trans-saharan trade and spread among the rulers, the ruled and was later embraced gradually by both urban and rural populace. Numerous scholars in west africa and especially in Nigeria before and after the ‘Uthmān Dan Fodio’s *Jihād* (1754-1817, See more about him and his *Jihād* movement on www.Google/Uthmandanfodio) had established Qur’anic schools for decades before the emergence of colonial imperialists, hence, the Islamic and Qur’anic schooling had gained ground in various parts of northern Nigeria and parts of southern Nigeria especially in Yoruba land and mid-western region.

By the early 20th century and with the amalgamation of northern and southern protectorates of Nigeria, the then Colonial government expanded the scope of religious studies in Nigeria, though, the traditional Islamic education was prevalent in the

northern part against the southern region where Missionaries have entered into the nook and cranny of the region, converted many into Christianity through evangelism, biblical education and church programmes and enforced its teaching in schools as reported by National Teachers’ Institute (Adeyemi,2016). The trend continued with the aids of the imperialists; though, with meager cases of objections in the Southern region (Rosalind, 2001), the northern part was firmly immersed in Islamic education with huge rejection of western ideologies, christian indoctrinations and education by the northern emirates, scholars and the elites of the period (Rosalind, 2001). In 1950s, according to Fafunwa (1974) the syllabi for Religious Studies (both ISS and CRS) were drawn up by both federal and regional ministries of education. These syllabi prepared students for the subject in WAEC Examination. In the case of ISS, there were little or no textbooks written in English until about 1968-1970. The teachers were mostly traditional *Mallams* and *Alfas* (Muslim Scholars) who passed through the local and earlier modern Arabic Teachers Colleges, but mainly used Arabic books, from which they would translate the needed lessons into acceptable local dialects for their students.

However, with the production of ISS books in English written to the syllabus, the subject became much easier to teach and learn. The Introduction of ISS as a course in post-secondary Advanced Teachers Colleges and Colleges of Education and later Universities made the teaching and learning widely accepted and easily taught in both primary and post- primary schools in Nigeria. The National Policy on Education (1977) makes ISS a core subject in primary and post-primary schools but as an elective Subject in Senior Secondary Schools (SSS). Within two decades (1984-2000), Nigeria adopted 6-5-4, 6-3-3-4 and later 9-3-4 Systems of Education and with this, NERDC (1984) reviewed the syllabi of all subjects including ISS and the subject was re-modified to teach the following:

- i. The historical and contemporary development of Islam as well as the lesson learnt from them.
- ii. The spiritual, moral, socio-economic and intellectual roles of Islam in society
- iii. The practical application of Islamic teachings to life.

To achieve the afore-mentioned objectives of ISS, the Syllabus consists of four major parts *vis-à-vis* : *Tārikh* (Historical development of Islam), *Tawhīd* (Islamic theology and monotheism), *Fiqh* (Islamic Jurisprudence) and Qur’ān and *Hadīth* (Prophetic/Apostolic Traditions).

Furthermore, 2004 Nigerian National Policy on Education (4th Edition) in Section 3 reiterates ISS as one of the senior secondary education subjects or field of studies under humanities with the aim of raising religiously, morally, academically and well-adjusted individual who can think independently and respects the views of others and be given the opportunity for higher education in the field of Islamic Studies. Progressively, Since the inception of the aforementioned system of education which ushered in the implementation of the curriculum under reference, the subject has been taught and learnt in various stages of schools nationwide; though, the score cards obtained as regard the trend of Students enrolments for the Subject have been relatively worrisome especially in the southern part of the country while other analyses suggest the upward trend in

students' performances and enrolments in the northern part (Busari,2016)

VI. PROBLEMS AFFECTING THE TEACHING AND LEARNING OF ISLAMIC STUDIES IN NIGERIAN SCHOOLS.

The learning of Islamic Studies and its components is essential for every Muslim because it is the gateway to be more acquaintance with Islam and its teachings. Through this, character building of a Muslim as an individual and a member of society would be developed as asserted by Syed Ali Ashraf (1985) when he defines Islamic education *inter alia*:

....an education which trains the sensibility of students in a manner that builds their attitude to life, approach to all kinds of knowledge and ethical values of Islam.

However, despite these abundant values of Islamic Education (as in ISS), there are numerous factors (problems and challenges) that are affecting the efficacy of ISS in Nigeria, these include:

6.1 Interest- Interest has been recognized by researchers and educationists as a motivational factor that influences learning and performance. The student's genuine and deep interest in the subject (ISS) goes a long way to imprint the concept and values of Islam and moral teachings learnt in the class in the heart of the learners and subsequently gingered such student to be of high moral standard. There are two types of interest which enhance student to attain an excellent level of academic performance as enunciated by Hidi and Renninger (2006); these are: Situational and Individual Interest.

Situational interest involves psychological state of interest that can be generated by specific environmental stimuli while individual Interest connotes relatively enduring pre-disposition to attend to certain objects and events and to engage in certain activities.

It could be deduced from the above assertion that situational interest triggered by environmental factors may evoke or contribute to the development of long-lasting individual interests which, without mincing words, would improve the students' ethical and religious understanding. However, many Nigerian students lack genuine interest in studying ISS and what it entails especially in post-primary schools. Our learners give little or no attention to ISS and run after other disciplines to become professionals but ignorantly forget to embed Islamic teachings to their struggles in order to be morally and ethically professionalized.

6.2 Parental Influence- Parents are the first teachers for children and their awareness and educational background go a long way to influence a child positively (Alokan *et al*, 2013). They prepare themselves to learn religious practices and principles, good morality and subsequently teach such at home in order to answer the children's questions and curiosity about religious and societal matters. While in other hands as posited by Alokan *et al* (2013) citing David, the illiteracy of the parents could have negative effects on the learner's academic and religious acts due to lack of supports, motivation and reinforcement. It is believed in some quarters that most of the problematic Muslim students and individuals are those neglected children at home in term of Islamic education. The care-free attitudes of the parents in practicing and teaching Islamic

education at homes through which the children can imitate contribute negatively to students' academic performance; while the students who had received Islamic education *ab initio* from their families through parents or otherwise exhibits positive demeanour ,good academic performances and commendable religious practices.

6.3 Teacher's Influence -Professionally, a teacher is someone who is trained, certified and certificated in both theory and practice of education. He is very important in the life cycle of a Student through his brilliance, influence, character, self-discipline and exemplary qualities because he is saddled with responsibility of imparting positive knowledge and information to the life of his students. According to Hippocrates as cited by Umar *et al* (2004), teacher affects eternity, he can never tell where his influence stops. Therefore, the influence of a well-trained, dedicated, qualified and approachable teacher on moral and academic performance of students in ISS can never be underestimated.

A good teacher of Islamic Studies has a responsibility of nurturing and developing his students spiritually, morally and ethically, re-shape their beliefs, characters, moral integrity and heighten their cognitive, affective and psychomotor tendencies to attain excellence. He must also create a conducive atmosphere for his students to learn and be a role model because he has assumed the position of *loco Parentis* who must not be found wanting of what he teaches. By doing these, the teacher influences the students and brings out the best in them. Furthermore, the teachers' educational qualifications, experiences, exposures and dedication go a long way to have influence on the Students. But, sadly, some ISS teachers are hostile, not approachable, not humane, not capable of handling the subject, not portraying good personality, failed to be a role model and reliable troubleshooters; and as such create many unresolvable problems in the hearts of Muslim students by scaring them away from class, expose them to bad attitudes and subsequently made them - coupled with other factors - elements of disorders (Zaiton and Hishamuddin,2012)

6.4 Problems of Pedagogy- Pedagogy has been defined as the discipline that deals with the theory and practice of education; it thus entails the study of how best to teach (Wikipedia). Abdul Rahman Salih as cited by Zaiton and Hishamuddin (2012) posited that the influence of educational methods comes from the fact that the content of any curriculum cannot be learned efficiently unless it is presented in a specific way. Inadequacy of methods may affect learning and cause undue wastage of time while application of modern and adequate methods enhances and influences Students' academic performance. For an ISS teacher to achieve his aim of graduating well-behaved and academically sound students, he needs to study the students' differences in physical characteristics, interests, homes, intellectual abilities, learning capacities, motor abilities, social skills, aptitude and talents, language skill and background experience. He must use variety of materials in a multimedia approach to vary the learning experiences. The influence of adequate and up-to date facilities and instructional materials needed to improve students' academic performance in ISS is over-whelming; but, regrettably, not many Islamic studies teachers, the Government or the School Owners themselves are

deeply interested in providing them in order to enhance the performances of the students in the subject.

Rosnani (2004), posits that the most frequent methodology used in ISS in many parts of the world including Nigeria are reading, narrations of stories from the Qur'an and the *Hadith* (Sayings of the Prophet), lectures, dictation of notes and memorization . There is urgent and dire need for all ISS stakeholders to expand the pedagogical methods of the subject in accordance with changing time instead of over-depending on traditional methods of teaching. The adoption of visual, audio and audio visual instructional materials with good approaches in teaching ISS is bound to produce students with high academic performances, adequate exposures and experiences that would be used to contribute meaningfully to religious and societal development.

6.5 Teacher-Student Relationship - Many scholars opined that if a teacher takes time to build relationship, they can motivate their Students to learn and be of good characters. According to Whitaker (2004), the main variable in the classroom is not the students, but the teacher. He opines that a good teacher recognizes the importance of connecting with his or her students by putting snags in the river of students' passing, and over time, he redirects hundreds of lives. The teacher's indifference to students' affairs affects their moral, behavioural and academic performances because to improve a school significantly, better and spirited teachers are needed. This phenomenon has greatly affected the students of ISS in Nigeria because many so-called certificated teachers of the subject are not in any way connected with their students, very hostile and failed to look after their students' successes in the subject.

These teachers, (locally called *Ustadh*, *Muallim*, *Mallam* or *Alfa*) even in formal educational sectors in Nigeria though, not all, create fears in the minds of students through harsh punishments, exposition of their superiority and unfriendly postures they bring before their students. However, well-behaved, friendly, self-disciplined, dedicated and approachable teachers of ISS have the tendencies of affecting the students' future positively. They serve as a worthy role model academically and ethically and leave an indelible mark in the hearts of their Students which propels them to be successful academic in their chosen carriers.

6.6 Family and Environmental Variables - According to European Union Monitoring Report of (2013) , the level of educational attainment of parents could influence the academic achievement of their children, because those Students from Parents with high level of education perform significantly better in studies than those whose parents are either illiterate or possessed low level of education. Furthermore, hereditary factor could also serve as variable in students' behavioural and academic performances. Those children who usually inherit a very high gene from their learned parents perform creditably in good learning environment compared to those who inherit poor gene even if the environment is conducive for learning as asserted by the Community Development, Sound Education, Good Health and Social Life Initiative(2013). Likewise, Muola (2010) also posited that the family background also constitutes a distinct variable in student's life because it influences the student physically, intellectually and emotionally. In the same vain, Fantuzzo and Childs (2000) believed that the impact of

environment in which the students reside and live cannot be underestimated, this is considered to be consequential for child developmental outcomes such as cognitive ability, school readiness, academic achievements, ethical and emotional adjustment'

If all these afore-mentioned variables are put into consideration, the students' demeanour and academic excellence in ISS could be measured within the realm of student's parental, family and environment variables. A well- educated, religious and morally grounded parents and family with sound Islamic education background is bound to produce in most cases, excellent and ethically- groomed children who will be excelling not in academic alone but also in the sphere of moral and religious angles; while, in the absence of these, the outcome might be catastrophic .

6.7 Textbooks and Language Barriers - The unavailability and inadequacy of up-to date and well explicit textbooks of ISS in some schools create a great deficiency in the students' academic and moral performances. Furthermore, the contents of some Islamic studies books in Nigeria failed to cater for the academic, religious and moral aspirations of students who initially had no Islamic educational background. These students often face problems in understanding the topics and contents of textbooks which are not explanatory enough and far from being easily understood. In addition, language being a sole vehicle through which communication occurs also possesses a serious threat to ISS students. It is an undeniable fact that Islam as a religion is divinely built in term of worship, teachings and supplications on Arabic language and even the Holy Book of Islam (Al -Qur'an) was revealed and continued to be recited mainly in Arabic. Therefore, most of the teachings in *Salāt* (Canonical Prayers) and other devotional acts are done with Arabic language and as such; this cause a huge gap between the learned teachers who are vast in Arabic and his innocent students who lack the understanding of the language but are offering ISS.

Majorly, even in most Nigerian Certification Examinations such as Senior Secondary Certificate Examinations (SSCE) and Unified Tertiary Matriculation Examination (UTME), ISS candidates are expected to write or read chapters and verses of the Qur'an in Arabic, and this constitute a great variable loss between these students who are well-groomed in Arabic language and those who do not in term of performance in ISS. In the same vein, Abdul (1983) reiterates that many ISS teachers lacked the basic elementary knowledge of Arabic in terms of Semantics (*Nahw*), Morphology (*Sarf*), Logic (*Mantiq*) and Rhetoric (*Balāghah*) and so on and could not transmit genuine meanings of subject matter rendered in Arabic to his students. In this trend, the moral, religious and inter relational teachings of ISS always lost in transit and the Students bear the brunt and consequences in term of academic and behavioural renaissance which in turn adversely affect their upbringing.

6.8 School and Curriculum Factors - School is a social and learning agent that provides an atmosphere through which a child (Student) may be formally educated in order to attain educational goals. According to Umoh(2006), nature only provides the raw materials in form of potentials but it is the school's environment that determines the extent of development. The school set-up, administration and execution of educational activities have a greater variable in Students' entire life.

However, no matter how well-organized and well-equipped a school is; its academic efficiency is based and determined by the type of curriculum adopted.

Being the totality of the learning experience in schools and a systematic and planned attempt undertaken by the school to modify or change the behaviours of learners, Curriculum is the *modus operandi* on which academic excellence is achieved. But, unfortunately, according to Rosnani(1998) the curriculum designed for Islamic Studies in many countries including Nigeria is deemed to be inadequate for the holistic development and academic excellence of Muslim students. It is pertinent to emphasize that, in a school where ISS as a subject is given adequate attention with qualified and dedicated teachers, up to date and well-structured curriculum and highly motivated students, the score cards of students' moral and academic performances is believed to be positive compared to those schools which lacked the basics.

6.9 The Time Table and Period Allocation Syndrome.

In critiquing the period allocated to ISS in Nigeria, Lawal (2006: 36) laments:

..... One of the problems noticed with Islamic Studies generally is that the number of periods allocated to it is grossly inadequate. The one or two periods allocated to the Subject cannot help in completion of the syllabus. The syllabus is so comprehensive to the extent that even with five periods per week, extra periods will have to be organized for the whole syllabus to be covered.

The above lamentation is crystal clear enough to elucidate one of the problems militating against the potency of ISS in the life of Nigerian students. The subject is either ignored, detested or squeezed in school time table with meager periods of either one or two per week. These allocated meagre periods are grossly inadequate to cover all aspects of ISS, monitor the learners' academic and ethical tendencies and to imprint the value of Islam which is the core value of ISS in the hearts of the students. However, according to Hassan as cited by Yusuf (n.d) on the issue of periods allocation, the revision of National Policy on Education (NPE) in 2004 in tune with the Universal Basic Education (UBE) in Nigeria witnessed the emergence of new primary school curriculum that suggested a minimum of three periods per week for both Arabic and Islamic Studies for effective teaching and learning

Subsequently, if the gesture is sustained and applied in primary and post- primary schools in Nigeria, the fortune of the ISS potency will be slightly improved, though, not immensely but would assist both the teachers and students to cover more grounds in actualizing the objective of the subject in producing God-fearing and ethically groomed individuals.

6.10 Merging of Islamic Studies with other Subjects-

Recently, the Federal Ministry of Education announced that in order to reduce the workload of primary and junior secondary pupils, they will be cutting down subjects from twenty to a maximum of ten subjects under the nine-year basic educational curriculum in order to align with International standards. To achieve this, the Ministry of Education partnered with the NERDC to fuse some subjects together.. However, subjects like Christian Religious Studies (CRS) and Islamic Studies (ISS) which are separately taught, were merged under a compulsory

subject known as Religion and National Values (RNV). Other subjects brought under the RNV include Civic Education, Social Studies, and Security Education. Apparently, this fusion has reduced the numbers of topics taught in ISS from at least ten topics per term to three topics and eroded the core values of teaching the subject because of the meager time devoted for it. This trend also created problems of identity for ISS teachers in which some of them are now compelled to teach RVN. Furthermore, the publishers and authors are also forced to write and produce RVN textbooks in which some of the books published had little or no space for ISS while other subjects were accommodated

6.11 Problems of Instructional Materials, Multimedia and ICT - Instructional Materials are the tools designed majorly for assisting the teacher in explaining a topic to the learners and enhance the learners in turn to grasp the educational information disseminated. These items available in various forms and these include textbooks, consumables, learning laboratories, slides films, film strips, recordings, learning charts and so on. Multimedia as noted by Oshinaike and Adekunmisi(2012: 1) is the combination of various digital media types such as text, images, sound and video into an integrated multi-sensory interactive application or presentation to convey a message or information to an audience while ICT in education is seen as the computing and communication services and character that variously support teaching, knowledge and a variety of performance (Nidhi, 2018:13).

It is not a hidden fact that the world has been digitalized through Information Communication Technology (ICT) and as such education has also gone digital; thus, teachers and students are now driven on the precepts of modern way of educational information dissemination. In tandem with the above assertion, the instructional materials, multimedia and ICT access needed for teaching and learning ISS in many schools are believed to be either unavailable or inadequate. In most cases also, some of the ISS teachers are not digitally-inclined; thus the usages of the items possess problems for both the teachers and student. The employment of these modern instructional materials in multimedia forms and getting information on topics to be thought in ISS through ICT is believed to be the easiest way of learning and teaching if properly accessed and this has not been the case in many primary and post primary schools in Nigeria.

VII. RECOMMENDATIONS FOR ISS CONUNDRUM IN NIGERIA.

Considering the succinct overviews of the factors and variables that are affecting the potency and efficacy of ISS in primary and post-primary schools in Nigeria, the following are recommended as solutions:

- i- Government, the school owners and the administrators should make provision for adequate manpower and facilities needed in the subject.
- ii- The Students' interest should be aroused through various enlightenment programmes, reinforcement, prizes and awards for the brilliant and well-behaved students of ISS.
- iii- The number of allocated periods for the subjects should be increased in order to cover the Islamic Studies Syllabus as prepared by Nigerian Educational,

Research and Development Council (NERDC). The era of one or two periods per week should be abolished.

- iv- In both public and private schools, the subject should be handled ONLY by qualified, certified, certificated, dedicated, friendly, competent and morally-inclined ISS teachers who will be worthy role models for the students in all areas.
- v- ISS students should be assigned specific roles in the classroom in order not to be perpetual passive learners and to develop their interest in the subject. This will give them clout of practicing what they learnt in their various communities.
- vi- Islamic organizations and conscious Muslims should assist both the government and school owners in procuring the necessary materials needed in the teaching and learning of ISS in the schools.
- vii- Adequate and functional instructional materials, comprehensive and easily accessible books and other needed materials should be procured by the school authorities for effective and meaningful teaching and learning of ISS
- viii- The parents should be sermonized to be worthy models for their children academically and morally. They must create a conducive Islamic environment for their wards at home to practice Islamic teachings as being taught in the School.
- ix- Adoption of multimedia and ICT facilities for the online perusal of ISS information for teaching and learning must be given priority by the school and authorities. Also, the ISS teachers should acquaint themselves with the usages of these materials to enhance their teaching methodology
- x- The ISS teachers need to be friendly and accommodating, employ suitable and effective pedagogical methods to be used in teaching, simplify the textbooks and devise a simplest method of teaching and breaking Arabic language barriers for their students and allow themselves to be seen by the students as counselors, confidants and above all reliable *loco parentis*.
- xi- Federal Ministry of Education should, with matter of urgency fully reverse the fusion of ISS and other so-called related subjects. The loss accrued to Muslim students offering ISS (as well as students offering CRS) as the result of this fusion in term of religious, moral and ethical gains is enormous and as such; its reversal would ameliorate the problems on ground.

VIII. CONCLUSION

Initially, prior to emergence of colonial imperialists in Nigeria, Muslims of northern and southern parts of the country were deeply involved in the acts of teaching and learning the tenets of Islam in their various domains. The British government activities propagated Christianity amidst outcry of neglects and forceful conversion by Muslims until various Islamic organizations took the bull by its horns and established schools

modeled in both western and Islamic ways to cater for their children education.

However, despite numerous transformations that has occurred in the teaching and learning of Islamic Studies in primary and post-primary schools in Nigeria, there are factors and variables that are militating against its potency. These include interest of the Student, teachers and parental factors, school curriculum deficiency, Arabic language barrier and pedagogical problems. Various solutions to minimize these problems such as adequate motivations and reinforcements for the students, provision of needed materials in ISS, simplification of methods to learn Arabic and continuous teaching of the subject by competent, friendly, dedicated, certified and God-fearing teachers were all advocated.

With all the aforementioned recommendations and the position of Islam on the acquisition of knowledge, all hands must be on deck to enhance the growth of Islamic Studies in Nigeria.

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A Social Network-based Framework for Interactive and Personalized Web-based Learning.

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Abstract- E-learning has been practiced extensively across the globe, and thanks to Internet penetration and advancement it is progressively being adopted among students in the learning environment. E-learning systems are currently available from high schools to higher institutions of learning globally. However, the systems still lack in covering certain areas of the education sphere and conventional frameworks of e-learning are incapable of answering to those demands both for learners and tutors. This paper proposes a framework that integrates social networks into web-based learning environment to make the environments more interactive and personalized. This research paper shows increased social interactivity and personalization through user profiles in the e-learning environment. This paper also evaluates some of the existing frameworks of e-learning and introduces a new functional framework integrated with Facebook social network that aims to enhance personalized and interactive web-based learning environment. To evaluate the proposed framework's personalized interactivity, experiments and online surveys were conducted. An analysis of the data collected was carried out with the aim of trying to establish the existence of any relationship between the student's performances and increased social interactivity after the use of the proposed framework in the e-learning environment. Increased social interactivity among education actors, enhanced e-learning environment, better learning outcomes and performance and increased learner productivity and participation across cross-platforms were mentioned as some of the perceived impacts of social interaction in an e-learning environment. A total of 84% of the respondents reported lack of personalization and 66% mentioned inadequate e-learning infrastructure and unreliable information whilst 62% indicated inadequate training of lecturers or course instructors as significant barriers of e-learning systems not integrated with social network(s). The outcome of this research can be used to contribute to best teaching practices among lecturers and improve online learning experiences to students in institutions of higher learning.

Index Terms- *E-learning, Personalization, Social Interactivity, Social Networking Sites (SNS), Social Presence.*

I. INTRODUCTION

In recent years there has been considerable interest among educators in the use of online communication for learning. With the prevalence of virtual learning environments and social presence, online communication is now used to support learning and build community in universities, colleges, schools and other organizations. According to Vaghjee and Panchoo social presence does not only mean to communicate, the quality of interaction is important for learning purposes [1].

E-learning is the virtualization of the traditional learning and teaching via internet with additional attributes like better planning and management through data analysis [2]. The current e-learning platforms increasingly continue to put a significant emphasis on timely content delivery and technology. Most e-learning content today is designed, generated and distributed via centralized learning management systems with no much focus on the user-centric social interactive aspects of learning. This demands a change in focus from technology-driven to people-driven models in the present e-learning environment.

Suitable technology for instructors to use in a classroom setting is important in terms of appropriate learning style. Thus, a balance is needed between styles of learning and use of technology in classrooms for students to benefit fully from both [3]. This style improves access to information, and increases ways in which material is provided to students; it uses equipment in classrooms and follows nontraditional forms of progress assessment [4].

The increased integration of Information Communication and Technology (ICT) in everyday life has increased the mobility of students and their need for a more flexible, adaptable and dynamic education system. The growing number of nontraditional students enrolling in schools (adults, students with specific needs, people who work, etc.), suggests that schools as we know them may eventually disappear thanks to technological advancement being witnessed in education environment. Much study has focused on how the social media can transform the effectiveness of social relationships into learning effectiveness. For instance Facebook enables individuals to present themselves in an online viewable profile and articulate their social networks. It also enables individuals to join virtual groups and explore hobbies, interests, and other specific knowledge of group members. Past study by Sulaiman et al. aimed to study the pattern of knowledge shared among academia through Facebook by viewing the number of like, comment and share [5].

The ubiquity of online social networking has resulted in their pedagogical applications in higher education institutions. According to Mehmood et al. A new dimension of Social Media is now shaping up to form a completely new segment in its services i.e. distance e-learning [6]. They further stated that factors of this increasing enthusiasm is based on SM e-learning perception, convenience, academic reasons, easiness and collaboration by social networking.

The rapid development of interest in the use of social networking sites in both academic and non-academic spheres calls for efficient planning for the implementation and integration of these valuable technologies into higher educational institutions for effective, efficient and ethical use of such technologies.

This paper seeks to build the body of knowledge on top of the existing in regard to integration of social networks with e-learning platforms. This contribution will improve learner's online learning experience by enhancing social interactivity in a user-centered approach.

This paper is organized in five sections: *Section I* Introduction, *Section II* Related work, *Section III* Framework for personalized and integrated web-based learning, *Section IV* Experiments and results, *Section V* Conclusion and future work.

II. RELATED WORK

Electronic learning is becoming indispensable as it continues to tick all the right boxes integral for learning in the 21st century [7]. Virtual communities have become the

bedrock of virtual learning in a way that it provides participants to engage in a vigorous and meaningful discussion [8]. The benefits of "zero geography" are ever visible as the facilitation, promotion and support of diverse knowledge ideas are shared across these communities in an uninterrupted real time scenario [8].

Social Networking Sites (SNS) ability to boost learning within a virtual setting can be attributed mainly to the notions of "participation, belonging, communities and identity construction" [9] in wide contrast to the unidirectional learning of the internet otherwise. The ability of the various SNSs in terms of their potential for virtual learning varies invariably in accordance with their target audience and the nature of communication it supports [10] and something we must understand in order to correctly identify the vast potential for these platforms for electronic learning. Sulaiman et al. aimed to study the pattern of knowledge shared among academia through Facebook by viewing the number of like, comment and share [5]. Nentwich and Konig in their study reported that Facebook demonstrates potential as a platform for public relations for scientists, universities, institutes and school associations [12]. The same authors report that platforms like Facebook can be used for synchronous communication with specific reference to the contribution that they could bring in e-learning. Fishpaw and Ketel in their work alluded that from course design perspective the use of SM is increased in preparing new e-learning courses and packages [12].

Vaghjee and Panchoo In their research findings found out that the online environment as it is being used by learners is not meeting their pedagogical needs online as they still depend on the face to face lectures [1]. According to the researchers, social presence does not only mean to communicate, the quality of interaction is important for learning purposes.

In their work Balakrishnan & Loo, found out that younger generation is too enthusiastic for using SM for distance e-learning [13]. The factors of this increasing enthusiasm is based on SM e-learning perception, convenience, academic reasons, easiness and collaboration by social networking which are same as analysed in Ganeshan & Xu work [14]. Balakrishnan & Loo also highlights the interests of students and teacher towards using SM for e-learning as they believe it will ease and enhance communication and collaboration between different e-learning entities [13]. The results of Balakrishnan & Loo [13], Ganeshan & Xu [14] see similar trends as shown in earlier work of Stanciu et al. which highlight the popularity of social networking and its possibilities as an education tool in Romania [15].

Models and frameworks are structural set of activities to guide the research process. According to Brathwaite, it is important to “evaluate different theories or frameworks available within a topical area of interest before selecting one” [16]. Thus, the essence of this section of this paper is to evaluate the existing frameworks on the research topic as shown in Table 1. The frameworks were evaluated based on two criteria that is *personalization* and *social interactivity*.

Personalization is the ability of an e-learning system that can predict a student’s needs based on his/her profile. The profile is collected from the activities when the student accesses the system. With this knowledge the system will be able to recommend certain learning materials match with the student’s needs.

Research into *interactivity* as a perception-related variable has frequently focused on customers and analyzes how various elements (such as multimedia, speed, and control mutuality) influence the ways in which customers perceive or experience the interactivity level of a medium [17].

According to Alabdulkareem, social media play major role in developing social interactions between students and the society in general, that is mean widening the limits of teaching from class walls to be within the community [18]. Undoubtedly, promoting interactivity in e-learning courses can have a major impact both on the engagement of the learners with the content, course instructors and the levels of their knowledge retention. This can affect positively the students’ learning outcomes in a learning process.

Table 1: E-learning frameworks evaluation table

	Framework	Features	Personalization and interactivity levels
1.	Chatti et al. Web 2.0 framework (2007)	Comprised of 3 main components: networking and collaboration, intelligent search and knowledge creation.	Limited interactivity levels No personalization in learning
2.	Forester’s Web 2.0 framework (2008)	Web 2.0 used to run applications such as XML, Flash etc. Web 2.0 applications include blogs, wikis, social network, RSS, tags etc.	Limited interactivity levels No personalization in learning
3.	Gillet et al. Web 2.0 framework (2008)	Combination of actors, activities and assets.	Passive e-learning interactivity level No personalization in learning
4.	Wan Web 2.0 – e-learning framework (2010)	Consists of 3 main parts: web 2.0 tools, e-learning 2.0 applications and e-learning 2.0 learning modes.	Moderate interactivity levels Limited personalization in learning
5.	Constructivism Elements & E-Learning Design of Learning Activities (2012)	Consists of 2 categories: the learning design elements and the learning assessment elements.	Moderate interactivity levels Limited personalization in learning

6.	Web 2.0 embedded e-learning functional framework (2012)	Comprised of 3 main entities: course, research laboratory and user (student/lecturer).	Moderate interactivity levels Limited personalization in learning rather collaborative approach
7.	Faboodle Technology Framework for Accessing Moodle through Facebook (2013)	Comprised key features: course list, forum list, discussion threads, mark read, secure access, Moodle authentication, Moodle session and user privilege management and information on demand.	Moderate interactivity levels Limited personalization with study groups approach
8.	Collaborative learning framework, Ebrahim (2014)	Consist of a collaborative learning approach.	Moderate interactivity levels Limited personalization in learning rather collaborative approach
9.	Personalized and Interactive Web-based framework	Proposing a user-centric approach.	Full e-learning interactivity level Highly personalized

III. FRAMEWORK FOR PERSONALIZED AND INTEGRATED WEB-BASED LEARNING

The proposed framework enables social networking sites applications access to the Learning Management System LMS (Moodle e-learning system) contents and activities consistently with the LMS interface and workflow. The framework leverages the social networking interactivity features which promotes social interactivity and enhances personalization of the e-learning process.

A. Framework composition

The framework borrows from Croxton who proposed the online course interactivity framework shown in Fig. 1, which includes key elements of social cognitive theory, interaction equivalency theorem, and social integration theory, and can help to increase the likelihood of creating a learning environment that promotes deep and meaningful learning, is satisfying, and is one in which students will choose to persist [19]. The integrated framework seeks to expand the interaction equivalency theorem through the integration of Facebook as a social network artifact in the Moodle e-learning system as an advancement to bring social interactivity and personalization in the web-based learning. The research data analysis indicated Facebook (90%) and WhatsApp (82%) as the most ideal social networking sites preferred in the integration with an e-learning system in the institutions of higher learning.

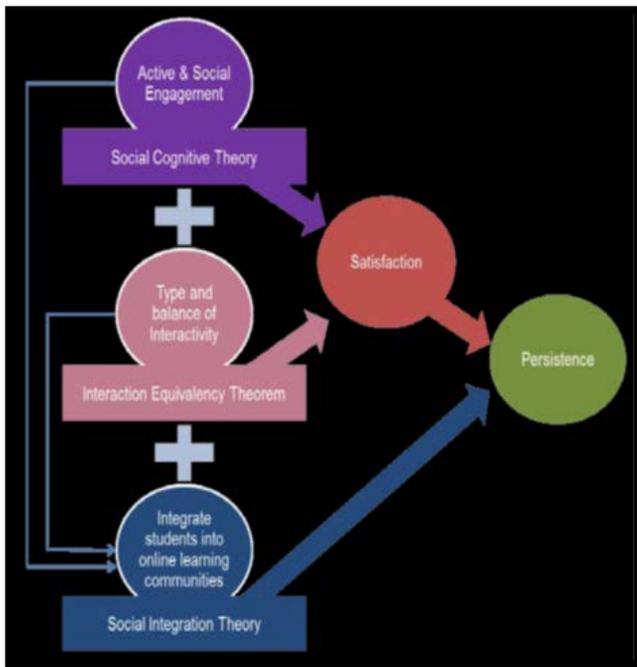


Fig. 1: Framework for course interactivity
Source: 1MERLOT Journal of Online Learning and Teaching

B. Enhancement to the Croxton framework

An online survey question with multiple choices sought to establish how personalized the e-learning platform not integrated with social networking site(s) is in terms of delivery of instructional contents to the learners. In the responses 66% of respondents indicated existence of limited personalization, while 32% of the other respondents stated that there is moderate personalization and only 2% of the remaining respondent acknowledged existence of full personalization in terms of delivery of instructional contents to the students. The data analysis in this research work overwhelmingly revealed the lack of personalization in the e-learning platforms not integrated with social networking site(s) in terms of delivery of instructional contents to the learners. This findings is similar to [20] who reported that these are due to the problem when the e-learning is student-oriented and does not have capabilities to adapt students' preferences.

Majority of the responses to the survey agreed to the statement that an e-learning system integrated with social networks and personalization can assist educators (lecturers) in improving individualized learning needs (i.e. considering each student's need individually). This clearly shows that social networks if properly integrated with online learning environments has significant capacities and opportunities of harnessing learner-personalization in the web-based learning environment. The social networks virtual connections enhance

individualized learning needs and increase student-content usage within the online learning environment.

On the perceived challenges which would exist in the e-learning frameworks not fully integrated with social networks, 84% of the respondents reported lack of personalization as a barrier. This analysis shows that the majority of the students (over 80%) reported lack of personalization as a major challenge in integrating social networking site(s) with e-learning systems.

1) Personalization feature

The primary purpose of this user-centric approach in learning is to open student pathways and encourage student voice and choice in their learning process. In these personalized environment in learning, educators seek to meet individual student within their own zone of proximal development. In absence of personalization, there is a gap between the individual student, their learning process, and the necessary support they require to enrich their learning experience. The shift towards personalization significantly changes the dynamism between the teacher and student. In this case the instructors/educators assumes new roles as mentors, coaches and facilitators, hence the power and control shifts to the learners. Social networking site(s) integrated in the proposed e-learning platform will offer learners ownership over their learning and grounding learning in their interests and passions, making them feel valued, motivated and in control in the learning process.

The use of artificial intelligence i.e. knowledge representation facilitates personalization through creation of individual student profiles in the integrated framework. The idea of creating individual student profiles is that instructors and educators get to know their learners well and not just their abilities and learning styles but also their dynamic preferences and education needs and use this insight to design more effective, sustainable individualized instruction, relevant content and guidance. This will address learners' individual dynamic needs, interests and learning styles and significantly scale up student-centered approach to e-learning.

The e-learning platform will have a feature to predict learner's needs based on his/her profile captured in the student profile data in the Facebook account. Each learner will have individual profiles of pages of interests, groups, events, publications etc.

2) *Social interactivity feature*

This study sought to find out the perceived benefits of using interactive e-learning platform integrated with social networks in regard to the learning activities. The purpose of this was to understand deeply the perceived benefits of using interactive e-learning platform integrated with social networks in regard to the learning activities. Majority of the respondents 82% mentioned the enhancement of social interactivity skills and enhancement of personalization of learning process as the most important benefits while on the other hand 78% of the respondents believed using this highly interactive e-learning platforms integrated with social networks in the learning activities promotes higher level of lecturer-learner and learner-learner interaction and also motivates the students' participation in the learning activities. Half of the respondents 50% thought that this interactive e-learning platforms integrated with social networks gives online learners more control over their e-learning process.

Chen et al. argued that students' learning interaction and conversations on Twitter can reflect their educational experiences, knowledge construction and learning process [21]. The survey data confirms this statement. Almaghlouth in his findings similarly revealed that the use of social networking can encourage and motivate students to work collaboratively, sharing and reusing resources available to them, opening their minds to the social network, giving students the opportunity to be creative and to engage with other students, whether they are from their class or from outside [22].

C. *Description of the proposed e-learning framework*

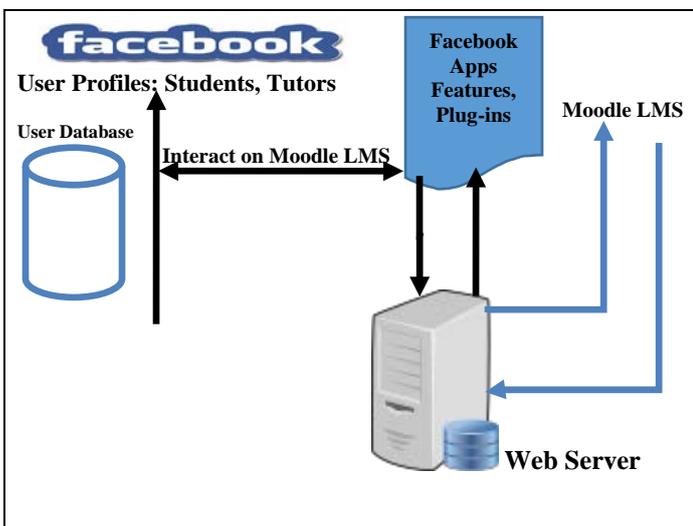


Fig. 2: Personalized and Interactive Web-based Framework

The framework as shown in Fig. 2, has a three layer architecture, developed by PHP programming language along with HTML, JavaScript and CSS files. The key features of the framework include: the Facebook Applications with social interactivity capabilities, User profiles of Students and Tutors/Course Instructors with personalization capabilities, Moodle LMS, Web Server, Moodle Plugins; *Moodle plugin is just a folder of PHP scripts (and CSS, JavaScript, etc. if necessary)*. The Fig 2. provides an architecture of Moodle LMS integrated with Facebook social network for personalized and interactive web-based learning. Facebook Applications features will include online search, online links, uploads, live videos and photos, chat room for discussion forums and RSS feeds.

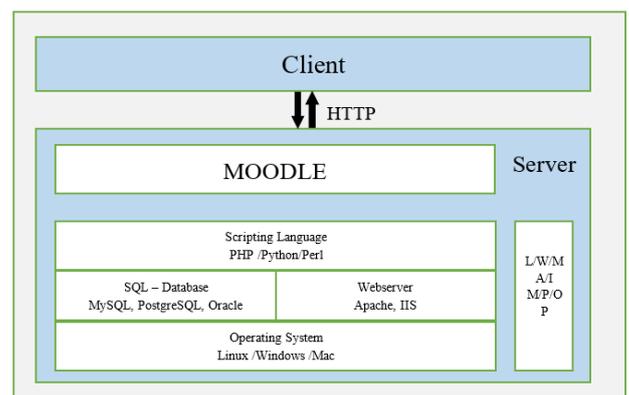


Fig. 3: Moodle architecture
 Source: <https://moodle.org> [Accessed August 2017]

With reference to Fig. 3, Moodle installation comprises the Moodle code executing in a PHP-capable web server; a database managed by MySQL, PostgreSQL, Microsoft SQL Server, MariaDB, or Oracle; and a file store for uploaded and generated files (the moodledata folder) [23].

All three parts can run on a single server; or they can be separated with many load-balanced web-servers, a database cluster, and a file-server; or anywhere between those extremes. Moodle database is the permanent storage of data and it allows the access for the data to be viewed, or collected and written to [23].

D. *Moodle as a modular system*

The Virtual Learning Environment system is structured as an application core, surrounded by numerous plugins to provide specific functionality as shown in Table 2. The system is designed to be highly extensible and customizable without

modifying the core libraries. Customizing or extending the Moodle system is through the plugin architecture.

Plugins in Moodle are of specific types. That is, an authentication plugin and an activity module will communicate with Moodle core using different APIs, tailored to the type of functionality the plugin provides. Functionality common to all plugins (installation, upgrade, permissions, configuration) are, however, handled consistently across all plugin types.

The standard Moodle distribution includes Moodle core and a number of plugins of each type, so that a new Moodle installation can immediately be used to start teaching and learning. After installation a Moodle site can be adapted for a particular purpose by changing the default configuration option, and by installing add-ons or removing standard plugins. Physically, a Moodle plugin is just a folder of PHP scripts (and CSS, JavaScript, etc. if necessary). Moodle core communicates with the plugin by looking for particular entry points, often defined in the file lib.php within the plugin [23].

Table 2: Activity and Modules of the Moodle Platform [24]

Activity	Module	Description
Creation	Database	Database allows to build, display and search a bank of record entries about any topic; allows to share a collection of data
Organisation	Lessons	represent a set of ordered topics summarizing the instructional materials and allow the access to them through the respective link;
Delivery	Assignments	represent a set of ordered topics summarizing the instructional materials and allow the access to them through the respective link; allow teachers to collect work from students; allow teachers to evaluate the student's work and provide feedback including grades, in a private mode; allow students to upload assignment files;
	Workshops	represent a peer assessment activity with many options; allow students to submit their work via an online text tool and attachments;
Communication	Chats	allow synchronous conversation
	Forums	represent a communication tool where students and teachers can exchange ideas by posting comments,
	News	represent a special forum for general announcements; allow teachers to add posts and to send emails;
Collaboration	Glossary	allows creating and maintaining a list of definitions; represents a

		mechanism for collaborative activities that can be restricted to entries made by the teacher;
	Wikis	allow users to edit collaborative Web pages; provide space for collaborative work,
Assessment	Choice	allows teachers to ask questions and specify multiple choice answers; represents a useful mechanism to stimulate thinking about a topic;
	Quiz	allows teachers to design and build quizzes with a variety of questions, with different types of answers, such as multiple choice, true/false, short answer
	Survey	allows teachers to gather feedback from students using prepackaged questionnaires
	Feedback	allows teachers to create surveys to collect feedback
Reusability	SCORM	represent specifications that enable interoperability, accessibility and reusability of the learning content; represent tools that enable SCORM packages to be included in the course
	External tools	enable interaction with compliant learning resources (e.g. Learning Tools Interoperability) and activities on other Web sites; provide access to new activities' types or materials;

IV. EXPERIMENTS AND RESULTS

Two experiments were carried out targeting undergraduate and postgraduate students of Kenyatta University exposed to the Moodle Course Learning Management System in e-learning activities.

A. Framework validation

Evaluation is the most important step in framework development. It provides essential feedback to the framework development and the quality assurance process. There are a number of evaluation methods that could be used for evaluating a proposed framework. These are observational, descriptive, analytical, testing and experimental method. This paper explored the experimental method in the framework validation to get feedback from the participants of the test.

B. Experiment 1: Plain Moodle e-learning system

Experiment 1 was designed to show the relationships between integration of social media integrated e-learning platform functions and a plain e-learning platform in terms of the differences with and without the social networks functions as a formative evaluation. In the first experiment a plain Moodle e-learning system was used in the e-learning process where selected participants engaged in the e-learning activities in an in-class setting for a 1 hour class time. The parameters tested in the experiment was the *user-personalization* and *social interactivity levels*.

C. Experiment 2 : Facebook integrated Moodle system

In experiment 2 the integrated framework with Facebook social network and interactive user personalization interface was employed in a practical setting for a longer duration of time. The practical evaluation included the out-of-class setting for a longer (one-week) duration. The selected participants engaged in the e-learning activities for a period of one week. The parameters tested in the experiment was the user-personalization and social interactivity levels.

D. Participants profile and procedure

The experiment participants in this study were chosen using purposive sampling. Accordingly, participants chosen were students who have participated or are participating in online learning and are experienced in diverse social networking sites that are incorporated in the current learning management systems in institutions of higher learning. This participants sampled for the study were advanced users of e-learning system from Kenyatta University the School of Virtual and Open Learning (SOVL) and hence they provided better insights. These comprised learners who had interacted with an e-learning systems for more than 3 years in their studying in the institution of higher learning.

This study targeted 50 participants, representing learners in the online learning environment from Kenyatta University using the Moodle Course Learning Management System. The University is offering e- learning program using Moodle Course Learning Management System in 11 centres with 3998 enrollment as of 2016 [25]. The program has the highest achievements in delivery of e-learning since its establishment according to the Baseline Survey Report Commissioned by the Commonwealth of Learning [25]. This offered a reasonable sample size for generalization of the responses as representative of higher learning institutions using e-learning platforms in the learning process.

E. Experiment and results

a) Experiment 1: Plain Moodle e-learning system

One formative evaluation using an experimental design in an in-class setting for a 2 hour class time. Experiment 1 was designed to show the relationships between integration of social media integrated e-learning platform functions and a plain Moodle e-learning platform in terms of the differences with and without the social networks functions as a formative evaluation. In this evaluation 50 students and two lecturers from Kenyatta University took the role of active participants, wherein all participants played different and interrelated roles in regard to the learning activities using the e-learning system. The participants of the validation process were purposefully selected to be those that had experience of interacting with Moodle Course Learning Management System. Based on their knowledge the participants were considered good test cases in evaluating the social network integrated e-learning framework. Linkert scale was used in this case as a measuring method after the experiments and the results presented in percentage in a table.

Table 3: Plain Moodle E-learning System Results

Statement	Agree	Strongly Disagree	Neutral	Disagree	Strongly Disagree
The plain e-learning system enhances social interactivity in the e-learning process.	10	10	0	40	40
The learning activities in the e-learning system are applicable in the e-learning teaching activities.	10	10	20	50	10
The learning tasks in the framework are clear and are easy to execute.	30	10	20	20	20
The learning tasks in the framework are clear and are easy to execute	30	10	20	20	20
The existing plain Moodle e-learning platform is practical and highly interactive to use in the e-learning environment	10	10	20	40	20
The system's user interface is user-friendly and easily understandable to the intended users	60	40	0	0	0
The existing Moodle system adequately addresses the social presence	30	0	10	70	0

and user personalization in the learning process					
The framework is aligned with current e-learning frameworks used in the institutions of higher learning	70	0	10	20	0

b) Experiment 2 : Facebook integrated Moodle system

In this evaluation the same 50 students and two lecturers took the role of active participants. They were required to use the proposed system as part of their learning process. They participated in the learning activities through the student-centric instructional approaches with an e-learning platform integrated with social network(s) to analyze social interactivity in the e-learning environment.

The teaching activities were designed on the Facebook, in order to increase social interactivity in the e-learning environment, included but not limited to: discussion groups, content and instructions delivery, managing individual assignments, learner-learner or learner-instructor chats and practical sessions through Facebook live videos.

Instructors and learners used Facebook Wall, Live feeds, Chat Rooms to communicate with each other. Oftentimes, learners assisted each other in answering each other's questions and assignments. Practical sessions were also conducted using Facebook features which included live videos, chat rooms/discussion forums and RSS live feeds.

Table 4: Facebook Integrated Moodle System Results

Statement	Agree	Strongly Disagree	Neutral	Disagree	Strongly Disagree
The framework developed enhances social interactivity in the e-learning process.	60	30	10	0	0
The learning activities in the framework are applicable in the e-learning teaching activities	50	30	10	0	0
The learning tasks in the framework are clear and are easy to execute.	30	10	20	20	20
The proposed Moodle e-learning platform integrated with	60	40	0	0	0

Facebook Social Network is practical and highly interactive to use in the e-learning environment					
The system's user interface is user-friendly and easily understandable to the intended users	60	40	0	0	0
The proposed framework adequately addresses the social presence and user personalization in the learning process	70	0	10	20	0
The proposed framework is aligned with current e-learning frameworks used in the institutions of higher learning	70	0	10	20	0

V. DISCUSSION OF RESULTS

The experimental results (Table 4) in this paper revealed that Facebook as a social networking site integrated with the e-learning framework enhanced social interactivity and active interaction among the learners and instructors during the learning process. The experiment found out that the two environments had two different outcomes, which suggest that creating an interactive learning environment by integrating Facebook with Moodle e-learning platform can not only prove to be valuable but also influence higher learning outcomes in the learning process.

This paper observes that the learner-learner and instructor-learner interactions is enhanced in the proposed e-learning system integrated with social networking site. This results are similar to the findings of Vaghjee and Panchoo [1]. In their study in an open ended question the students listed certain barriers they had to face using the online learning environment. For some students, use of Moodle meant "extra work with little connection to their course", "interface not user friendly", "a platform technologically oriented rather than meeting their specific needs, hence need for additional functionalities" [1]. The exploratory study demonstrates what research has been showing so far, that Moodle is used more as a repository of notes where collaborative work or interactions are almost non-existent.

Learners nowadays are used to multitasking between several platforms simultaneously, and today's learners feel little enthusiasm when it comes to the traditional teaching or poorly dynamic learning platforms. Proper integrations of these social networking sites in e-learning platforms will undeniably enhance a greater participation by learners in their learning processes, henceforth developing other pertinent skills such as deep learning, critical thinking, collaboration among peers and reflection.

Undoubtedly promoting social interactivity in the proposed e-learning framework can have a major impact both on the engagement of the learners with the content, course instructors and the levels of their knowledge retention. With reference to Table 4, high interactivity levels could be attributed to the integrations of the Facebook social network in the web-based environment to boost social interactions among participants in online learning.

Majority of participants (Table 4) overwhelmingly agreed that the proposed e-learning platform is highly interactive for learners to use in e-learning environment and this could be attributed to the existence of the interactive features offered by Facebook social network.

Based on their interactions the participants pointed out (Table 4) that the system's user interface was user friendly, an ability which gives users confidence in interacting with the system features and social interface.

Majority of the participants as shown in Table 4, approved that the proposed system adequately addresses the social presence and user personalization in the web-based learning process. This could be chiefly attributed to the user-centric approach of the platform to address specific relevant educational needs of the learners.

Most of the learners agreed as expressed in Table 4 that the suggested platform was aligned with the proposed e-learning frameworks used in the institutions of higher learning and this is in terms of the teaching activities.

A learning environment needs to be flexible, interoperable and adaptable, so that it can quickly respond to the needs of the participants within it and this is what the proposed framework is designed to offer. The proposed framework seeks to provide an interactive platform that personalizes the learning process and social interactions between the participants in the web-based learning environment to meet their respective individual needs and preferences of users if and when they arise.

VI. CONCLUSION AND FUTURE WORK

The aim of this paper was to evaluate existing e-learning frameworks integrated with social networking sites and to propose a framework integrated with social networking tools in e-learning platform. The framework provides a bridging gap between the students and instructors in web-based learning environments. The use of social networking tools facilitates more and more students to connect to the teachers and the faculty members where they can get maximum outcomes and enhanced interactive learning experience. This paper evaluated the existing e-learning frameworks not integrated with Facebook social networking site and one integrated to ascertain their levels of social interactivity and approaches in enhancing virtual learning experiences in the institutions of higher learning. In this study, results demonstrate that integration of Facebook social network with an e-learning platform increases social interactivity and personalization. As an achievement, this paper advances the integration of Facebook social network with Moodle LMS to enhance social interactivity and personalization in web-based learning environment. Vaghjee and Panchoo in their research mentioned that the online environment as it is being used by learners is not meeting their pedagogical needs online as they still depend on the face to face lectures [1]. The proposed framework provides an enabling e-learning environment that creates adaptable and networked models of high-level interaction that allows the learner to supplement or choose adaptations that meet their constraints of time and convenience. This personalized or customized learning framework proposed basically provides the social interfaces that enables tailoring the learning process to individual needs and interests with the purpose of ensuring that every learner achieves the desired learning outcomes. With advances in technologies, e-learning technological application cannot be overemphasized. Research has revealed that the future demand and sustainability of web-based learning environment will be driven by continuous enhancements to the existing techniques, tools and technologies that would have value addition to the education and e-learning actors. Future research work should cover integration of e-learning systems with other social networking sites other than Facebook.

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Black carbon from ship emissions: a review of its measurement and estimation methods, emissions factors, global emissions, and impacts

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Abstract- Black carbon (BC), an outcome of incomplete combustion of fossil fuel and biomass burning, has a global and regional influence on radiative forcing and a large effect on the environment and human health. Several studies concerning black carbon emissions and its impacts on climate, environment and human health, have been carried out, but only a few have considered ship emissions. However, it was reported that black carbon from ship emissions affected the climate, environment, as well as human health, particularly in the Arctic region and coastal areas. Therefore, the aim of this paper is to do a review on BC emissions from the ship. In achieving the objective of this study, several papers including articles, reports, and scientific assessments on black carbon emissions from the ship were reviewed and synthesized.

As results, it was reported in the literature that shipping contributed about 2% of global anthropogenic BC emissions and 9% of total BC from diesel emissions, and the annual global BC from ship emissions was reported to 131 Gg. In the case of the remote regions, particularly the Arctic, the annual global BC from the ship was estimated to 1.2 Gg.

Black carbon pollutes the environment by contributing to the PM_{2.5} composition, as well as the climate change by either warming or cooling effects. It also has a great effect on cardiopulmonary diseases and premature deaths.

Index Terms- Black carbon, Climate Change, Pollution, ship emissions.

I. INTRODUCTION

Black carbon is an aerosol mostly formed during the process of an incomplete combustion of biomass, biofuels, and fossil fuels. It is the highest ranked light-absorbing compound of particulate matter (PM) and has a warming effect by absorbing heat from the atmosphere and reducing the albedo when deposited on ice or snow (The Intergovernmental Panel on Climate Change, IPCC). Black carbon was defined as a distinct type of carbonaceous material, formed primarily in flames, then directly emitted to the atmosphere, and has a unique combination of physical properties (Bond et al. 2013). Hence, two properties related to light absorption and heat resistance were reported to be particularly useful for measurement purposes: (1) BC strongly absorbs visible light with a mass absorption coefficient (MAC)

value above $5 \text{ m}^2 \text{ g}^{-1}$ at $\lambda = 550$ nanometers (nm) wavelength for freshly produced particles, (2) BC is refractory, with a volatilization temperature near 4000 K (Bond et al. 2013).

Relatively, these distinct properties give to black carbon its relevance in various research fields such as climate change, air chemistry, ambient air quality, biogeochemistry, and paleoclimatology (Bond et al. 2013).

The evidence is that many studies concerning black carbon emissions and its impact on climate, environment and human health had been undertaken, but only a few had taken ship emissions into consideration. Within those few, both Lack et al., 2008 and ICCT-2015 reported that ship contributed about 2% to the total anthropogenic BC emissions, and 9% of the total diesel BC emissions.

Black carbon from ship emissions was reported to have adverse impacts on climate, human health, ecosystems, and visibility, particularly in the Arctic region and coastal areas. Thus, it was reported in EPA 2012-Report to Congress of black carbon that BC influenced climate through multiple mechanisms. Within those mechanisms, EPA 2012 noted that: (1) BC absorbed radiations of all wavelengths, which contributed to warming of the atmosphere and dimming at the surface, (2) BC darkened the surface and decreased reflectivity, once deposited on snow and ice, and (3) BC altered the distribution of clouds and their properties. These latest are most likely greater in the Arctic region and other snow-ice covered regions because atmospheric BC layers absorb radiation both from incident sunlight and reflected rays from the surface (Corbett et al., 2010). Black carbon emissions from the international ship are significant, and contribute to global and regional climate change, particularly in the Arctic (IMO-2012).

In the case of human health, as a part of PM_{2.5}, BC has been consistently linked to cases of pulmonary and respiratory diseases and implicated as a contributor to premature deaths from these illnesses (Corbett et al., 2007 and Liu et al., 2016). However, we can mention that black carbon effects on human health were not clearly detailed in the literature due to the lack of studies in that field.

From all these reasons cited above, black carbon from ship emissions is of concern in this review. Therefore, we focus on BC measurement and estimation methods, EF_{BCs} and its influential parameters, BC global emissions, and BC impacts on climate, environment and human health.

II. MEASUREMENT AND ESTIMATION METHODS.

There are multiple techniques and methods for black carbon measurement.

Shina et al., (2003) have measured black carbon concentration with an optical transmission technique. That method compared the attenuation of white light through a loaded filter relative to that of a blank filter. The relationship between optical attenuation (ATN) and the BC concentration ($\mu\text{g cm}^{-2}$) was given by $\text{ATN} = \sigma \text{BC}$, where $\text{ATN} = 100 \times \ln(I_0/I)$, σ was the mass absorption cross-section for BC deposited on quartz filter ($\text{m}^2 \text{g}^{-1}$), and I_0 and I were the transmitted light intensities through the blank and loaded filters, respectively.

Lack et al., (2012) reported that BC emissions factors measured by photo-acoustic, filter-based absorption (PSAP and MAAP), and laser-induced incandescence were consistent on an absolute level. BC also showed good correlation with thermal-optical reflectance-measured for EC; however, the TOA method showed inconsistent results to both BC_{FSN} and $\text{BC}_{\text{Filter}}$ (Lack et al., 2012). Table 1 summarizes different BC measurement techniques with their prevalence of use.

Table 1: Description of BC measurement techniques

Method type	Method Description	Prevalence of Use
Light absorption/optical	Filter-based: Light absorption by particles measured through a filter loaded with particles; BC quantified using factors that relate light absorption to a mass concentration.	High
	Photoacoustic: Light absorption by particles measured by heated particles transferring energy to the surrounding air and generating sound waves; BC is quantified using factors that relate light absorption to a mass concentration.	Low
	Incandescence:	Low

III. EMISSION FACTORS AND ITS INFLUENTIAL PARAMETERS

As previously shown, there are different types of measurement techniques used during black carbon measurement, and that comes with consequences on the related data. In addition, EF_{BC} from the ship (in g per Kg fuel) depends on the broader metric of light absorbing carbon (LAC), or light-absorbing elemental carbon (EC) considered. However, both LAC and EC were encountered in literature as black carbon emissions factors depending on the measurement methods. For example, the photoacoustic measurement can estimate optical properties of LAC, but it is still limited in characterizing the mass of LAC.

	Incandescent (glowing) particles mass is measured; BC quantified by calibrating the incandescent signal to laboratory-generated soot.	
Isolation of specific carbon fraction	Thermal-optical: measured as carbon fraction that resists removal through heating to high temperature and has a laser correction for carbon that chars during the analysis procedure; BC quantified as the amount of carbon mass evolved during heating.	High
	Thermal: BC measured as the carbon fraction that resists removal through heating to high temperatures; BC quantified as the amount of carbon mass evolved during heating.	Low

Source: EPA 2012- Report to Congress on Black Carbon, page 116.

In the case of BC estimation, it was shown in EEA. (2009) that calculation of black carbon emissions from all sources, except on-road transport, can be expressed by:

$$\text{BC emissions} = \text{fuel (kg)} \times \text{PM emission factor (g/kg)} \times (\text{BC/PM}) \text{ ratio.}$$

However, in IMO. (2012)-global emissions of marine black carbon-BLG\17\INF-2.doc; it was remarked that most of the studies used the single EF_{BC} approach to estimate BC emissions. Evidently, the single EF_{BC} approach did not consider some important parameters in BC estimation such as the physical and operational characteristics of ships. Therefore, they constructed a refined activity-based methodology to model global and regional BC emissions from the international ship, which included fuel consumption for each ship type, engine type, fuel type, and sensitivity of EF_{BC} to each of these parameters.

However, the same estimation approach was used by IMO. (2012) to estimate the total BC emission in the Arctic for the year 2004, but IMO. (2012) found twice the average value recorded by the other authors. The higher BC emissions value found by the IMO-2012 was likely due to the higher EF_{BC} (0.56) used in that estimation.

While, EC mass is measured using thermo-optical methods, and that strips away OC in the measurement process.

The discrepancy of BC emissions factors viewed on the measurement angle was highlighted by (Petzold et al. 2010), where both elemental carbon (EC) and black carbon (BC) emissions factors were represented depending on the engine load. Wherein, for an engine loaded about 85-110%, EC and BC emissions factors were $0.179 \pm 0.018 \text{ g kg}^{-1}$ and 0.062 ± 0.007 respectively.

Table 2 outlines different EF_{BC} from a ship found in the literature.

Table 2: EF_{BC} from a ship found in the literature depending on some non-exhaustive influential parameters.

Year	Literature	Influential parameters (not exhaustive)	EF_{BC} (g Kg ⁻¹)
2003	Sinha et al.	Tanker and container, diesel engine, diesel oil, gross tonnage.	0.18 ± 0.02
2004	Bond et al.	Diesel engine, heavy fuel oil.	0.34
2008	Petzold et al.	Container, diesel engine, heavy fuel oil, 85% - 110% loaded.	0.174 ± 0.04 *
2008	Lack et al.	Tanker, container, cargo and bulk ships, diesel, slow speed diesel (SSD).	0.41 ± 0.27
		Tug and large fishing boats, diesel, medium speed diesel (MSD).	0.97 ± 0.66
2010	Corbett et al.	Passenger vessels (e.g. ferries, pilot boats), diesel, high-speed diesel (HSD).	0.36 ± 0.23
		All ship type, diesel engine, diesel oil.	0.35
2010	Petzold et al.	Four-stroke, diesel engine, heavy fuel oil, 85% - 110% loaded.	0.179 ± 0.31 *
		Four-stroke, diesel engine, heavy fuel oil, 85% - 110% loaded.	0.06 ± 0.04
		Four-stroke, diesel engine, heavy fuel oil, 85% - 110% loaded.	0.367
2012	IMO	Tanker, container, cargo carriers, bulk carriers, tugboats, and passenger boat, diesel engine, MDO and HFO fuel oil.	0.56
2015	ICCT	Container vessel, diesel engine, DPFs and HFO fuel oil.	0.31 ± 0.31

*means BC emission factor is considered in terms of element carbon (EC)

As we remarked above, the discrepancy of black carbon emissions factors found in the literature was not only due to the higher uncertainty but also due to the different methods used in its measurement.

The results portrayed by Petzold et al., (2008*, 2010*) and Sinha et al., (2003) agreed. However, the figures were low when compared to the other authors, and that makes us conclude that there had been under-estimation since only EC had been used as a factor for BC estimation. (Petzold et al., 2013).

Petzold et al., (2013) reported that the correlation of EC mass estimated from the thermo-optical approach to BC mass

estimated from photoacoustic measurements has been shown to be good for sources, where EC dominates total PM, such as diesel engines. As it was shown, most of the ships have a diesel engine, the EC mass estimated from the thermal-optical approach can be used to extrapolate the BC mass until the scientists find a new and unique BC measurement technique.

Black carbon emission is generally related to the combustion process as well as other factors that are called influential parameters (or factors). Thus, the fuel type, the engine type, age, load, the emission abatement technology, the maneuvering time, and the speed of the engine were shown to play a significant role in black carbon emissions (Lack et al. 2012). To link BC emission factors to the engine speed, Lack et al., (2008) came up with mass-based emission factors of light absorbing carbon (EF_{LAC}) of 0.41, 0.97, and 0.36 for slow (SSD), medium (MSD), and high-speed diesel (HSD) powered vessels respectively.

Furthermore, the role of ship and fuel type on BC emission factors was highlighted by IMO. (2012)-global emissions of marine black carbon-BLG\17\INF-2.doc. The table 3 summarizes BC emission factors based on ship and fuel type found out by IMO-2012.

Table 3: Emission factors estimated in IMO. (2012).

	Centrale Estimate		High Estimate (95% CI)				Low Estimate (95% CI)					
			At Sea		In Port		At Sea		In port			
	HFO	MDO	HFO	MDO	HFO	MDO	HFO	MDO	HFO	MDO		
Tanker	0.38	0.228	0.95	0.57	0.44	0.31	2.18	1.53	0.32	0.16	0.49	0.24
Container	0.8	0.48	2	1.2	0.96	0.67	4.82	3.37	0.64	0.32	0.95	0.48
Cargo	0.4	0.24	1	0.6	0.56	0.39	2.82	1.97	0.24	0.12	0.35	0.18
Carriers												
Bulk	0.38	0.228	0.95	0.57	0.53	0.37	2.64	1.85	0.23	0.12	0.35	0.17
Carriers												
Tugboats		0.97		2.425		1.08		5.38		0.86		1.3
Passenger	0.36	0.216	0.9	0.54	0.46	0.32	2.31	1.62	0.26	0.13	0.39	0.19
Boat												

Source: IMO. (2012)-global emissions of marine black carbon-BLG\17\INF-2.doc.

The average value of emission factor based on ship and fuel types in this chart shows a higher black carbon emission factor for each ship type with HFO than with MDO. The second conclusion is that black carbon emission factor for each ship type using either HFO or MDO is higher in Port than in Sea. That is due to the fact that ship at offshore operates at a lower speed. To highlight the other influential parameters, it was reported by ICCT-2015 that available technologies and operational practices, such as fuel switching, scrubbers, and vessel speed reduction, could reduce shipping emissions by up to 70 percent.

IV. GLOBAL EMISSIONS

The global emissions of black carbon using bottom-up inventory method were reported by Bond et al., (2013) to be 7500 Gg yr⁻¹ in the year 2000. Out of that global BC emissions value, Bond et

al., (2013) reported that marine ship contributed about 2% with a large fraction of remote regions such as the Arctic.

The likely annual global black carbon emissions from the ship were reported to be around 131 Gg (Lack et al., 2008, Bond et al., 2004 & 2007, Eyring et al., 2009). Whereby, that average value represented about 2% of the global anthropogenic black carbon emissions and 9% of the global diesel black carbon emissions (Lack et al., 2008 and ICCT-2015).

In addition to this global value of black carbon emissions from the ship, some regional black carbon values such as the Arctic region and the Southern Atlantic Ocean have been recorded. Thus, for the year 2004, the annual global black carbon emissions from the ship in the Arctic region was reported to be around 1.2 Gg (AMAP-2011, AMSA-2009, and Corbett et al 2010). However, for the same year, the IMO. (2012)-global emissions of marine black carbon-BLG\17\INF-2.doc estimated average BC emissions of 2.3 Gg from international ship operating in the Arctic, based on an average EFBC of 0.56 g kg⁻¹ fuel.

On the other hand, Shina et al., (2003) reported that the global black carbon emissions from ocean-going ships in the Southern Atlantic Ocean for the year 2000 ranged from 19-26 Gg yr⁻¹. The table 4 below gives the summary of black carbon emissions found in the literature.

Table 4: Annual black carbon from ship emissions found in the literature.

Year of study	Study area	Literature	Total emissions (Gg y ⁻¹)
2003	Southern Atlantic Ocean	Sinha et al.	19-26 ^a
2004 & 2007	Global scale	Bond et al.	132
2005	Global scale	Eyring et al.	33
2008	Global scale	Lack et al.	133 (± 27)
2009	Global scale	Eyring et al.	130
2009	Arctic	AMSA	1.18 ^b
2010	Arctic	Corbett et al.	1.23 ^b
2011	Arctic	AMAP	1.2 ^b
2012	Arctic	IMO	2.3 ^b

^a total yearly BC from ocean-going ship emissions in the Southern Atlantic Ocean off the coast of Namibia in 2000.

^b total yearly BC from shipping emissions in Arctic region for the year 2004.

The yearly global black carbon emissions recorded by Lack et al., (2008), Bond et al., (2004 & 2007), and Eyring et al., (2009) were in close agreement, and were higher than the value recorded by Eyring et al., (2005). The lower BC global emissions recorded by Eyring et al., (2005) was likely due to the Lower emission factor used to estimate that global BC emissions.

In the case of the yearly regional black carbon emissions outlined in the chart above, the Southern Atlantic Ocean BC emissions from the ship (Sinha et al., 2003) was higher than that recorded in the Arctic region. Probably, these lower BC values from ship emissions found in the Arctic region for the year 2004 were due to the difference in location between the emissions site and the recording site. However, it is important to note that between four studies undertaken for the year 2004 in the Arctic region, three

(AMSA-2009, Corbett et al., 2010, and AMAP-2011) were in agreement, with around 1.2 Gg y⁻¹ BC. That makes us conclude that the annual BC emissions from the ship in the Arctic for the year 2004 were very likely about 1.2 Gg. Elsewhere, IMO-2012 found twice the average value of the previous studies. That was probably linked to the uncertainty encountered in black carbon measurement, the discrepancy in BC emissions factors, the higher EF_{BC} used (0.56 g kg⁻¹), and the different technique used during BC measurement and estimation.

In the case of the seasonal BC emissions in the Arctic region, Corbett et al., (2010) reported that BC emissions of in-Arctic ship traffic for the year 2004 were 0.18, 0.19, 0.28, and 0.23 Gg y⁻¹ for winter, spring, summer, and fall (Autumn) respectively. BC emissions in summer were the highest followed by the fall. That was due to the higher number of trips in summer (4807) followed by fall (3729), spring (3390) and winter (3072). In addition to the year 2004 BC emissions inventory in the Arctic region, Corbett et al., (2010) did some projections based on “Business As Usually (BAU)” and the high-growth scenarios for the years 2020, 2030, and 2050. Table 5 resumes those projection figures.

Table 5: Potentials emissions inventories of in-Arctic shipping and diverted the global ship to Arctic routes for 2020, 2030, and 2050.

Year	Inventories/diversions	In-Arctic emissions projections (gg y ⁻¹)	BC global shipping to arctic routes BC emissions projections (gg y-1)
2020	BAU ¹	1.2	0.70
2030	BAU	1.5	0.90
2050	BAU	2.7	2.4
2020	High-growth ²	1.5	0.91
2030	High-growth	2	2.5
2050	High-growth	4.7	12

Source: Corbett et al., (2010)-Arctic shipping emissions inventories and future scenarios

¹ BAU diversions in 2020, 2030, and 2050 are 1%, 1%, and 1.8% of global shipping in each of those future years, respectively. Global shipping growth outside of Arctic is ~2.1% per year.

² High-growth diversions in 2020, 2030, and 2050 are 1%, 2%, and 5% of global shipping in each of those future years, respectively. Global shipping growth outside of Arctic is ~3.3% per year.

Corbett et al., (2010) reported that in 2004, Arctic transport vessels contributed less than 1% of ship BC emissions, and in 2050, ships in the Arctic may contribute less than 2.5% of global ship BC emissions. However, this is not without consequences on the Arctic region as shown previously. The Arctic region is sensitive to BC emissions in terms of radiative forcing, snow, and ice melting even though the emissions level is still low.

V. IMPACTS OF BLACK CARBON ON ENVIRONMENT, CLIMATE, AND HUMAN HEALTH

The obvious impact of black carbon on the environment is visibility (smog). However, it may contribute to some photochemical reactions with the co-emitted aerosols generating some secondary pollutants. Black carbon may also affect the environment via its significant proportion in $PM_{2.5}$ from ship emissions. Different proportions of black carbon such as 15%, 6.6%, 4%, and 2.7% in $PM_{2.5}$ were argued in the previous studies by Corbett et al., (2010), Liu et al., (2016), Sinha et al., (2003), and Petzold et al., (2008) respectively. $PM_{2.5}$, including BC, had been linked to a reduction in crop yields and damage to materials and buildings (Evens et al., 2015).

With respect to climate, IMO-2012 reported that BC emissions from the international ship were significant, and contributed to global and regional climate change particularly in the Arctic. Somewhere, it was reported that within Arctic BC sources, the ship was cited to have a large impact on low-altitude BC concentrations and deposition, therefore, it seemed likely to have a large forcing per unit emissions. Furthermore, the previous global BC emissions from the ship of about 1.2 Gg y^{-1} recorded in the Arctic shows that the Arctic is still being impacted. In the case of future perspective, Corbett et al., (2010), suggested that the first-order calculation of global warming potential, due to 2030 emissions in the high-growth scenario of short-lived forcing of $\sim 4.5 \text{ Gg}$ of black carbon from Arctic ship might increase global warming potential by some 17% to 78%.

In the case of black carbon from ship radiative forcing, the debate is not clear since some argued for the negative RF while other argued for the positive one. For example, Liu et al., (2016) concluded in their study that the radiative forcing of BC from ship emissions in East Asia was strongly negative off the coast of China, Japan, and Korea ($< -0.3 \text{ W m}^{-2}$). On the other hand, in EEA Technical report, (2013), it was reported that BC from ship emissions had a positive RF of about $+0.002 \text{ W m}^{-2}$. Thus, to control effectiveness, it urges to harmonize the ideas about the trade-off of radiative forcing of BC from ship emissions.

Smith et al., (2009), made evidence of black carbon impacts on human health, that is, BC had a distinct health effect despite being only a small fraction of PM. In the study conducted by Corbett et al., (2007) to examine cardiopulmonary and lung cancer mortalities due to ship emissions, it was reported that PM emissions from ships were responsible for approximately 60,000 deaths annually with most deaths occurring near coastlines in Europe, East Asia, and South Asia. Liu et al., (2016) did a study on health and climate impacts of ocean-going vessels in East Asia and reported that ship emissions led to more than 24,000 premature deaths annually.

VI. IMPLICATIONS

In measuring BC, the challenge is that air pollution inventories are focusing on mass emissions (EC), while BC is characterized by its optical properties (LAC) (Wang et al., 2016). Thus, a measurement that forms the basis of underlying emissions and speciation factors does not provide a complete accounting for these optical properties. It is important then for scientists to come up with a measuring method that combines the photoacoustic and the thermal-optical methods, which give the optical properties of

LAC and EC mass respectively. Once EF_{BC} is measured in a good manner, it will likely solve most of the uncertainties encountered in BC global emissions estimation.

During our review, we concurred concerning the need for black carbon emissions reduction. To begin with, since possible future ship fuel quality regulations through the MARPOL Annex VI legislation on sulfur content do not necessarily reduce emissions of BC (Lack et al., 2009); we propose to undertake some limitations techniques through the best available technology (BAT) and the best environmental practices (BEP) approach during the ship conception and operation. This BAT/BEP approach should be applied not only for the engine conception but also for the ship emissions abatement technologies such as scrubbers and filters. Further, the Container vessels using HFO oil and the Tugboats using MDO oil were shown to have the highest EF_{BC} among the ship types, therefore, the International Maritime Organization (IMO) should regulate the operating time of these vessels, particularly in port, in order to reduce BC global emissions

VII. CONCLUSION

There was a large discrepancy concerning black carbon emissions factors as well as the global emissions. That non-uniformity was not only due to the various methods used in the measurement but also the higher level of uncertainty. Furthermore, the various definitions of black carbon played a role in its measurement methods resulting in different EF_{BC} . In addition, we mention that fuel factors and EF_{BC} are sources of uncertainty in BC inventory; and the latter is sensitive to ship operational conditions.

As a part of PM, and with a global average emission of 131 Gg y^{-1} , BC from the ship is affecting the climate, the environment, as well as human health, unfortunately.

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Pure Bending Analysis of Isotropic Thin Rectangular Plates Using Third-Order Energy Functional

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Abstract- Studies previously carried out on pure bending analysis of isotropic thin rectangular plate using total potential energy functional have mainly used second order (Ritz energy function) and fourth order (Galerkin and work error energy functional). The objective of this study is pure bending analysis of isotropic thin rectangular CCCC, CSCS, CSSS and SCCC plates. In this paper, third order energy functional is used for analysis. The Rayleigh Ritz energy method of direct variation approach for plate analysis is adopted. The third order energy functional method is derived from first principle by using equations and principles of theory of elasticity. Polynomial series is used to formulate the approximate shape functions for the plate with various boundary conditions. Direct variational calculus was applied on the third-order energy function to obtain the coefficient of deflection which was used to determine the stiffness component for the plates. The coefficients of deflection for CCCC, CSCS, CSSS and SCCC are obtained for various aspect ratios (ranging from 1.0 to 2.0 at the increment of 0.1). The various coefficient of deflection is used to obtain the deflection at the center of the plates. The central deflection of the various plate with aspect ratio (ranging from 1.0 to 2.0 at the increment of 0.1) from this studies were compared with the values of Szilard (2004) and Timoshenko and Krieger (1959). From the comparison, it was observed that the maximum percentage difference recorded for CCCC, CSCS and CSSS plates was 3.58, 4.91 and 1.79 respectively. While for SCCC there was no significant difference. These values of percentage differences are relatively small, which indicates that the method of this present study is considered adequate, satisfactory and reliable for analyzing pure bending isotropic thin rectangular plate.

Index Terms- Pure bending analysis, third order energy functional, thin plate, boundary conditions, theory of elasticity.

Paper Type- Research paper

Nomenclature:

- x The primary axis of the plate. That is the shorter of the two axes of the major plane of the plate.
- y The secondary axis of the plate. That is the longer of the two axes of the major plane of the plate.
- z The tertiary axis of the plate. That is the shortest of the three axes of the plate.
- a Length of the primary dimension of the plate.

- b Length of the secondary dimension of the plate.
- t Thickness of the plate or the length of the tertiary dimension of the plate.
- α It is the aspect ratio. That is $\alpha = b/a$
- S Simple support
- C Clamped or fixed support.
- CCCC Four edges of the plate are clamped.
- CSCS Two opposite edges of the plate are simple supported and the other opposite edges are clamped.
- CSSS Two opposite edges of the plate are both simple support and the other two edges of the plate are clamped and simple supported
- SCCC Two opposite edges of the plate are both clamped and the other two edges of the plate are simple supported and clamped
- u Displacement of the plate in x direction.
- v Displacement of the plate in y direction.
- w Transvers deflection
- σ Normal stress
- ϵ Normal strain
- E Modulus of elasticity
- V External work
- U Internal (strain) energy
- τ Shear stress of the plate
- γ Shear strain of the plate
- μ Poisson's ratio
- D Modulus of flexural rigidity of the plate
- A Coefficient of deflection
- h Shape (profile) function
- Π Total potential energy of the plate
- R Non dimension axis (quantity) parallel to x axis
 $R = x/a$
- Q Non dimension axis (quantity) parallel to y axis
 $Q = x/a$
- dR $dR = dx/a$
- dQ $dQ = dy/b$

I. INTRODUCTION

Plate is a solid that consist of two parallel surfaces separated by a small dimension (thickness). Generally, plate is subjected to load condition that can cause deflection transverse to the plate. Geometrically plate is bounded either by straight or curve lines. It can be used generally in architectural structures, bridges,

hydraulic structures, pavements, containers, airplanes, missiles, ships, instruments and machines parts.

Pure bending is a condition of stress where a bending moment is applied to a plate without the simultaneous presence of axial, stress, or torsional force. Rectangular plate has four edges and the edges are numbered as shown in Fig 1.0. Also the three rectangular plates considered in this research are shown in Figure 1.1.

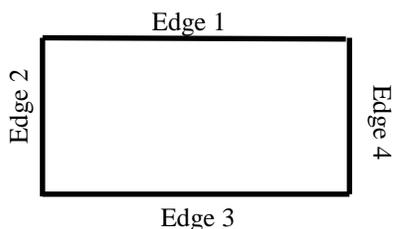


Figure 1.0. Sketch of rectangular plate with edge numbering

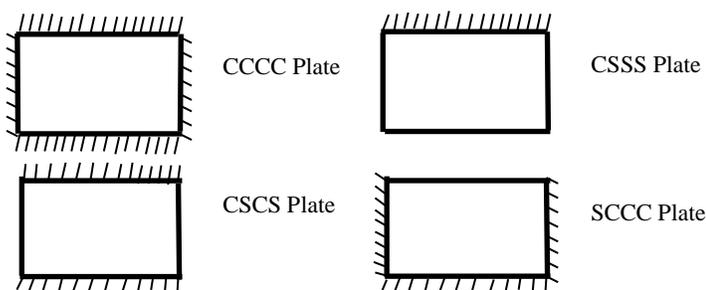


Figure 1.1. Plates of various boundary conditions.

The difficulty in obtaining exact solution to the classical plate governing differential equation by integration gave prelude to the use of energy approach to plate analysis. Typical of energy method is the use of assumed shape (displacement) functions. The closer the assumed shape is to the exact shape function, the more accurate the result. If the assumed shape function is far from the exact shape function, the resulting answer will differ from the exact answer by wide margin. Thus, earlier scholars made several efforts in coming up with different assumed shape functions that seem close to the exact shape function. This is usually confirmed by comparing the result emanating from the work with assumed shape function with the result obtained from numerical methods like finite element method. Some of the energy methods in use are Ritz energy method and Galerkin energy method (Ibearugblem, et al., 2013, Ezeh et al., 2014, Ozuluonye et al., 2014). Later, some scholars used work-error energy method (Eziefula et al., 2014, Onwuka et al., 2015, Ibearugblem, et al., 2015). Use of trigonometric function in the assumed shape functions dominated research in classical plate analysis prior to the year 2012 when Ibearugblem evolved polynomial shape function (Ibearugblem et al., 2012). Later, Ibearugblem et al. 2014 confirmed that the assumed polynomial shape function is exact shape function by direct integration of the governing differential equation of the classical plate. In this present work, the polynomial shape function will be adopted.

The Ritz energy method is a direct variational method for finding an approximate solution for continuum problems. The Ritz energy method has a function with "second derivative" as the highest order of derivative. The Galerkin energy method is a broad generalization of the Ritz method and is used primarily for the approximation solution of variational and boundary value problems, including problems that do not reduce to variational problems. In Galerkin energy method, the highest order of derivative is four. This is the same with work-error method. The difference between work-error method and Galerkin method is that while the latter cannot be subject to variation, the work-error method is subject to variation. The Ritz energy functional is shown on equation 1.

$$\Pi = \frac{D}{2} \int_0^a \int_0^b \left[\left(\frac{\partial^2 w}{\partial x^2} \right)^2 + 2 \left(\frac{\partial^2 w}{\partial x \partial y} \right)^2 + \left(\frac{\partial^2 w}{\partial y^2} \right)^2 \right] dx dy - q \int_0^a \int_0^b w dx dy \quad (1)$$

Energy functional for Galerkin and work-error are shown on equations (2) and (3) respectively.

$$\Pi = \int_0^a \int_0^b \left(\frac{\partial^4 w}{\partial x^4} \cdot w + 2 \frac{\partial^4 w}{\partial x^2 \partial y^2} \cdot w + \frac{\partial^4 w}{\partial y^4} \cdot w \right) dx dy - \frac{q}{D} \int_0^a \int_0^b w dx dy = 0 \quad (2)$$

$$\Pi = \frac{1}{2} \int_0^a \int_0^b \left(\frac{\partial^4 w}{\partial x^4} \cdot w + 2 \frac{\partial^4 w}{\partial x^2 \partial y^2} \cdot w + \frac{\partial^4 w}{\partial y^4} \cdot w \right) dx dy - \frac{q}{D} \int_0^a \int_0^b w dx dy \quad (3)$$

It is noteworthy that no previous research has used an energy functional with third derivative as the highest order of derivative in pure bending analysis of isotropic thin rectangular plates. In view of this, the research focused on using third order energy functional in pure bending analysis of isotropic CCCC, CSCS, CSSS and SCCC plates. This method aims to bridge the gap created by second and fourth order energy functional used for pure bending analysis of isotropic thin rectangular plates.

II. ANALYTICAL METHOD

FORMULATION OF THIRD-ORDER ENERGY FUNCTION

For a homogeneous rectangular thin isotropic plate, it is assumed that the thickness of the plate in the z-axis is relatively small compared with the other characteristic dimension in the x-axis and y-axis respectively. The theory of elasticity was used to formulate the third-order energy functional. The sequence of the formulation includes: kinematic, strains-deflection relationships, stress-strain (constitutive) relationship, stress-deflection relationship and total potential energy.

KINEMATICS

The displacement of a thin rectangular plate includes in-plane displacements u and v and out of plane displacement (deflection) w . The vertical normal strain of a plate is equal to zero. Consequently, upon this the vertical shear strains are negligible in classical plate analysis and assumed to be equal to zero. The six engineering strain components of a plate are defined in terms of displacements as:

$$\epsilon_x = \frac{\partial u}{\partial x} \quad (4)$$

$$\epsilon_y = \frac{\partial v}{\partial y} \quad (5)$$

$$\gamma_{xy} = \frac{\partial u}{\partial y} + \frac{\partial v}{\partial x} \quad (6)$$

$$\epsilon_z = \frac{\partial w}{\partial z} = 0 \quad (7)$$

$$\gamma_{xz} = \frac{\partial u}{\partial z} + \frac{\partial w}{\partial x} = 0 \quad (8)$$

$$\gamma_{yz} = \frac{\partial v}{\partial z} + \frac{\partial w}{\partial y} = 0 \quad (9)$$

STRAINS-DEFLECTION RELATIONSHIPS

The relationships that exist between the in-plane strain components (ϵ_x , ϵ_y , and γ_{xy}) and the out of plane displacement, w . Solving out equation (8) gave:

$$u = -z \frac{\partial w}{\partial x} \quad (10)$$

Similarly, solving out equation (9) gave:

$$v = -z \frac{\partial w}{\partial y} \quad (11)$$

Substituting equations (10) and (11) into equations (4) and (5) respectively gave:

$$\epsilon_x = -z \frac{\partial^2 w}{\partial x^2} \quad (12)$$

$$\epsilon_y = -z \frac{\partial^2 w}{\partial y^2} \quad (13)$$

Similarly, substituting equations (4) and (5) into equation (6) gave:

$$\gamma_{xy} = -2z \frac{\partial^2 w}{\partial x \partial y} \quad (14)$$

STRESS-STRAINS RELATIONSHIPS

From the classical plate assumptions, the effects of normal stress and vertical shear stresses (σ_z ; τ_{xz} ; τ_{yz}) on the gross response of the plate are negligible when compared with the effects from the in-plane stresses (σ_x ; σ_y ; τ_{xy}). This leaves us with only three stress components: (σ_x ; σ_y ; τ_{xy}). The resulting constitutive equations include:

$$\sigma_x = \frac{E}{1-\mu^2} (\epsilon_x + \mu \epsilon_y) \quad (15)$$

$$\sigma_y = \frac{E}{1-\mu^2} (\mu \epsilon_x + \epsilon_y) \quad (16)$$

$$\tau_{xy} = \frac{E(1-\mu)}{2(1-\mu^2)} \gamma_{xy} \quad (17)$$

STRESS-DEFLECTION RELATIONSHIPS

This is done to obtain the relationships, which exist between the in-plane stresses and the out of plane displacement. Substituting equations (12) and (13) into equation (15) gave:

$$\sigma_x = \frac{-Ez}{1-\mu^2} \left(\frac{\partial^2 w}{\partial x^2} + \mu \frac{\partial^2 w}{\partial y^2} \right) \quad (18)$$

Similarly, substituting equations (12) and (13) into equation (16) gave:

$$\sigma_y = \frac{-Ez}{1-\mu^2} \left(\mu \frac{\partial^2 w}{\partial x^2} + \frac{\partial^2 w}{\partial y^2} \right) \quad (19)$$

Furthermore, substituting equation (14) into equation (17) gave:

$$\tau_{xy} = - \frac{Ez(1-\mu)}{(1-\mu^2)} \frac{\partial^2 w}{\partial x \partial y} \quad (20)$$

TOTAL POTENTIAL ENERGY

Strain energy is defined as average of indefinite summation of the product of stress and strain at every point in the plate within the plate domain. This is given mathematically as:

$$U = \frac{1}{2} \iiint_{xyz} \sigma \epsilon \, dx \, dy \, dz \quad (21)$$

That is

$$U = \frac{1}{2} \iint_{xy} \left[\int_{-h/2}^{h/2} \sigma \epsilon \, dz \right] dx \, dy \quad (22)$$

$$\text{Let } \bar{U} = \int_{-h/2}^{h/2} \sigma \epsilon \, dz \quad (23)$$

That means

$$U = \frac{1}{2} \iint_{xy} \bar{U} \, dx \, dy \quad (24)$$

$$\text{But } \sigma \epsilon = \sigma_x \epsilon_x + \sigma_y \epsilon_y + \tau_{xy} \gamma_{xy} \quad (25)$$

The external work due to lateral load uniformly distributed on the plate, q is given as:

$$V = -q \iint_{xy} w \, dx \, dy \quad (26)$$

Total potential energy is the summation of strain energy and external work given as:

$$\Pi = U + V \quad (27)$$

Multiplying equations (12) and (15) gave:

$$\sigma_x \epsilon_x = \frac{Ez^2}{1-\mu^2} \left(\left[\frac{\partial^2 w}{\partial x^2} \right]^2 + \mu \left[\frac{\partial^2 w}{\partial x \partial y} \right]^2 \right) \quad (28)$$

Similarly, multiplying equations (13) and (16) gave:

$$\sigma_y \epsilon_y = \frac{Ez^2}{1-\mu^2} \left(\left[\frac{\partial^2 w}{\partial y^2} \right]^2 + \mu \left[\frac{\partial^2 w}{\partial x \partial y} \right]^2 \right) \quad (29)$$

And multiplying equations (14) and (17) gave:

$$\tau_{xy} \gamma_{xy} = 2 \frac{Ez^2(1-\mu)}{(1-\mu^2)} \left[\frac{\partial^2 w}{\partial x \partial y} \right]^2 \quad (30)$$

Now, let us add equations (28), (29) and (30). Substituting this addition into equation (23) gave:

$$\bar{U} = D \left(\left[\frac{\partial^2 w}{\partial x^2} \right]^2 + 2 \left[\frac{\partial^2 w}{\partial x \partial y} \right]^2 + \left[\frac{\partial^2 w}{\partial y^2} \right]^2 \right) \quad (31)$$

Substituting equation (31) into equation (24) gave the strain energy equation as:

$$U = \frac{D}{2} \iint_{xy} \left(\left[\frac{\partial^2 w}{\partial x^2} \right]^2 + 2 \left[\frac{\partial^2 w}{\partial x \partial y} \right]^2 + \left[\frac{\partial^2 w}{\partial y^2} \right]^2 \right) dx dy \quad (32)$$

Mathematically, this equation can be rewritten as:

$$U = \frac{D}{2} \int_0^a \int_0^b \left(\frac{\partial^3 w}{\partial x^3} \cdot \frac{\partial w}{\partial x} + 2 \frac{\partial^3 w}{\partial x \partial y^2} \cdot \frac{\partial w}{\partial x} + \frac{\partial^3 w}{\partial y^3} \cdot \frac{\partial w}{\partial y} \right) dx dy \quad (33a)$$

or:

$$U = \frac{D}{2} \int_0^a \int_0^b \left(\frac{\partial^3 w}{\partial x^3} \cdot \frac{\partial w}{\partial x} + 2 \frac{\partial^3 w}{\partial x^2 \partial y} \cdot \frac{\partial w}{\partial y} + \frac{\partial^3 w}{\partial y^3} \cdot \frac{\partial w}{\partial y} \right) dx dy \quad (33b)$$

Substituting equations (26) and (33) into equation (27) we obtain the third-order energy functional for plate in pure bending as:

$$\Pi = -\frac{D}{2} \int_0^a \int_0^b \left(\frac{\partial^3 w}{\partial x^3} \cdot \frac{\partial w}{\partial x} + 2 \frac{\partial^3 w}{\partial x \partial y^2} \cdot \frac{\partial w}{\partial x} + \frac{\partial^3 w}{\partial y^3} \cdot \frac{\partial w}{\partial y} \right) dx dy - q \int_0^a \int_0^b w dx dy \quad (34a)$$

or:

$$\Pi = -\frac{D}{2} \int_0^a \int_0^b \left(\frac{\partial^3 w}{\partial x^3} \cdot \frac{\partial w}{\partial x} + 2 \frac{\partial^3 w}{\partial x^2 \partial y} \cdot \frac{\partial w}{\partial y} + \frac{\partial^3 w}{\partial y^3} \cdot \frac{\partial w}{\partial y} \right) dx dy - q \int_0^a \int_0^b w dx dy \quad (34b)$$

Let deflection (out of plane displacement) be defined as:

$$w = Ah \quad (35)$$

Substituting equation (35) into equation (34) gave:

$$\Pi = -\frac{A^2 D}{2} \int_0^a \int_0^b \left(\frac{\partial^3 h}{\partial x^3} \cdot \frac{\partial h}{\partial x} + 2 \frac{\partial^3 h}{\partial x \partial y^2} \cdot \frac{\partial h}{\partial x} + \frac{\partial^3 h}{\partial y^3} \cdot \frac{\partial h}{\partial y} \right) dx dy - qA \int_0^a \int_0^b h dx dy \quad (36a)$$

or:

$$\Pi = -\frac{A^2 D}{2} \int_0^a \int_0^b \left(\frac{\partial^3 h}{\partial x^3} \cdot \frac{\partial h}{\partial x} + 2 \frac{\partial^3 h}{\partial x^2 \partial y} \cdot \frac{\partial h}{\partial y} + \frac{\partial^3 h}{\partial y^3} \cdot \frac{\partial h}{\partial y} \right) dx dy - qA \int_0^a \int_0^b h dx dy \quad (36a)$$

DIRECT VARIATION OF TOTAL POTENTIAL ENERGY

Differentiating equation (36) with respect to deflection coefficient, A gave:

$$\frac{d\Pi}{dA} = -AD \int_0^a \int_0^b \left(\frac{\partial^3 h}{\partial x^3} \cdot \frac{\partial h}{\partial x} + 2 \frac{\partial^3 h}{\partial x \partial y^2} \cdot \frac{\partial h}{\partial x} + \frac{\partial^3 h}{\partial y^3} \cdot \frac{\partial h}{\partial y} \right) dx dy - q \int_0^a \int_0^b h dx dy = 0 \quad (37a)$$

or:

$$\frac{d\Pi}{dA} = -AD \int_0^a \int_0^b \left(\frac{\partial^3 h}{\partial x^3} \cdot \frac{\partial h}{\partial x} + 2 \frac{\partial^3 h}{\partial x^2 \partial y} \cdot \frac{\partial h}{\partial y} + \frac{\partial^3 h}{\partial y^3} \cdot \frac{\partial h}{\partial y} \right) dx dy - q \int_0^a \int_0^b h dx dy = 0 \quad (37b)$$

Rearranging equation (37) by making A the subject of the equation gave:

$$A = \frac{-q \int_0^a \int_0^b h dx dy}{D \int_0^a \int_0^b \left(\frac{\partial^3 h}{\partial x^3} \cdot \frac{\partial h}{\partial x} + 2 \frac{\partial^3 h}{\partial x \partial y^2} \cdot \frac{\partial h}{\partial x} + \frac{\partial^3 h}{\partial y^3} \cdot \frac{\partial h}{\partial y} \right) dx dy} \quad (38a)$$

or:

$$A = \frac{-q \int_0^a \int_0^b h dx dy}{D \int_0^a \int_0^b \left(\frac{\partial^3 h}{\partial x^3} \cdot \frac{\partial h}{\partial x} + 2 \frac{\partial^3 h}{\partial x^2 \partial y} \cdot \frac{\partial h}{\partial y} + \frac{\partial^3 h}{\partial y^3} \cdot \frac{\partial h}{\partial y} \right) dx dy} \quad (38b)$$

Now let us define the principal in-plane coordinates (x and y) in terms of non-dimension in-plane coordinates (R and Q) as:

$$x = aR \quad (39)$$

$$y = bQ \quad (40)$$

$$\alpha = \frac{b}{a} \quad (41)$$

Substituting equations (39), (40) and (41) into equation (38) gave:

$$A = \frac{-qa^4 \int_0^1 \int_0^1 h \, dRdQ}{D \int_0^1 \int_0^1 \left(\frac{\partial^3 h}{\partial R^3} \cdot \frac{\partial h}{\partial R} + \frac{2}{\alpha^2} \frac{\partial^3 h}{\partial R \partial Q^2} \cdot \frac{\partial h}{\partial R} + \frac{1}{\alpha^4} \frac{\partial^3 h}{\partial Q^3} \cdot \frac{\partial h}{\partial Q} \right) dRdQ} \quad (42a)$$

or:

$$A = \frac{-qa^4 \int_0^1 \int_0^1 h \, dRdQ}{D \int_0^1 \int_0^1 \left(\frac{\partial^3 h}{\partial R^3} \cdot \frac{\partial h}{\partial R} + \frac{2}{\alpha^2} \frac{\partial^3 h}{\partial R^2 \partial Q} \cdot \frac{\partial h}{\partial Q} + \frac{1}{\alpha^4} \frac{\partial^3 h}{\partial Q^3} \cdot \frac{\partial h}{\partial Q} \right) dRdQ} \quad (42b)$$

Equation (42) can be written in designated form as:

$$A = \frac{qa^4}{D} \left(\frac{-k_4}{k_1 + \frac{2}{\alpha^2} k_2 + \frac{1}{\alpha^4} k_3} \right) \quad (43)$$

Where k_1, k_2, k_3 and k_4 are defined as follows:

$$k_1 = \int_0^1 \int_0^1 \frac{\partial^3 h}{\partial R^3} \cdot \frac{\partial h}{\partial R} \, dRdQ \quad (44)$$

$$k_2 = \int_0^1 \int_0^1 \frac{\partial^3 h}{\partial R \partial Q^2} \cdot \frac{\partial h}{\partial R} \, dRdQ \quad (45a)$$

or:

$$k_2 = \int_0^1 \int_0^1 \frac{\partial^3 h}{\partial R^2 \partial Q} \cdot \frac{\partial h}{\partial Q} \, dRdQ \quad (45a)$$

$$k_3 = \int_0^1 \int_0^1 \frac{\partial^3 h}{\partial Q^3} \cdot \frac{\partial h}{\partial Q} \, dRdQ \quad (46)$$

$$k_4 = \int_0^1 \int_0^1 h \, dRdQ \quad (47)$$

Where the k parameters are the stiffness components of the rectangular plate.

NUMERICAL EXAMPLE

Analyze a classical isotropic thin rectangular plate using **third-order-energy functional** with:

- i. CCCC Plate with $w = A(R^2 - 2R^3 + R^4)(Q^2 - 2Q^3 + Q^4)$
- ii. CSCS Plate with $w = A(R - 2R^3 + R^4)(Q^2 - 2Q^3 + Q^4)$
- iii. CSSS Plate with $w = A(R - 2R^3 + R^4)(1.5Q^2 - 2.5Q^3 + Q^4)$
- iv. SCCC Plate with $w = A(R^2 - 2R^3 + R^4)(1.5Q^2 - 2.5Q^3 + Q^4)$

CCCC Plate:

$$k_1 = \int_0^1 \int_0^1 \frac{\partial^3 h}{\partial R^3} \cdot \frac{\partial h}{\partial R} \, dRdQ = \frac{-2}{1575} \quad (48)$$

$$k_2 = \int_0^1 \int_0^1 \frac{\partial^3 h}{\partial R \partial Q^2} \cdot \frac{\partial h}{\partial R} \, dRdQ = \frac{-4}{11025} \quad (49)$$

$$k_3 = \int_0^1 \int_0^1 \frac{\partial^3 h}{\partial Q^3} \cdot \frac{\partial h}{\partial Q} \, dRdQ = \frac{-2}{1575} \quad (50)$$

$$k_4 = \int_0^1 \int_0^1 h \, dRdQ = \frac{1}{900} \quad (51)$$

Substituting equations (48), (49), (50) and (51) into equation (43) gave:

$$A = \frac{qa^4}{D} \left(\frac{\frac{1}{900}}{\left[\frac{2}{1575} \right] + \frac{2}{\alpha^2} \left[\frac{4}{11025} \right] + \frac{1}{\alpha^4} \left[\frac{2}{1575} \right]} \right) \quad (52)$$

CSCS Plate:

$$k_1 = \int_0^1 \int_0^1 \frac{\partial^3 h}{\partial R^3} \cdot \frac{\partial h}{\partial R} \, dRdQ = \frac{-4}{525} \quad (53)$$

$$k_2 = \int_0^1 \int_0^1 \frac{\partial^3 h}{\partial R \partial Q^2} \cdot \frac{\partial h}{\partial R} \, dRdQ = \frac{-34}{3675} \quad (54)$$

$$k_3 = \int_0^1 \int_0^1 \frac{\partial^3 h}{\partial Q^3} \cdot \frac{\partial h}{\partial Q} \, dRdQ = \frac{-62}{1575} \quad (55)$$

$$k_4 = \int_0^1 \int_0^1 h \, dRdQ = \frac{1}{150} \quad (56)$$

Substituting equations (53), (54), (55) and (56) into equation (43) gave:

$$A = \frac{qa^4}{D} \left(\frac{\frac{1}{150}}{\left[\frac{4}{525} \right] + \frac{2}{\alpha^2} \left[\frac{34}{3675} \right] + \frac{1}{\alpha^4} \left[\frac{62}{1575} \right]} \right) \quad (57)$$

CSSS Plate:

$$k_1 = \int_0^1 \int_0^1 \frac{\partial^3 h}{\partial R^3} \cdot \frac{\partial h}{\partial R} \, dRdQ = \frac{-19}{525} \quad (58)$$

$$k_2 = \int_0^1 \int_0^1 \frac{\partial^3 h}{\partial R \partial Q^2} \cdot \frac{\partial h}{\partial R} \, dRdQ = \frac{-51}{1225} \quad (59)$$

$$k_3 = \int_0^1 \int_0^1 \frac{\partial^3 h}{\partial Q^3} \cdot \frac{\partial h}{\partial Q} \, dRdQ = \frac{-31}{350} \quad (60)$$

$$k_4 = \int_0^1 \int_0^1 h \, dRdQ = \frac{3}{200} \quad (61)$$

Substituting equations (58), (59), (60) and (61) into equation (43) gave:

$$A = \frac{qa^4}{D} \left(\frac{\frac{3}{200}}{\left[\frac{19}{525} \right] + \frac{2}{\alpha^2} \left[\frac{51}{1225} \right] + \frac{1}{\alpha^4} \left[\frac{31}{350} \right]} \right) \quad (62)$$

SCCC Plate:

$$k_1 = \int_0^1 \int_0^1 \frac{\partial^3 h}{\partial R^3} \cdot \frac{\partial h}{\partial R} dRdQ = \frac{-1}{350} \quad (63)$$

$$k_2 = \int_0^1 \int_0^1 \frac{\partial^3 h}{\partial R \partial Q^2} \cdot \frac{\partial h}{\partial R} dRdQ = \frac{-2}{1225} \quad (64)$$

$$k_3 = \int_0^1 \int_0^1 \frac{\partial^3 h}{\partial Q^3} \cdot \frac{\partial h}{\partial Q} dRdQ = \frac{-19}{3150} \quad (65)$$

$$k_4 = \int_0^1 \int_0^1 h dRdQ = \frac{3}{1200} \quad (66)$$

Substituting equations (58), (59), (60) and (61) into equation (43) gave:

$$A = \frac{qa^4}{D} \left(\frac{\frac{3}{1200}}{\left[\frac{1}{350} \right] + \frac{2}{\alpha^2} \left[\frac{2}{1225} \right] + \frac{1}{\alpha^4} \left[\frac{19}{3150} \right]} \right) \quad (67)$$

III. RESULT AND DISCUSSION

The values of the center deflection for CCCC and CSCS plates analyzed for different aspect ratio are presented on tables 3.1 and 3.2. These values of the center deflection for the various plates obtained in this work were compared with the values obtained by Szilard (2004) on table 3.1, Timoshenko and Krieger (1959) on tables 3.2 respectively. Their relationships with present studies is shown graphically on figure A.1, A.2, A.3 and A.4 respectively. From table 3.1, it is obvious that the values from this present work are upper bound to the values in the works of Szilard (2004) and very close to it. The maximum percentage difference encountered is 3.58%. By statistical standards, this difference is regarded not being significant. The reason for this difference may not be as a result of the energy functional used but as a result of different deflection functions used. While the present work used Ibearugbulem's polynomial deflection equation, Szilard used trigonometric deflection equation. From tables 3.2 and 3.3, the values of the central deflection for CSCS and CSSS plates obtained in this work were compared with the values obtained by Timoshenko and Krieger (1959). It is obvious that the values from the present work are upper bound to the values in the works of Timoshenko and Krieger (1959) and very close to it. The maximum percentage difference encountered is 4.91% for CSCS plate and 1.79% for CSSS plate. This means that at 95% and 98% confidence level, one can say that the values from this study is the same with the values from the works of Timoshenko and Krieger (1959). By statistical standards, this maximum difference of 4.91% and 1.79% are regarded not being significant. The reason for this difference may not be as a result of the energy functional used but as a result of different deflection functions used. While the present work used Ibearugbulem's polynomial deflection equation, Timoshenko and Krieger used trigonometric

deflection equation. The values of the central deflection for SCCC plate obtained in this work were compared with the values obtained by Ozuluonye (2014) on table 3.4.

From Table 3.4, it can be seen that the values from the present work is exactly equal to the values in the works of Ozuluonye (2014). The reason for this exactness is majorly because both the present study and the works of Ozuluonye (2014) used the same energy functional (Ibearugbulem polynomial deflection equation). This also goes a long way to justify the third-order energy functional as a veritable energy functional for rectangular plate analysis

Table 3.1: Center Deflection of CCCC plate.

Aspect ratio b/a	w _c present study	w _c Szilard (2004)	Absolute percentage difference
1.0	0.001329	0.001283	3.58
1.1	0.001586	0.001532	3.53
1.2	0.001819	0.001759	3.40
1.3	0.002025	0.001961	3.22
1.4	0.002203	0.002138	3.01
1.5	0.002355	0.002291	2.80
1.6	0.002484	0.002422	2.58
1.7	0.002594	0.002534	2.38
1.8	0.002688	0.002630	2.19
1.9	0.002768	0.002713	2.02
2.0	0.002863	0.002784	1.86

Table 3.2: Center Deflection of CSCS plate.

Aspect ratio b/a	w _c present study	w _c Timoshenko and Krieger (1959)	Absolute percentage difference
1.0	0.00199	0.00192	3.56
1.1	0.00261	0.00251	4.17
1.2	0.00330	0.00319	3.46

1.3	0.00402	0.00388	3.73
1.4	0.00477	0.00460	3.66
1.5	0.00551	0.00531	3.82
1.6	0.00624	0.00603	3.55
1.7	0.00695	0.00668	4.04
1.8	0.00762	0.00732	4.15
1.9	0.00826	0.00790	4.55
2.0	0.00885	0.00844	4.91

1.2	0.00202	0.00202	0
1.3	0.00218	0.00218	0
1.4	0.00231	0.00213	0
1.5	0.00243	0.00243	0
1.6	0.00252	0.00252	0
1.7	0.00260	0.00260	0
1.8	0.00267	0.00267	0
1.9	0.00273	0.00273	0
2.0	0.00278	0.00278	0

Table 3.3: Center Deflection of CSSS plate.

Aspect ratio b/a	w_c present study	w_c Timoshenko and Krieger (1959)	Absolute percentage difference
1.0	0.00282	0.00280	0.59
1.1	0.00354	0.00350	1.15
1.2	0.00429	0.00430	0.34
1.3	0.00503	0.00500	0.61
1.4	0.00576	0.00580	0.69
1.5	0.00646	0.00640	0.95
1.6	0.00713	0.00700	1.79
1.7	0.00775	0.00770	0.65
1.8	0.00833	0.00820	1.61
1.9	0.00887	0.00880	0.81
2.0	0.00937	0.00930	0.74

Table 3.4: Center Deflection of SCCC plate.

Aspect ratio b/a	w_c present study	w_c Ozuluonye (2014)	Absolute percentage difference
1.0	0.00161	0.00161	0
1.1	0.00183	0.00183	0

IV. CONCLUSION

Based on the result obtained, the following conclusions were drawn:

1. The third-order energy functional used in this study is mathematically the same with the energy functional of Galerkin and Ritz. The functional with highest order of derivative of three proved to produce the same response with the Galerkin's functional (fourth-order functional) and Ritz functional (second-order functional).
2. The values of deflections at the centers of the plate obtained herein are very close to the results obtained by previous research works that used different methods of analysis.
3. The stiffness components of this study is reliable and can be used in confidence for plate analysis. The final deflection formulas derived herein are very reliable and can be used in confidence by future analysis to analyze rectangular plates.

APPENDIX A

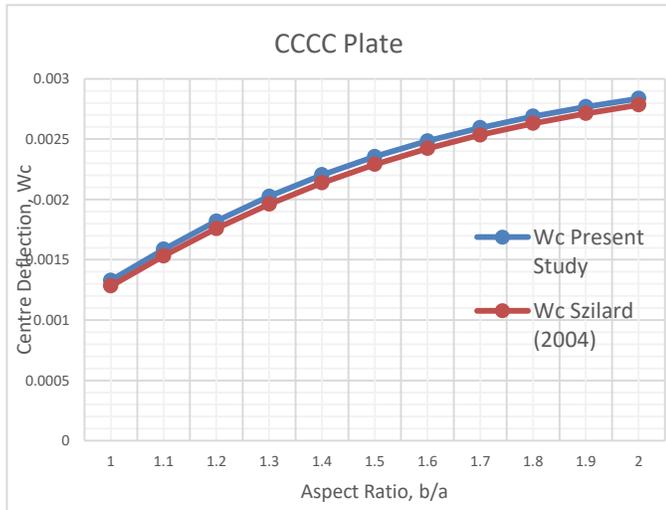


Figure A.1: Center deflection w_c against the aspect ratio for CCCC plate

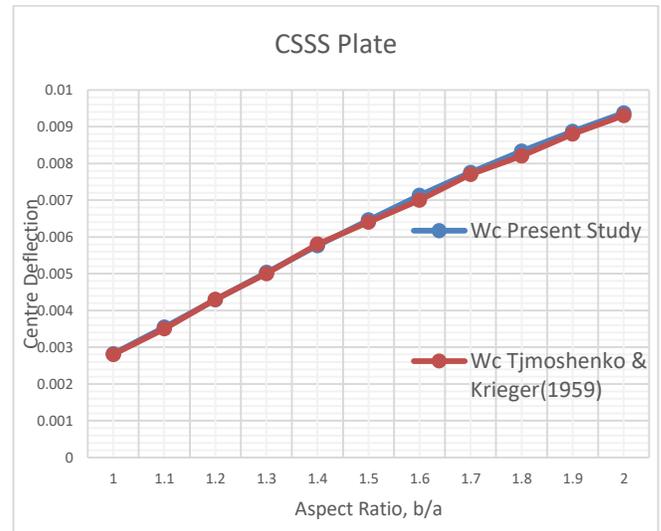


Figure A.3: Center deflection w_c against the aspect ratio for CSSS plate

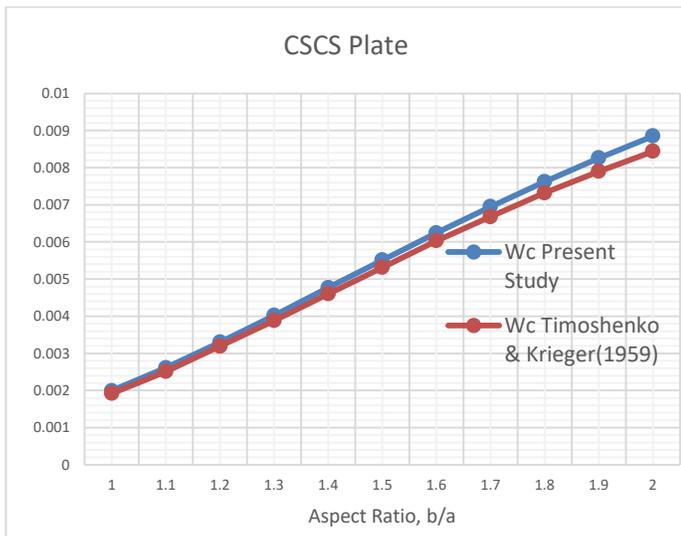


Figure A.2: Center deflection w_c against the aspect ratio for CSCS plate



Figure A.4: Center deflection w_c against the aspect ratio for SSSC plate

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The Influence of User Experience towards User Satisfaction of E-Government Service: a Case Study of GAMPIL Application

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Abstract- In 2016, the number of Internet users in Indonesia was 132.7 million users or about 51.5% of the total Indonesian population, and around 63.1 million internet usage came from smartphone users. Cities in Indonesia are experiencing many positive changes and Indonesia is implementing Smart City. Bandung is one of the Smart City. One of innovative application of Bandung Smart City is made an application to help business actors in Bandung city to facilitate in doing business licensing by using an application called GAMPIL. GAMPIL Application user has user experience and user satisfaction with the average value of moderate category in the continuum line of research. User experience towards user satisfaction of GAMPIL Application users have a positive and significant relationship with a value of 99,2% and the remaining 0,8% are influenced by other variables.

Index Terms- GAMPIL Application, Smart City, User Experience, User Satisfaction.

I. INTRODUCTION

The number of Internet users Indonesia in 2016 was 132.7 million users or about 51.5% of the total Indonesian population of 256.2 million. Most Internet users are on the island of Java with a total of 86,339,350 users or about 65% of the total use of the Internet. This encourages the Government of Bandung, as a city with higher growth requires a more qualified urban system with the utilization of media and technology. For that, in this digital era, the ability of supervision from the local government also needs to be upgraded. With the real city monitoring in order to solve the problem effectively and efficiently [1].

With the increasing number of Micro Small and Medium Enterprises (MSMEs) spread throughout Bandung City with various types of businesses [2]. The perpetrators of MSMEs is facilitated by the Government of Bandung in developing its business. Beginning with the launch of (GAMPIL) Gadgets Mobile Application License application) which is mobile application that allows the citizens of Bandung / MSMEs to get licensing business easily and quickly.

All efforts owned by the government to realize the reform of good service through the online system also is not always running well and without obstacles. In its implementation to the citizen, there are still challenges and obstacles that approach the *DPMPTSP (Dinas Penanaman Modal dan Perizinan*

Terpadu Satu Pintu) in carrying out the service by using the online system.

User experience is often interpreted as the achievement of a product or service that is considered successful or failed by its users. Can be interpreted, successful or failure of a product or service according to user experience reflects the satisfaction or not perceived by the customer. [3]

The phenomenon of user experience has been growing. According to Dobrota, Nikodijevic, and Mihailovic (2012), who conducted research on the Influence of The Customer Experience on Satisfaction with Mobile Phones, the results show that the market considers the needs of customers that make the user experience has a positive value that impact on customer satisfaction.

Another research on Understanding Customer Satisfaction and Loyalty: Empirical Study of Mobile Instant Messages in China was conducted by Deng, et al (2010), the results show that the Functionality, Trust, Emotional, and Service Quality perceived by users significantly influence customer satisfaction.

Then the Government of Bandung should be able to ensure that the services provided are in accordance with the expectations and desires of the citizens. In essence the Bandung City Government should seek and develop ways to maintain and satisfy the public.

Based on the description above the author will conduct research on the influence of user experience to user satisfaction toward GAMPIL Application users.

II. LITERATURE REVIEW

A. User Experience

The user experience is the experience of a product or service created for someone who uses it in the real world. When the product or service is developed, people pay much attention to the product or service [4].

B. Elements of User Experience

The user experience is widely depicted on all aspects of the interaction between users and products. The UX concept varies in terms of the scope, object, or element under consideration [5].

1. Functionality

Functionality as tools and features that enable users to complete task and achieve their goals [6].

2. Trust

Trust is a privacy protection that allows users to choose how their personal information is used. Furthermore, he states that

trust is the user's perception of the competence and knowledge of the provider of the expected behavior, namely integrity [7].

3. Emotional

The emotional value is the utility derived from the feelings or affective states that a product generates [8]. The play or fun gained by using the service for its own sake is related to emotional value [9].

4. Service Quality

Service Quality (ServQual) is the expected level of excellence and control over the level of excellence to meet user desires [10].

C. User Satisfaction

Satisfaction is expressed as the level of feeling in which how one feels good pleasure or disappointment that describes the results of comparisons of perceived and expected perceived product / service performance [11].

D. The relationship between variables X and Y

Building a user experience for a user satisfaction company should provide a user experience about the products / services offered. So, users can use and instantly feel the experience of a product / service. The user's perceived experience will be different, the similarity lies in the way it works that there is often a difference between successful and unsuccessful products / services (Garret, 2011). According to (Deng & et, 2010), Understanding Customer Satisfaction and Loyalty: An Empirical Study of Mobile Instant Messages in China suggests that user experience involvement with user satisfaction is based on how the user's perspective on functionality, trust, emotional and service quality which is prolonged.

Based on the exposure put forward by previous research, it can be concluded that user satisfaction or dissatisfaction can be felt if the user has felt or use (user experience) a product / service when someone has bought or used the product / service.

E. Research Framework

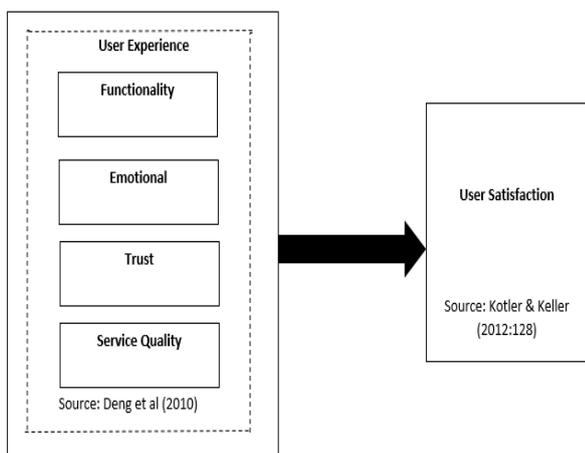


Fig.1. Research Framework

F. Research Hypotheses

H₀: User Experience do not significantly affect User Satisfaction of GAMPIL Application.

H₁: User Experience have significant affect User Satisfaction of GAMPIL Application.

III. RESEARCH METHODOLOGY

A. Research Characteristics

This research uses quantitative research approach. The type of research used in this research is descriptive and causal.

B. Measurement Scale

Scale used in this study is ordinal scale with the aim to provide information in the form of value on the answer. For each option the answer is scored, the respondent should describe, support the statement (positive) or not support the statement (negative).

C. Research Stage

Stages of research is a description of the process in conducting research. Stages of research in this study are described in the flow below:

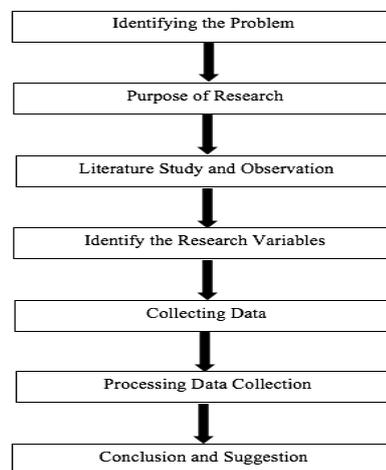


Fig.2. Research Stage

D. Population and Sample

The population in this study is the user of GAMPIL application. Sampling technique used in this research is purposive sampling. Samples taken in this study were 398 respondents.

E. Data Testing Technique

The data testing technique used is the validity and reliability test which is one important aspect that must be considered in arranging the questionnaire. To facilitate the calculation of validity and reliability in order to obtain accurate data and minimize errors, data processing is done with the help of Statistical Programs of Science Software (SPSS) for Windows.

IV. RESEARCH RESULTS AND DISCUSSION

A. Validity and Reliability Test

1. Validity Test

Validity means the extent to which precision and accuracy of a particular measuring instrument performs its function size. Validity test is a measuring tool used to get the data is valid. Valid means the instrument can be used to measure what should be measured [11].

The value of validity is essentially a correlation value. Therefore. to test the validity is done by the total item correlation technique which is the basis of the pearson correlation.

Table 1. Validity Test Results

Variable	Sub Variable	Items	Correlated Coefficient	Significant Level
User Experience (x)	Functionality	1	0,537	0,361
		2	0,732	0,361
		3	0,561	0,361
	Emotional	4	0,547	0,361
		5	0,568	0,361

	Trust	6	0,519	0,361
		7	0,564	0,361
		8	0,572	0,361
		9	0,724	0,361
		10	0,545	0,361
	Service Quality	11	0,635	0,361
		12	0,549	0,361
		13	0,730	0,361
		14	0,560	0,361
		15	0,700	0,361
User Satisfaction (Y)		16	0,561	0,361
		17	0,519	0,361
		18	0,715	0,361
		19	0,608	0,361

After calculation using Statistical Program of Science Software (SPSS) for Windows, obtained information that all statement submitted for User Experience variable and User Satisfaction has the value of validity coefficient > r table (0.361) then all statements are declared valid.

2. Reliability Test

Reliability shows the level of confidence in the results of a measurement. Measurements that have high reliability means that measuring instruments used can provide reliable results (reliable). To indicate whether a variable is reliable or not, the reliability value received is at least 0.70 [13]. To test the reliability of the instruments used in this study, pre-test conducted on 30 respondents.

Table 2. Reliability Test Results

Variable	Sub Variable	Cronbach Alpha	N of Items
User Satisfaction (X)	Functionality	0,772	3
	Emotional	0,724	3
	Trust	0,789	4
	Service Quality	0,795	4
User Satisfaction (Y)		0,825	5

After calculation using Statistical Program of Science Software (SPSS) for Windows, it is found that all data has been declared reliable. From the table that the value of r count > 0.70, it can be concluded that the questionnaire has good reliability.

B. Data Analysis Technique and Hypothesis Testing

For methods Quantitative analysis data continuum into two parts of them:

1. User Experience Variable X

Based on the percentage of the overall score of respondents' answers on Service Quality, obtained an average value of 62,1%. If illustrated, then it looks as follows:

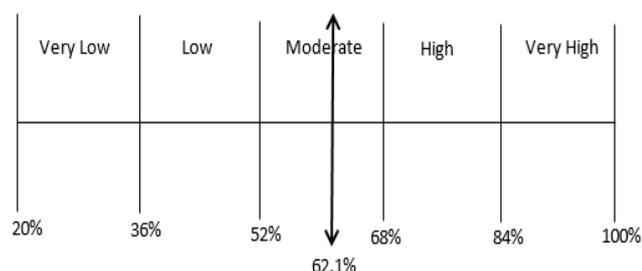


Fig.2. Continuum Line of User Experience

Based on the picture above, it is known that the percentage of respondents scores on the User Experience included in the moderate category, is at intervals (52% - 68%). Thus, it can be concluded that the User Experience classified moderate.

2. User Satisfaction Variable (Y)

Based on the percentage of the overall score of respondents' answers about User Satisfaction, obtained an average value of 62%. If illustrated, then it looks as follows:

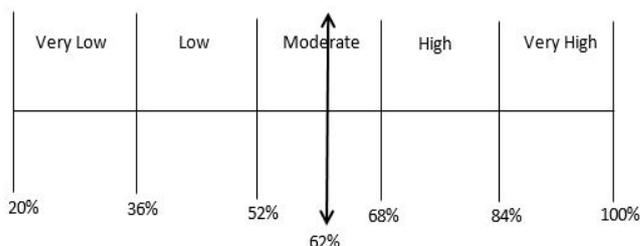


Fig.3. Continuum Line of User Satisfaction

Based on the picture above, it is known that the percentage of respondents score on User Satisfaction included in the moderate category, is at intervals (52% - 68%). Thus, it can be concluded that User Satisfaction classified moderate.

C. Methods Successive Interval (MSI)

Because the data generated by the measurement is ordinal and to convert it into an interval scale, data intervalization is required by using the Methods Successive Interval (MSI).

D. Classical Assumption Test

In simple linear regression, there is a classical assumption test consisting of normality test and heteroscedasticity test. Here are the results of both tests:

1. Normality Test

Normality test aims to test the independent variables (X) and the dependent variable data (Y) on the resulting regression equation, whether it is normally distributed or not normally distributed. In this study using the Kolmogorov- Smirnov normality test at the level of significance is 0,05. If a significance value greater than 0,05 means normal distribution, the following table 3 is the result of the normality test:

Table 3. The Result of Normality Test using Kolmogorov-Smirnov

One-Sample Kolmogorov-Smirnov Test

	Unstandardized Residual
N	398
Normal Parameters ^{a,b}	
Mean	,0000000
Std.Deviation	,38443933
Most Extreme Differences	
Absolute	,040
Positive	,038
Negative	-,040
Test Statistic	,040
Asymp. Sig. (2-tailed)	,136 ^c

- a. Test distribution is Normal
 - b. Calculated from data
 - c. Lilliefors Significance Correction
 - d. This is a lower bound of the true significance.
- Source: data that have been processed by the author

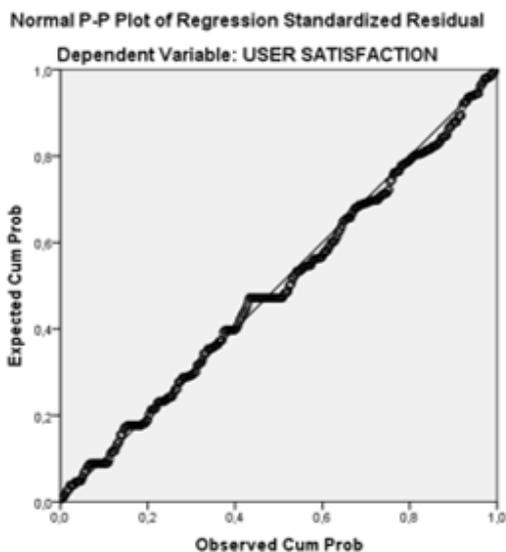


Figure 4. Graph of Normality Test Result

Based on the results of normality test Kolmogorov-Smirnov in table 3 above can be seen that the value of significance greater than 0,05, that is 0,136 indicating that the data is normally distributed. In addition, Figure 4.9 also shows that the data is spread out around the diagonal line which means that the data is normally distributed.

2. Heteroscedasticity Test

Heteroscedasticity test is used to know whether or not there is deviation of classical assumption of heteroscedasticity that is existence of variant inequality of residual for all observation in regression model. The prerequisite that must be fulfilled in the regression model is the absence of symptoms of heteroscedasticity. In this research, the test method used is Glesjer test. The Glejser test is performed by regressing the independent variable with its residual absolute value (ABS_RES). If the value of significance between independent variables with absolute residual is more than 0.05 then there is no problem of heteroscedasticity. From the result, it can be seen that the value of significance of independent variables is more than 0.05. Thus, it can be concluded that there is no problem of heteroscedasticity on regression model. For the results can be seen in the following table 4 below:

Table 4. The Result Heteroscedasticity Test Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error			
1 (Constant)	- 226	,042		5,331	,000

User Experience	,002	,001	,087	1,730	,084
-----------------	------	------	------	-------	------

a. Dependent Variable: ABS_RES

E. Simple Linear Regression

In this study, the authors use simple linear regression analysis, where in simple linear regression express the causality relationship between two variables and estimates the value of the dependent variable based on the value of the independent variable. Table 1 is the result of the linearity test:

Table 5. The Result of Simple Linear Regression Test Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients
	B	Std. Error	
1 (Constant)	-1,058	,067	
User Experience	,376	,002	,996

a. Dependent Variable: User Experience

Source: data that have been processed by the author

Based on regression output in table 1 can be presented the research regression equation as follows:

$$Y = -1,056 + 0,376X$$

Here is the explanation of the above equation:

- 1) The value of is the constant value of the User Satisfaction (Y), where there is no other variable affect the value of α . Its value is -1,056.
- 2) The value of X is the value of the User Experience (X). If there is an increase of one variable unit of User Experience,

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error			
1 (Constant)	- 1,056	,067		- 15,816	,000
User Experience	,376	,002	,996	222,835	,000

then the value of Y will increase by 0,376 or 37,6%. Because the value of the regression coefficient is positive (+), then it can be said that the influence of user experience (X) have a positive effect on user satisfaction (Y).

F. Hypothesis Testing

- 1. T Test

Table 6. The Result of T Test Coefficients^a

a. Dependent Variable: USER SATISFACTION

Source: data that have been processed by the author

The t_{count} for user experience is 222,835 with t_{table} 1,966 then $222,835 > 1,966$ shows that user experience has significant effect on user satisfaction. The coefficient regression has positive way that show user experience has positive significant affect towards user satisfaction. This result means hypothesis 1 is accepted.

2. Coefficient of Determination (R^2)

Table 7. The Result of R Square Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0,996 ^a	0,992	0,992	0,38492

a. Predictors: (Constant), User Experience

b. Dependent Variable: User satisfaction

Source: data that have been processed by the author

Table 7 above shows R value of 0,996 or 99,6%, this table shows the correlation/ relationship between variable X and variable Y, where the number included in the very high category (Indrawati, 2015). Furthermore, in table 4.6 above can also be seen the value of R Square (R^2) is equal to 0,992 or 99,2%, this means user experience has an effect of 99,2% to user satisfaction, while the remaining amount of 0,8% is influenced by other factors not researched in this study.

G. Discussion of Research Result

The result of respondent characteristic analysis shows that male respondents more dominant, where male respondents of 236 people with 59%, while female respondents of 162 people with 41%. On the age characteristics of respondents found that the age of respondents dominated by respondents with the range 17-25 years as many as 196 people with a percentage of 49%, then on the characteristic of respondents based on the level of education can be seen that the majority of GAMPIL Application users has the latest education Bachelor degree, which is as many as 182 respondents with the percentage of 46%. Characteristics of respondents based on region that the majority in Center of Bandung with 121 respondents of 31%. Then the last, the characteristics of respondents based on kind of business found that the majority is *TUK (Tanda Daftar Usaha Kecil)* with capital around 50 - 500 million with 220 respondents and the percentage 55%.

The result of quantitative analysis data continuum of user experience variable (X) on the continuum line shows the average percentage of 62,1%, which indicates that the level of user experience of GAMPIL Application users is categorized as moderate category. Based on the analysis of the quantitative analysis data continuum in the variable X can also be known that among the 14 statements describing the user experience factors, statement number 1 (GAMPIL Applications is reliable) has the highest percentage, which is 65,1% which belongs to moderate category. This means a sense of user experience of GAMPIL Application users mostly arises because they know GAMPIL Applications is reliable, therefore using GAMPIL Application feels easily because of GAMPIL Application is reliable who successful to provide the services. Meanwhile, the smallest percentage of 58,5% belonging to moderate category, there is statement number 10 (GAMPIL Application keeps their

promises), this is because GAMPIL Application users is not satisfied with the promise that given by GAMPIL Application. Meanwhile, the quantitative analysis data continuum of user satisfaction variable (Y) on the continuum line shows the average percentage of 62%, where the numbers indicate that the level of user satisfaction of GAMPIL Application users is categorized as the moderate category. The statement that has the largest percentage among the 5 statements that describes the user satisfaction is the statements number of 17 (GAMPIL Applications is successful), with the percentage of 62,5% which included in the moderate category. This means that the user satisfaction of GAMPIL Application users will be high if they feel GAMPIL Application is successful provide the services. Meanwhile, the smallest percentage is found in statements number 19 (I feel pleased with my overall experience of using GAMPIL Applications) with the percentage of 62%. The statement indicates that the GAMPIL Application users have not felt pleased with the overall experience of using GAMPIL Application.

Furthermore, for simple linear regression, the equation is $Y = -1,056 + 0,376X$. For the minus constant (Y), a negative estimate for the coefficient associated with a constant is not intrinsically a bad thing"[14]. Meanwhile, for the result of T test produce $t_{count} > t_{table}$ ($222,835 > 1,966$) thus obtained the result where H_0 is rejected. So, it can be concluded that the user experience has a significant affect towards user satisfaction on GAMPIL Application. Then, to find out how much influence of user experience towards user satisfaction of GAMPIL Application users can be determined by calculating Coefficient of Determination value (R^2). Results of data processing found that the value of (R^2) is 0,992 with the percentage of 99,2%, this means that user experience has an influence 99,2% towards user satisfaction of GAMPIL Application users, while the remaining amount of 0,8% influenced by other factors outside this research.

V. CONCLUSION AND SUGGESTION

A. Conclusion

Based on the results of research on the influence of user experience towards user satisfaction of GAMPIL Application users, then the conclusions obtained are as follows:

1. GAMPIL Application users have enough user experience, such as those in continuum line with the average percentage of user experience equal to 62,1% which is in the moderate category. That is the average of GAMPIL Application users has been quite satisfied both in the aspect of the functionality, emotional, trust, and service quality.
2. GAMPIL Application users have enough user satisfaction level, as in the continuum line with the average percentage of user satisfaction of 62% which is in the moderate category. That is the average GAMPIL Application users has good enough satisfaction by providing a good service.
3. Based on the coefficient of determination (R^2), user experience has an effect of 99,2% user satisfaction of GAMPIL Application users and the remaining of 0,8% influenced by other factors not examined in this study.

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A MEASUREMENT TOOL FOR ANALYZING FACTORS INFLUENCING THE URBAN QUALITY OF LIFE: A CASE STUDY FROM BANDUNG INDONESIA

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Abstract: Bandung is a city that become one of the largest growth in Indonesia. Bandung is also one of the centers of economic, social, political, and national administrative activities. The population growth rate reaches 3.5% per year and the total population is predicted to reach 4.1 million by 2031. This becomes a more serious challenge for Bandung in growing urban development and maintaining the quality of life of its citizens. Some of the issues that become serious problems for Bandung City are to build a sustainable urban facilities such as transportation, city cleanliness (including free from garbages, flood, slums, clean water), satisfaction rate of facilities and services, and infrastructure developments. The existence of smart cities provides an appropriate solution to the urban quality of life for its citizens. This paper intents to propose measurement tool to test the model of urban quality of life in a city. The study found 4 variables and 22 items which are valid and reliable to be used for further study.

Keywords Urban Quality of Life, Life Satisfaction, Bandung, Indonesia

1. INTRODUCTION

The total of the registered population is about 2.5 million people, Bandung City is the city with the third largest population after Jakarta and Surabaya. The city serves as the capital of the West Java Province and is located about 140 km from the country capital, Jakarta (see Figure 1). Located at 768 m above sea level, Bandung was originally developed as a resort city in the 1800s by the Dutch Indies government, partly due to its rich natural setting and comfortable climate (Voskuil, 2007). Bandung has become a large-scale city with an area of 168 km² and is one of the most important centres for political, economic, and social activity in Indonesia. Over the last few decades, in developing public infrastructure as well as generating local businesses such as tourism, manufacturing, textiles and apparel, pharmaceutical, financial, food, entertainment, and services, a large amount of investment both domestic and foreign has been successfully done by the city of Bandung (Firman, 2009a). Bandung has brought many rapid growth opportunities in the commercial, industrial, and educational fields that can be linked to economic drives, rapid population growth and urban (Tarigan, et al., 2015).

conference in 2015, and 25 mayors from Asian and African cities signed the Declaration of the Smart City, committed to the development of Smart Cities through knowledge, technology and investment. This declaration, initiated by the current mayor of Bandung, Mr. Ridwan Kamil, it is one of the efforts of government to actualize the vision of Bandung to be a good example of Smart City in Indonesia (Tarigan, et al., 2015).



Figure 1 Bandung City in West Java Province and Indonesia

Source: Tarigan et al. (2015)

Tarigan (2015) stated that during the time of the colonization, the Dutch undertook development in Bandung that had a positive effect on business and military affairs so that it attracted the attention of many people to come and settle and trigger economic activity. After Indonesia gained its independence in 1945, Bandung still became a great city and has big power and importance roles in politics as host of the first Asian-African Conference. Bandung again held a



Figure 2 The position of Bandung City with its neighbouring cities and regencie
Source: Tarigan et al. (2015)

Tarigan et al. (2015) determine, Indonesia has one of the most important cities and has grown into a center because of its development which shows a higher rate of economic growth than the national average, it is the city of Bandung. In recent years, the city of Bandung has made good development improvements, however, Bandung also found many challenges to be solved due to rapid urbanization, including slums, basic infrastructure, and floods. The heavy traffic and congestion that occurred in the city of Bandung is getting worse because of rapid urban mobility and it is predicted in the future will get worse with the number of trips per day reaches 193% in 2030. Bandung city also should create new solutions and strategies to overcome the problem of waste production that has worsened and exceeded the capacity of garbage collection services. Poor attitudes of Bandung citizens impact on the seasonal floods that occur in Bandung. Poor attitudes of littering the drainage channel is the biggest contribution of Bandung citizens to the seasonal flood disaster in Bandung. Bandung has become the second largest city in terms of population living in slum areas. It affects poor drinking water, mediocre of solid waste, and suffers from limited sanitation. The total population of Bandung citizens is about 2.5 million and only 1.6 million people who get clean water distribution from Perusahaan Daerah Air Minum (PDAM). This means there are still many households of Bandung who still do not have access to clean water. Sometimes the water pressure at a particular location is also often unstable and causes the water flow stop completely. It has an impact to the high population growth. The population growth rate reaches 3.5% per year and the total population is predicted in 2031 will reach 4.1 million people. This becomes a more serious challenge for Bandung in growing urban development and maintaining the quality of life of its citizens. Some of the issues that become a serious problem for Bandung City to build a sustainable urban environment are transportation, cleanliness of the city such as free from garbage, flood, slums, clean water, satisfaction rate of facilities and services which are given to residents of Bandung city, and infrastructure development. (Tarigan, et al., 2015).

Bandung has undergone many dramatic changes such as, urban infrastructure, service provision, housing, land converted into housing, these are problems in Bandung quality of life that are happening and need to be solved as soon as possible. In addition to problem in Bandung quality of life, other quality of life issues in Bandung are rapid land-use changes, uncontrolled traffic conditions, uncontrolled population growth, and environmental damage in the city center. Government of

Bandung itself has not been able to provide maximum handling, solution, and adequate responses (Arifwidodo, 2012).

Based on the explanation above, the author would like to conduct a research that proposes a new modified model to analyze factors influencing the urban quality of life. The proposed model of this study has not been tested yet. Therefore, the objective of this research is to propose measurement tools to test the model.

2. RESEARCH OBJECTIVES AND QUESTIONS

As far as this study doing literature reviews, this study cannot find any convincing indicators to be used for measuring the urban quality of life in a city, especially the city that fits with city of Indonesia characteristics. Citizen's characteristics, social and economic background of Indonesia have quite different from other countries. A model or indicators which can be implemented in a city of a country might not be able to be directly implemented well in the city of other countries. Therefore, the objectives of this study are to find out the variables, indicators, and items which fit to be used for measuring the urban quality of life in a city. In line with the objectives the research questions that want to be answered are: a) Based on the literature result, what are the variables and indicators to measure the urban quality of life in a city?, b) Based on interview result, what are the variables and indicators to measure the urban quality of life in a city?, and c) What items that can be used to measure the urban quality of life in a city?

3. RESEARCH METHODOLOGY

In order to achieved the research objectives and answer the research questions, this study applies two steps in identifying the indicators of the urban quality of life, first step is literature review and second step is depth interview. In doing the first step, literature review, this study uses primary literature such as articles from journals and conferences proceedings which are available online in the internet and modern electronic search engines, as well as electronic data bases as suggested by Zikmund, Babin, Carr, and Griffin (2009), and Indrawati (2015). Besides primary literature, this study also uses secondary literature such as books, review articles, indexes and abstracts, and also uses tertiary literature, such as encyclopaedias and dictionaries. The process of literature review was done by reading all related literatures with the object of this study, compare one literature to others to find out the similarities, contrast one literature to others to find out the differences, and finally summarize what the literatures say about indicators of the urban quality of life.

The second step which is done in this study is interview. In doing depths interviews, the researchers ask many questions and follow up each answer with probes for additional elaboration. An open ended interview format used to ensure that the information obtained would be related to the objectives on the study. Open-ended questions were prepared and were given to the respondents. The interviewers adusted the sequence of the questions given and added questions based on the responses of the respondents (Creswell & John, 2009). During the interview the researchers recorded the interview and transcribe edit after the interview finished.

To enhance confidence of the information, this study conducted and selected several people from each sector who are considered to have the capability to answer research questions based on Quadra Helix Model. Based on Quadra Helix there are the main pillar that contributes to the growth of creative industries covering four sectors of government, business, academia, and civil society. Quadruple Helix is a development of Triple Helix by integrating civil society, innovation, and knowledge (Afonso, Monteiro, & Thompson, 2012). The expectation of the four sectors of the Quadruple Helix work in an integrated manner, so it can play their respective roles optimally. Concluded of the population in this study is divided into 4 sectors, namely:

1. Government – Among executives in municipal / regional governments as regulators / policies and managers associated
2. Business Player – The entrepreneur who has business
3. Academia – The expert of the scientific sector and universities who understands about topic
4. Civil Society – Citizen or immigrants

During the interview, this study applied at least two interviewers who make research notes and put the codes on every meaningful statement of interviewees. The interviewers check the interpretation against the interviewees and peer interviewer to reduce bias of a single interviewer and for confirmation of the collected textual data.

The respondents for depth interview were selected, which are chosen by using purposive sampling technique. In purposive sampling technique the sample is selected when the sampling is confined to specific types of people who can provide the desired information, either because they are the only ones who have it or because they conform to some criteria set by the researcher (Sekaran & Bougie, 2010). Table 1 shows the respondents of this research.

Table 1 Respondents based on Quadruple Helix Model

Category	Respondents	Number
Government	Bandung Government worker	4
Business Player	The entrepreneur who has run the business in Bandung city more than 3 years	4
Experts	The experts who understand Bandung smart city and the concept of urban quality of life	4
Civil Society	Bandung citizens or immigrants in Bandung	4
Total		16

The collected textual data were processed and analysed following the six steps of analysing textual data from (Creswell & John, 2009), namely organizing and prepare the data for analysis, read through all the data, detailed analysis with textual data coding process and segments the text, use the coding process to generate a description of the setting or people as well as categories or themes for analysis, advance

how the descriptive and themes are represented in the qualitative narrative and in this research are also in descriptive percentage, and the last step is making interpretation of the data.

4. RESULTS AND DISCUSSION

4.1 Urban Quality of Life: Literature Review Result

There are four main fields were identified that have dealt with satisfaction and urban quality of life – physical features, features of social nature, environment features, and institutional features.

Table 2 Definition of Variables

Variable	Definition
Physical Features	Is a “place” when personal, group, or cultural processes have been given meaning through it (Białowolska, 2016)
Social Nature	Individual’s non-conscious or automatic evaluations of his or her life in contrast to explicit life satisfaction, being a conscious or controlled evaluative judgment of one’s life (Białowolska, 2016)
Environment Features	As with other people or objects, it is possible to create emotional and close bonds with places (Białowolska, 2016)
Institutional Features	Operate in a few advanced contemporary countries and only in recent times (Białowolska, 2016)

Based on the literatures related to urban quality of life, this study makes a table to summarize the urban quality of life variables and indicators as shown in Table 3.

Table 3 Variables and Indicators based on Literature Result

Variable	Indicator
Physical features	Public transport, for example the bus, tram or metro
	Health care services
	Doctors
	Hospitals
	Cultural facilities (concert halls, theatres, museums and libraries)
	Sport facilities: sport fields and indoor sport halls
	Availability of retail shops
	Public spaces such as squares
Features of	Pedestrian ares
	I feel safe in Bandung

Social Nature	Generally speaking, most people in my city can be trusted
Environment Features	Green spaces - such as parks and gardens
	Quality of the air
	Cleanliness
	Noise Level
Institutional Features	Administrative services of Bandung help people efficiently
	Generally speaking, the public administration of Bandung can be trusted

4.2 Urban Quality of Life: Based on Interview Result

In order to make the variables and indicators of the urban quality of life fit with Indonesia's situation, this study finds out the variables and indicators from Indonesia's government, business players, civil society, and experts. Based on the result of interview with 16 respondents, this study found that the variables of the urban quality of life are as shown in Table 4 below.

Table 4 Variables of Urban Quality of Life based on Respondents agreement

Variables	% Respondents Agree
Physical Features	90%
Social Features	83%
Environment Features	88%
Institutional Features	85%

Table 4 shows that 90% respondents agree that Physical Features as variable of urban quality of life in a city, 83% respondents agree that Social Features as variable of urban quality of life in a city, 88% respondents agree that Environment Features as variable of urban quality of life in a city, and 85% respondents agree that Institutional Features as variable of urban quality of life in a city.

Based on the result of interview with 16 respondents, this study found that the indicators of the urban quality of life in a city are as shown in Table 5.

Table 5 Indicators based on Interview Results

Variable	Indicator	% of Respondents Agree
Physical features	Public transport, for example the bus, tram or metro	73%
	Health care services	62%
	Doctors	69%
	Hospitals	69%
	Cultural facilities (concert halls, theatres, museums)	60%

	and libraries)	
	Sport facilities: sport fields and indoor sport halls	74%
	Availability of retail shops	60%
	Public spaces such as squares	77%
	Pedestrian ares	71%
Features of Social Nature	I feel safe in Bandung	75%
	Generally speaking, most people in my city can be trusted	66%
	Most people in my city are politeness	78%
	Most people in my city are love each other	71%
	Most people in my city are gentle	65%
	Most people in my city friendly	82%
Environment Features	Green spaces - such as parks and gardens	85%
	Quality of the air	80%
	Cleanliness	87%
Institutional Features	Administrative services of Bandung help people efficiently	85%
	Generally speaking, the public administration of Bandung can be trusted	90%
	The public administration of Bandung is responsive	75%
	The public administration of Bandung uses optimal resources	85%

5. CONCLUSION

Referring to the literature review results and interview result, this study find that both of results suggests the same four variables, but in term of indicators the findings are different since based on interview result some indicators have been added and few indicators have been removed. Therefore,

model for measuring the urban quality of life in a city is presented in figure 3.

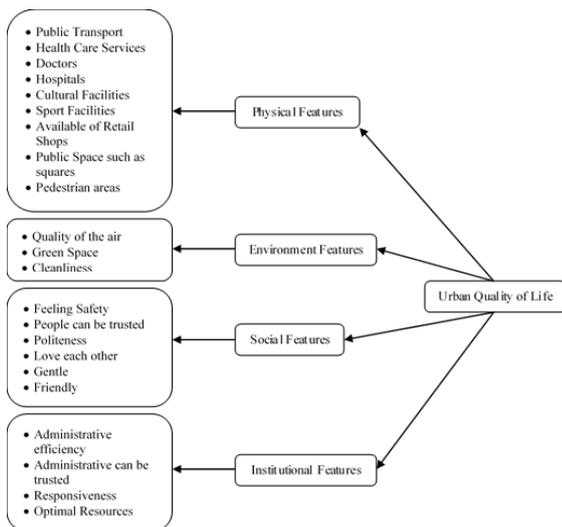


Figure 3 Proposed Model of Urban Quality of Life

The next process that will be done by the writers are testing the variables and items through a pilot test. Once the measurement tool is valid and reliable, it will be used to collect main data to test if the proposed model can be applied to measure the urban quality of life in a city of Indonesia.

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A Survey of the Information Needs of Automobile Technicians and Road Transport Workers in Offa Local Government Area, Kwara State, Nigeria

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Abstract: Information is an indispensable element which is crucial to the development of human societies. This study investigated the information needs of automobile technicians and road transport workers in Offa Local Government Area of Kwara State, Nigeria. The descriptive survey research design was adopted for the study. The population of study comprises 2976 automobile technicians and road transport workers in the communities of Offa Local Government Area. Stratified random sampling technique was used to select 1786 respondents from the study population while questionnaire was used to collect data for the study. The analysis of data collected was based on frequency counts and percentages. Challenges such as unavailability of information sources, poor information searching/ retrieval skills, low awareness of the importance of information, time constraints and inefficient information infrastructure hindered access to information. The study recommends establishment of modern information infrastructure, increased funding and sensitization on the importance of information among others.

Keywords: Information, Information needs, Automobile technicians, Road transport workers, Offa Local Government Area

Introduction

The relevance of information to the sustenance and advancement of human societies cannot be overemphasized. Throughout the phases of human existence, the germane roles played by information have been accorded proper recognition hence appreciated by various nations. Information is synonymous to knowledge and it has been recognized as the driver of economic growth and productivity which has no substitute when it comes to the national development (Oyeronke, 2012). The transition of nations from the state of underdevelopment to actual development depends largely on the availability, accessibility and utilisation of

information. Kaniki (2008) viewed information as ideas, imaginative works of the mind, and data of value that are potentially useful in decision making, question answering, and problem solving. In his own view, Martin (1995) conceptualized information as the life blood of society. Information can therefore be viewed as the fuel which powers the vehicle of development in nations. Information is that which is transmitted by the act or process of communication, it may be a message, a signal, and a stimulus (Shera, 1972).

Adequate access to information and its effective utilisation is central to improved performance and attainment of set goals by individuals and organisations. As a valuable resource, information is now regarded as a prerequisite for individual growth and societal development. In this 21st Century, information is increasingly being recognised as an economic resource like land, labour, capital and skills (entrepreneur). The importance of information has made it a basic need for optimum performance in all facets of human endeavours. To thrive in this modern era, one needs a variety of information, no matter how well-versed one is in a field or profession. Every individual and society have their respective information needs which must be adequately catered for (Tahir, Mahmood and Shafique, 2008).

According to Ehikhamenor (1990), information need could be referred to as the extent to which information is required to solve problems, as well as the degree of expressed satisfaction or dissatisfaction with the information. Information need is a gap in a person's knowledge that, when experienced at the conscious level as a question, gives rise to a search for an answer (Reitz, 2004). Thus, information needs refer to requirements which must be met in order to fill the conscious knowledge gap in a particular activity. People need information in order to increase their knowledge, reduce their level of ignorance, eliminate their uncertainties and to make rational decisions in daily activities.

Information needs of individuals can be categorised in many ways based on their peculiarities which are noticeable in occupations, educational qualifications, ethnic background, locations and economic status. Thus, information needs could be on academic, social, health, finance, legal and economic activities. All these categories of information needs are geared towards enhancing the daily activities of individuals in the society. The satisfaction of the different categories of information needs is largely influenced by the availability and accessibility to relevant sources of information. The understanding of information needs and information-seeking behaviour of various professional groups is essential as it helps in the planning, implementation, and operation of information system, and services in work settings (Devadason and Lingman, 2008). Furthermore, the awareness of the different information needs of professional groups helps in determining the appropriate sources of information to be adopted in meeting their social, health, finance, legal, economic and security needs.

Statement of the problem

The relevance of information to the attainment of developmental goals in human societies cannot be underestimated. Information, unarguably, constitutes an invaluable resource without which meaningful development can be achieved. Information is needed in order to accelerate growth in the productive sectors of a nation's economy and to ensure sustained development in the lives of the citizenry. Regrettably, adequate information which has been identified as a key resource in developmental activities is not always made available to artisans and professional groups especially automobile technicians and road transport workers who contribute immensely to the economic development of Nigeria. In cases where information is disseminated to them, such information is not always timely and pertinent to their diverse needs. Furthermore, the information disseminated to this category of workers are not usually obtained from authoritative sources which makes it to be misleading and susceptible to multiple interpretations. This affects the productivity of automobile technicians and road transport workers as they are usually constrained to work with the inaccurate information at their disposal. It is against this background that this study aims at assessing the information needs of automobile technicians and road transport workers in Offa Local Government Area, Kwara State, Nigeria.

Background information of Offa Local Government Area, Kwara State, Nigeria

Offa Local Government Area is located in Kwara State, Nigeria (coordinates 8° 9'N and 4° 43' E) with a population of about 90,000 inhabitants. The vegetation in Offa is savannah vegetation and the city is well known for the cultivation of sweet potatoes and maize, weaving and dyeing trade. There is presence of social amenities such as good road network, electricity supply, telecommunication facilities, hospitals and others in the local government area. Offa local government is home to some tertiary institutions which include the Federal Polytechnic Offa, (established in 1992), the Kwara State College of Health Technology (established in 1976), Summit University, National Open University, Lens Polytechnic and the Nigeria Navy School.

Research objectives

The major objective of this study is to assess the information needs of automobile technicians and road transport workers in Offa Local Government Area, Kwara State, Nigeria. The specific objectives of this study are to:

- i. examine the information needs of automobile technicians and road transport workers in Offa Local Government Area;
- ii. investigate the sources of information available to automobile technicians and road transport workers in Offa Local Government Area;
- iii. determine the challenges hindering automobile technicians and road transport workers from accessing accurate information in Offa Local Government Area; and

- iv. proffer solutions to the challenges hindering automobile technicians and road transport workers from accessing accurate information in Offa Local Government Area.

Research questions

This study will provide answers to the following questions:

- a. What are the information needs of automobile technicians and road transport workers in Offa Local Government Area?
- b. What are the sources of information available to automobile technicians and road transport workers in Offa Local Government Area?
- c. What are the challenges hindering automobile technicians and road transport workers from accessing accurate information in Offa Local Government Area?
- d. What are the solutions to the challenges hindering automobile technicians and road transport workers from accessing accurate information in Offa Local Government Area?

Methodology

The descriptive survey research design was adopted for the study. The population of the study comprises 2976 automobile technicians and road transport workers in the communities of Offa Local Government Area. Stratified random sampling technique was used to select 1786 respondents from the study population while questionnaire was used to collect data for the study. The analysis of data collected was based on frequency counts and percentages.

Analysis of data and interpretation of results

Questionnaire administration and response rate

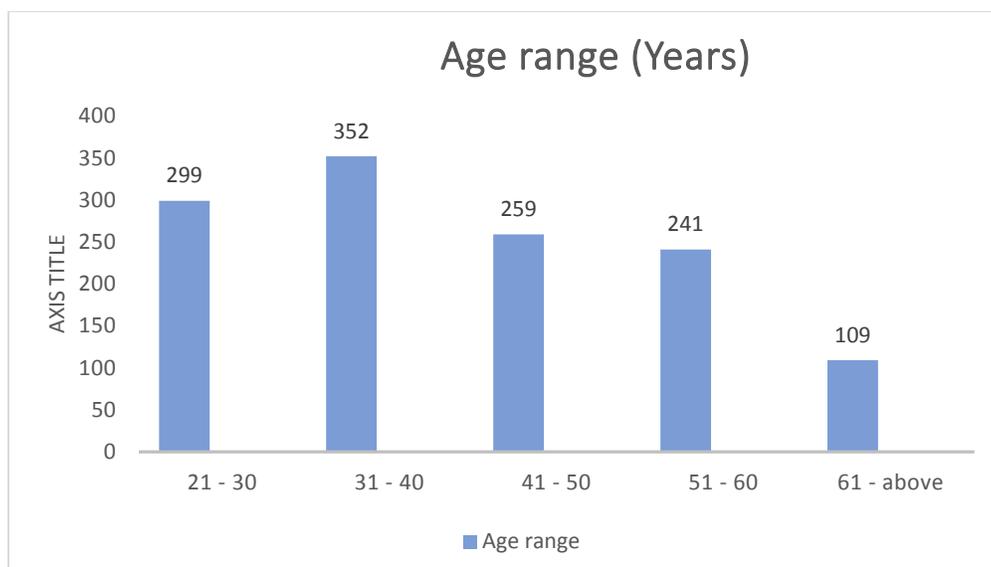
The sample size consists of 1786 respondents drawn from the total population of the study. Out of 1786 copies of the questionnaire administered, 1260 copies were returned and found valid for analysis giving a response rate of (70.5%) as shown in Table 1.

Table 1: Response rate of respondents

S/N	Artisan groups	No of questionnaire administered	No of questionnaire returned	Response rate (%)
1	Automobile technicians	154	123	70.5
2	Road transport workers	1632	1137	
	Total	1786	1260	

Demographic details of the respondents

Figure 1: Age range of the respondents



The figure above shows the age range of the respondents of the study. A total number of 299 respondents (23.7%) falls within the age range of 21-30, 352 respondents (27.9%) were between the ages of 31 and 40 while 259 respondents representing (20.5%) were between the ages of 41-50. Two hundred and forty-one respondents (19.1%) are between 51 and 60 years while 109 respondents (8.7%) are above 61 years. Thus, it could be inferred that most of the respondents are between 31 and 40 years.

Figure 2: Marital status of the respondents

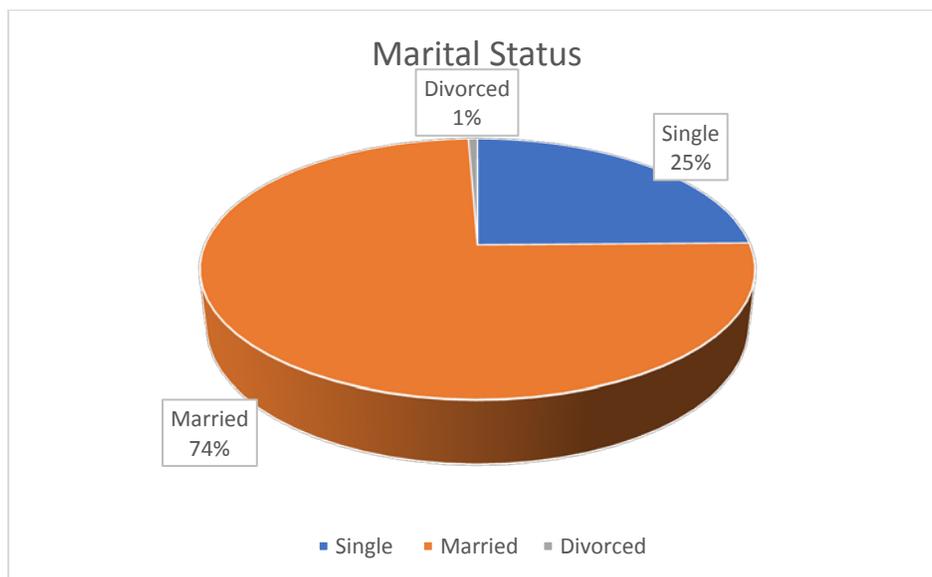


Figure 2 revealed that 312 respondents (25%) are single, 940 respondents (74%) are married while 8 respondents (1%) are divorced. Hence, it could be noted that most of the respondents are married.

Answers to the research questions

1 What are the information needs of automobile technicians and road transport workers in Offa Local Government Area?

In order to ascertain the information needs of the respondents, they were asked to indicate their level of agreement or disagreement with the items in the Table below.

Table 2: Information needs of automobile technicians and road transport workers in Offa Local Government Area, Kwara state, Nigeria

Hint: f = frequency, % = percentage

S/N	Information needs	Agreement score		Disagreement score	
		f	%	f	%
1	Information on availability of mechanical/engineering products (spare parts, fuel, automobile dealerships, tyres etc.)	1222	97	38	3
2	Information relating to commercial activities of your immediate community	1197	95	63	5
3	Health information (personal hygiene, disease prevention and control, food and nutrition, housekeeping, child care and family planning)	1065	85	195	15
4	Legal information (laws, statutes, government legislation, human rights)	860	68	400	32
5	Information on government/political activities (political parties, electoral processes, governance system)	592	47	668	53
6	Information on financial activities (how to obtain loan, banking activities, insurance, financial support by government and other agencies)	1184	94	76	6
7	Information on social activities (entertainment, leisure, recreation, religion, sports)	902	71	352	29
8	Information on staff welfare, union activities	1043	82	217	18
9	Information on community/societal development	1006	80	254	20
10	Safety/security information	1116	89	144	11
11	Educational information (adult literacy classes, vocational education)	712	57	548	43
12	Information on current affairs in my nation and international communities.	302	24	958	76

Table 2 shows the information needs of automobile technicians and road transport workers in Offa Local Government Area, Kwara state, Nigeria. A vast majority of the respondents (97%) and (95%) stated that they need information on availability of mechanical/engineering products such as spare parts, fuel, automobile dealerships, tyres and on commercial activities of their immediate community respectively. A total number of

1065 respondent (85%) noted that they require information on health issues such as personal hygiene, disease prevention and control, food and nutrition, housekeeping, child care and family planning while 860 respondents (68%) agreed that they need legal information (laws, statutes, government legislation, human rights).

Nearly half of the respondents (47%) expressed that they need information on government/political activities (political parties, electoral processes, governance system) while majority of the respondents (94%) require information on financial activities (how to obtain loan, banking activities, insurance, financial support by government and other agencies) in order to perform optimally. Nine hundred and two respondents (71%) reiterated their need for information on social activities (entertainment, leisure, recreation, religion, sports), 1043 respondents (82%) required information on staff welfare, union activities while 1006 respondents (80%) stated that they need information on community/societal development. A large section of the respondents (89%) noted that they need safety/security information, 712 respondents (57%) required information on educational activities (adult literacy classes, vocational education) while few respondents (24%) expressed their desire for information on current affairs in their nation and in international communities.

Based on this, it could be inferred that most of the respondents need information on availability of mechanical/engineering products, commercial activities in their immediate community, health issues, safety/security and on financial activities. Information needs on current affairs, educational activities and on government/political activities were ranked low by the respondents and not required by most of the respondents.

2. What are the sources of information available to automobile technicians and road transport workers in Offa Local Government Area?

Table 3: Sources of information available to automobile technicians and road transport workers in Offa Local Government Area

Hint: f = frequency, % = percentage

S/N	Information sources	Agreement score		Disagreement score	
		f	%	f	%
1	Professional colleagues	1023	81	237	19
2	Friends/relatives	895	71	365	29
3	Radio	781	62	479	38
4	Television	612	48	648	52
5	Seminar/workshops/conferences	112	9	1148	91
6	Libraries	25	2	1235	98
7	Information centres	12	1	1248	99
8	Newspapers	214	17	1046	83
9	Association meetings/Town hall meetings	832	66	428	34
10	Internet	101	8	1159	92

11	Government agencies	328	26	932	74
12	Local government authority	214	17	1046	83
13	Non-Governmental organisations (NGOs)	113	9	1147	91

Table 3 shows the sources of information available to automobile technicians and road transport workers in Offa Local Government Area. Majority of the respondents (81%) stated that they obtain information to meet their needs through professional colleagues while 895 respondents (71%) got information from friends and relatives. Radio constitutes a viable source of information to 781 respondents (62%), 612 respondents (48%) depended on television to meet their information needs while 112 respondents (9%) obtained information from seminar/workshops/ conferences. Very few respondents (2%) and (1%) used the libraries and information centres in meeting their information needs, 214 respondents (17%) relied on newspapers while 832 respondents (66%) got information from association meetings/town hall meetings. One hundred and one respondents (8%) identified the Internet as their source of information, 328 respondents (26%) obtained information from government agencies, 214 respondents (17%) got information from local government authority while 113 respondents (9%) identified Non-Governmental organisations (NGOs) as their source of information.

Based on the findings, it could be noted that most of the respondents relied on professional colleagues, friends/relatives and association meetings/Town hall meetings in obtaining information relevant to their daily activities. Sources of information such as newspapers, Internet, libraries and information centres was used by few section of the respondents.

3. What are the challenges hindering automobile technicians and road transport workers from accessing accurate information in Offa Local Government Area?

Table 4: Challenges hindering automobile technicians and road transport workers from accessing accurate information in Offa Local Government Area

Hint: f = frequency, % = percentage

S/N	Statements	Agreement score		Disagreement score	
		f	%	f	%
1	Unavailability of information sources	1096	87	164	13
2	Lack of awareness of relevant information sources	968	77	292	23
3	Difficulty in accessing both print and online materials	1020	81	240	19
4	Financial constraints	917	73	343	27
5	Poor information searching/ retrieval skills	1084	86	176	14
6	Lack of support from government and other concerned agencies	857	68	403	32
7	Time constraints	1046	83	214	17
8	Power failure	869	69	391	31
9	Inefficient information infrastructure (libraries,	1184	94	76	6

	Internet, repositories etc.)				
10	Low awareness of the importance of information	1084	86	176	14

Table 4 presents the challenges hindering automobile technicians and road transport workers from accessing accurate information in Offa Local Government Area. A vast section of the respondents (87%) identified unavailability of the information sources as a major challenge to accessing accurate information while 968 respondents (77%) noted that lack of awareness of relevant information sources prevents them from accessing the right information. A total number of one thousand and twenty respondents (81%) identified difficulty in accessing both print and online materials as a major challenge, 917 respondents (73%) identified financial constraints while poor information searching/ retrieval skills prevented 1084 respondents (86%) from accessing accurate information.

Eight hundred and fifty-seven respondents (68%) stated that lack of support from government and other concerned agencies is a major barrier to adequate information, 1046 respondents (83%) agreed that time constraints hindered them from obtaining the right information while 869 respondents (69%) attributed their inability to access accurate information to power failure. A vast majority of the respondents (94%) stated that inefficient information infrastructure (libraries, Internet, repositories etc.) prevented them from accessing accurate information while 1084 respondents (86%) submitted that low awareness of the importance of information is a major encumbrance to accessing accurate information.

From the analysis above, it could be inferred that challenges such as unavailability of information sources, poor information searching/ retrieval skills, low awareness of the importance of information, time constraints and inefficient information infrastructure (libraries, Internet, repositories etc.) hindered the respondents from accessing accurate information.

4 What are the solutions to the challenges hindering automobile technicians and road transport workers from accessing accurate information in Offa Local Government Area?

Table 5: Solutions to the challenges hindering automobile technicians and road transport workers from accessing accurate information in Offa Local Government Area

Hint: f = frequency, % = percentage

S/N	Statements	Agreement score		Disagreement score	
		f	%	f	%
1	Provision of the information sources	1127	89	133	11
2	Information literacy training	927	74	333	26
3	Sensitization on the awareness of information sources	1021	81	239	19
4	Provision of funds/financial support to purchase information sources	962	76	298	24
5	Training on information searching/retrieval skills	911	72	349	28

6	Provision of adequate support by government and other concerned agencies	980	78	280	22
7	Provision of stable electricity supply	824	65	436	35
8	Provision of efficient information infrastructure (libraries, Internet, repositories etc.)	1023	81	237	19
9	Sensitization on the importance of information	1016	80	244	20
10	Information repackaging	712	57	548	43

Table 5 shows the solutions to the challenges hindering automobile technicians and road transport workers from accessing accurate information in Offa Local Government Area. Majority of the respondents (89%) agreed that the provision of the information sources is a solution to the problem hindering access to information while 927 respondents (74%) identified information literacy training as a solution to the challenge. One thousand and twenty-one respondents (81%) viewed sensitization on the awareness of information sources as a possible solution, 962 respondents (72%) agreed that provision of funds/financial support to purchase information sources will help in tackling the challenges while 911 respondents (72%) expressed that training on information searching/retrieval skills will go a long way in addressing the challenges hindering access to accurate information.

A large number of respondents (78%) stated that provision of adequate support by government and other concerned agencies is a solution to the challenge hindering access to accurate information, 824 respondents (65%) advocated for the provision of stable electricity supply to tackle these challenges, 1023 (81%) agreed that the provision of efficient information infrastructure (libraries, Internet, repositories etc.) will help in addressing these challenges. A total number of 1016 respondent (80%) expressed that sensitization on the importance of information is an efficient measure in tackling the challenges while 712 respondents (57%) submitted that information repackaging will enhance access to accurate information.

Discussion of findings

The findings of the study revealed that most of the respondents required information on the availability of mechanical/engineering products, commercial activities in their immediate community, health issues, safety/security and on financial activities. They need this information in order to enhance their economic activities and to foster rapid socio-economic development in their community. This importance of information was supported by *Weiss, Crowder and Bernardi (2000)* who described information as the cornerstone of successful socio-economic development which plays a key role in decision making. Some of the respondents also need information on health issues. This is in consonance with the view of *Ugboma (2010)* who stated that information is a major resource that is needed in every sphere of life endeavour especially in health matters.

Majority of the respondents relied on professional colleagues, friends/relatives and association meetings/Town hall meetings in order to obtain information relevant to their daily activities. This could be attributed to the shortage of information infrastructure and services which limit information accessibility in the local government area. This finding was supported by Kamba (2009) who highlighted inadequate basic infrastructure (electricity, telecommunication, roads and transportation), low literacy levels, lack of suitable information services and lack of technical competencies as among the barriers to delivery of information services in rural areas in developing countries.

The challenges hindering the respondents from accessing accurate information include unavailability of information sources, poor information searching/ retrieval skills, low awareness of the importance of information, time constraints and inefficient information infrastructure (libraries, archives, information centres and Internet). This assertion was further established by Dorsch (2000) who identified lack of time, inadequate access to information sources, lack of skills, cost of information and geographical isolation as the major barriers to effective use of information. Ugah (2007) also noted that factors such as lack of awareness; inaccessibility; bibliographic obstacles: environment; poor infrastructure and declining budgets affect access and use of information. Furthermore, insufficient technical infrastructure, complex and technical languages of some information sources and literacy levels of information seekers limit the usage of information sources.

Conclusion

Information is an essential resource which is needed by people in their daily activities for decision making and developmental purposes. This study established that automobile technicians and road transport workers have diverse information needs which must be catered for in order to enhance their activities. Their information needs cover areas such as availability of mechanical/engineering products, commercial activities in their immediate community, health issues, safety/security and financial activities. Though, there are several sources of information available to these professionals, majority of them relied on professional colleagues, friends/relatives and association meetings/town hall meetings in order to satisfy their information needs. Challenges such as unavailability of information sources, poor information searching/ retrieval skills, low awareness of the importance of information, time constraints and inefficient information infrastructure hindered them from accessing accurate information.

Recommendations

Based on the findings of the study, the following recommendations were made:

- i. The state government and the local government authority should establish modern information infrastructure such as libraries, archives and information centres which will constantly provide

accurate, timely and relevant information to meet the diverse information needs of automobile technicians and road transport workers in Offa Local Government Area.

- ii. The existing libraries and information centres should endeavour to collect and manage information resources relevant to the needs of these professional groups. They should collaborate with local news outfits, Non-Governmental Organizations and other concerned agencies in order to keep these professionals abreast with the current happenings in their community.
- iii. The use of information sources such as newspapers, Internet, libraries and information centres should be encouraged among automobile technicians and road transport workers in Local Government Area in order to enable them have access to authoritative information.
- iv. There is an urgent need to sensitize automobile technicians and road transport workers in Offa Local Government Area on the importance of using relevant information sources in meeting their information needs.
- v. Adequate information literacy training should be provided to automobile technicians and road transport workers in Offa Local Government Area in order to enhance their information searching/retrieval skills.
- vi. Information repackaging and translation services should be implemented in libraries and information centres of Offa Local Government Area in order to facilitate increased usage of information sources and services by automobile technicians and road transport workers.

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Data Fusion for the Internet of Things

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Abstract- Internet of things has been increasing at a tremendous rate since last few years. Thus, it has been an active area of research. Data from a single node can provide enough information for various conditions on the field. However, the data from the IoT is used to get an inference on a high level which can be used to take corrective actions. To take the corrective actions, the data should be mined properly which in turn depends on correct data from the sensor. Data fusion techniques are used to provide correct data from the sensor to the data mining algorithm. Data fusion in IoT is not a well-researched topic. In this design, various data fusion techniques are examined, and a hierarchical approach for data fusion in IoT is proposed. The design uses Fuzzy Kalman Filter for state estimation, and Dempster- Shafer method for decision fusion to create a dynamic context-aware system. The proposed design is also scalable for a higher number of nodes in the network which is not found in all implementations. The research also offers a design metrics which can be used for comparison of different data fusion.

Index Terms- Internet of Things, Data Fusion, Kalman Filter, Dempster – Shafer Theory.

I. INTRODUCTION

The Internet of Things (IoT) generates tremendous amounts of raw data from its surrounding environment. Wireless Sensor Networks which form a part of IoT sense the environmental conditions and relay the information to the server. This information is then processed using data mining algorithms at the server side to get an overall picture of how the conditions are and then control actions are taken. Usually, the data provided by the sensor nodes is raw. Significant computation needs to be done on the data before meaningful extraction of information can take place. The computation should be performed before the data mining can take place. The data mining is the final step of information extraction. But before the data is fed for mining it needs to be in the proper format so that the predictive pattern or anomalies in the data can be found. This data processing technique which combines and integrates data from different sources is called as data fusion. With data fusion, it becomes easier to take decisions based on high-level inferences from the data extraction. Also, less time and computational capacity will be expended to get to an inference if the data is meaningful.

Data fusion is not a new concept and has been implemented in different domains like image processing for data extraction. There is a lot of research on IoT data fusion techniques which study the fusion of data in Wireless Sensor Networks. These methods use mature data fusion algorithms like Bayesian, Classical inference, Dempster – Shafer, and fuzzy logic approach to implementing it for Internet of Things (Rodger, 2012). However, research should also go into the hierarchy of data fusion implementation. The sub-layers of architecture in which the data fusion techniques are implemented are very important. This domain is not well explored, and the research intends to put light on postulating architecture for data fusion.

In this research, the current implementations of data fusion techniques will be studied in detail. Their hierarchical structure will be explained and compared with standard parameters. Using the knowledge gained in this study, another hierarchical solution will be provided, and it will be compared with the existing techniques. This research will extend the hierarchical implementation of IoT and cover all levels of data abstraction i.e. from a sensor to server.

II. RELATED WORKS

Data Fusion has been implemented in different domains for sensors from heterogeneous backgrounds. It is defined by Castanedo (2013) as “Combination of multiple sources to obtain information which is less expensive and has higher quality or more relevant information.” The following section describes the existing methods for multi-sensor data fusion model. This section discusses the methods in detail and shows the gap that the research intends to fill.

Wide research has been done in Multi-Sensor Data Fusion which has application in various sectors. There are different data fusion techniques implemented by different researchers. There are statistical methods employed like Bayesian Methods, moving average and ad hoc methods like Fuzzy Logic and Neural Network used for multi-sensor data fusion. The scope of multi-sensor data fusion has to be defined. There are researches like Rodger (2012) where an integrated vehicle maintenance system was created using fuzzy Multi-Sensor Data Fusion (MSDF) to reduce failure risks. Two architectures are discussed here – Central Fusion and Distributed Fusion.

The study presents Fuzzy Kalman Filter Approach (FKFA) for better data error elimination as conventional Kalman Filter performs poorly under high computational number. The FKFA is used to reduce time needed to perform complex matrix manipulations in the vehicle maintenance model. If one system fails then, other sensors should take over the system to give collective decision for the same. Thus, a dynamic approach to selection of sensors should be present. This research uses dynamic detection and fault detection methods to find anomalies in the data of the vehicle. Another specific application of MSDF is discussed by De Paola, et. al, (2016) to cater to incorrect data because of inaccuracy in sensors. A Bayesian system in three-tier architecture of a smart home is proposed in the research. In the design, a dynamic group of sensors is used for data fusion to deduce inferences in a context aware environment. The lowest tier forms the sensor and reads all the environmental changes. The intermediate performs the multi-sensor data fusion and tries to infer the external conditions. The highest tier is the most complex where the system dynamics are modified to extract maximum features. This tier also caters to various factors like the cost and computational capacity and checks if they cross the predefined threshold. Dynamic Bayesian method used in this research create an information slice for a specified time while capturing the dynamic nature of past and present states. The designed system is tested in a controlled environment of a smart home. Reduction in energy consumption with redundancy is described using the technique. Compared to the Bayesian approach and FKFA described above, Gite & Agrawal (2016) describe another context aware process that uses sub processes like context acquisition, context processing, and context usage. The context processing contains noise removal, data calibration, context interpretation and context prediction. The research proposes Dempster – Shafer Theory (DST) in context-aware systems and compares the Bayesian approach with DST. It is theorized that when full probabilistic information is not available, DST performs better than Bayesian approach. This research proposes a technique but no implementation is done to prove the results. The computational capacity needed for the approach is also discussed which is more than the Bayesian Method. Here, with the study of researches, it is found that there are different approaches like FKFA, Dynamic Bayesian and DST for data fusion. These techniques all have their advantages and disadvantages depending on the application. The scope of these data fusion models is constrained to a small application where the data fusion of few sensors is done. Because of the scope, dynamic configuration is possible in the design and still the fusion complexity remains relatively low. The design is not scalable for a bigger number of systems working in tandem.

Along with specific applications like smart homes, research has also been done on larger scenarios like sensor data fusion for a city. The research Wang et al. (2016) gives comprehensive survey of different techniques and how the techniques can be scaled up for larger scenarios. It divides the sensor data fusion into three main categories. Complementary technique means putting together information from different sensors to get a bigger picture. Redundancy category fuses data from similar sensors to increase the accuracy of data. Cooperative operations combine to create new information. It describes combining different sensor networks and combines their data to form a predictive contextually rich model. This research also describes the evaluation framework for various data fusion techniques and compares various solutions based on the evaluation framework. This research does not propose any solution based on the findings of the study. Also, it also does not compare the computational cost and delay introduced in the communication.

Another comparison study of different techniques is given by Castanedo (2013) where the architectural analysis of different techniques is done. Castanedo (2013) describes the classification of data fusion techniques. It discusses the centralized, decentralized, distributed and hierarchical architecture of data fusion. In centralized fusion, all the data is concentrated in one particular central processor and then the data fusion takes place. Time delays are huge in this type of architecture. A node has its own computational capacity and there is no single point of data fusion in decentralized architecture. The communication costs in this architecture are high compared to centralized architecture. In distributed architecture, there are fusion nodes which fuse the data from several sensors. Thus, preliminary data fusion can be done at these nodes and brings down both computational cost and time of communication. Hierarchical architecture can be defined as hybrid model where data fusion is performed at different levels.

There are different techniques which are discussed here that have their own advantages and disadvantages. However, the scalability of the designs is not mentioned in any of the solutions along with other parameters like fusion complexity and implementation. There is a gap in the research to give a comprehensive survey of how the existing solutions can be scaled up to bigger architectures. This study intends to propose a design for a large scale scenario. Scalability of existing design will be studied, and next sections will explore the data fusion techniques in detail to offer a solution for data fusion.

III. DESIGN AND FINDINGS

The proposed system is defined in this section using the knowledge gained in the previous sections. The architecture of data fusion in this design solution will be similar to that proposed by De Paola, et. al, (2016). This three-tier architecture as shown in Figure 3 completely covers all the architectural challenges. It is a distributed architecture as discussed above and can change to hybrid architecture depending on the sensors. The sensor subset varies according to the requirement of the system. This will bring in a dynamic environment which is needed if the system has to be scaled up.

The data association technique that will be used is the evidence reasoning method described above. Using this technique, the disadvantages of Nearest Neighbor method will be eliminated. This technique does not cost too much overhead in computational capacity and also increases the efficiency by more than 10%. The State Estimation method will employ the Fuzzy Kalman Filter Approach (FKFA). The ad hoc methods like Kalman filter do not perform well while putting it under high computations. Thus, FKFA will be beneficial regarding state estimation to predict current state of the system. The FKFA will bring in a dynamic environment and also remove the error due to interferences. The decision fusion method in the design solution will be implemented using Dempster -

Shafer method. The Dempster – Shafer method will predict the decisions and create a context-aware system. Thus, the design solution will provide a dynamic approach depending on the environment and also context-aware decision making.

The design solution will be shown to scale up and scale down depending on the application. The dynamic and context-aware system along with scalability is to be compared with existing platforms. The implementation strategy for this hierarchical architecture will be tough. Firstly, a dummy dataset should be verified with the data association technique. When the data association technique is tested, the state estimation and decision fusion methods are to be implemented. The self-optimization tier is the most complex to be implemented. This can be implemented on a computer using MATLAB software. MATLAB is efficient to implement methods like FKFA and Dempster – Shafer theory.

A detailed block diagram of the architecture is shown in figure 2. This block diagram consists of all the layers and the proposed solutions used for each stage in the design solution. The solution for each layer has been carefully selected to remove any chances of errors in the data fusion system.

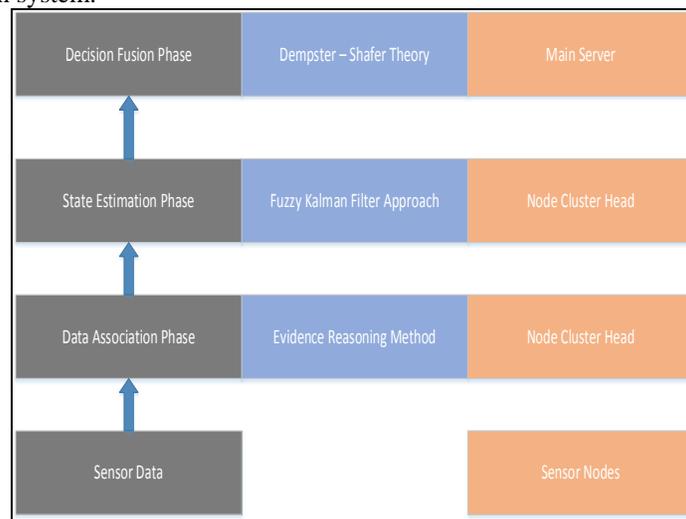


Fig 2: Final Block Diagram for the design solution

In this design solution, there is a main server similar to other models and a node cluster head to which all the sensor nodes are connected. In this design solution, the sensor nodes are given the least computation. As almost all sensor nodes are resource constrained, this removes any heavy computation load from the sensor node and it transmits the raw data to the node cluster. The node cluster is computationally advanced than the sensors, and it takes care of the decision fusion and state estimation for the sensor nodes. Thus, the Evidence Reasoning and Fuzzy Kalman Filter will be implemented in the node cluster head. The main server computes the decision fusion and eventually the data mining as well. Thus, the main inference is made by the main server. The main server is also responsible for the corrective measures that are to be taken. Thus, a hierarchical method for data fusion is proposed in this report. For implementation, the sensor nodes are implemented using small microcontroller units which measure different parameters like temperature, pollution level. The node cluster head can be implemented using an advanced embedded system which can communicate with the server and sensors, and perform data association and state estimation. The main server (cloud) can be simulated using simulation software.

There might be a possibility of errors in the implementation of this design solution, but it is hard to conclude without any implementation. The major area where errors might be generated is the central node where all the sensors are interfaced. The node cluster head forms the interface between two layers and also performs data association and state estimation. The resource constrained node cluster head would not perform well if many sensors are attached to it. Thus, for scalability, the cluster heads count will have to be increased which will increase the overall costs of the system.

Implementation and Performance Metrics

The practical implementation of the proposed design can be done using emulators and simulation tools. The sensor nodes can be implemented using small microcontroller units with very less computation capacity. Sensors can be interfaced to these systems which might measure all types of parameters like temperature, pollution content, weather conditions, and traffic at a particular place. These sensors then send the compiled data to the node cluster head. The node cluster head contains the data association and state estimation phases. The master node is capable of changing the configuration of the sensors depending on the application and user data requirements. This feature of providing a dynamic configuration of the sensors will provide an added advantage to the system. The implementation of the cluster node head can be done using another high end embedded system which can control the dynamic configuration and send the data to the server. It also computes the data using Evidence Reasoning method and Fuzzy Kalman Filter Approach.

There are several performance metrics defined by Wang, et. al, (2016) used for scaling the design solution to a scale of a smart city. The parameters are listed below.

- Context Awareness – Combining data from various sources helps to understand the context properly.

- **Dynamic Configuration** – There are two types of dynamic configuration i.e. hardware configuration and software configuration. Hardware configuration is to provide multiple functionalities depending on the application. So, if a sensor is providing one type of data for some amount of time, then it should be hardware compatible to provide another data as well like temperature. Whereas, software configuration is to change the cluster configurations of the system and reuse similar functionalities to get different type of data.
- **Type of Processing** – Network processing and cloud processing of data are two types of data processing methods. A hybrid data processing method is used in this domain which processes the data in network as well as at the cloud level.
- **Computation Cost** – The total amount of processing that needs to be done on all levels of the architecture comprise of the computational costs. The computational costs at sensor level, network level, and cloud level should be considered. Ideally, the sensor should be provided with the least computation and cloud should be provided with the highest computation.
- **Energy Consumption** – Each stage of the architecture will use energy to compute the data. With massive amounts of nodes installed in various locations, the energy consumption needs to be kept at minimum.
- **Scalability** – The implementation strategy should be scaled from a small simulation to a big scale. Thus, for a smart city data fusion architecture scalability is of utmost importance.

Comparison of design solution with existing solution

The design solutions discussed in various researches are compared with the design solution proposed in this report. Table 1 compares various implementations of data fusion to create a design metrics for implementation of data fusion methods. The design solutions discussed in the literature review do not cover all the performance metrics. Whereas, the design solution in this report covers all the features of the performance metrics and thus a better context aware and dynamic solution is proposed.

Parameter	(Rodger, 2012)	(De Paola, et. al, 2016)	Design Solution
Context Awareness	Not available	Context aware system	Context awareness feature due to Dempster – Shafer Theory.
Dynamic Configuration	Fault tolerant and dynamic detection using software	Dynamically configures sensory infrastructure.	Dynamic Configuration possible using software configuration
Type of Processing	Hybrid processing	Cloud Processing	Hybrid processing using both network and cloud processing
Computational Costs	$O(m^2 + m \cdot n)$ Where, n = number of sensors m = Number of possible values of various conditions in the system	Does not discuss computational costs.	Distributed computation shares the load of computation
Energy Consumption	Less energy consumption	High energy consumption due to computation of the data and transmitting the data wirelessly.	Less energy consumption as computation is done in cluster head nodes and main server. The sensors do not compute high amounts of data thus reducing the energy consumption
Scalability	Does not discuss any scalability feature	Solution is scalable depending upon subsystem discrete sensor needs.	Scalability is possible

IV. CONCLUSION

Data fusion is an old technique which is implemented in different domains of applications like image processing. The use of data fusion is not done in the Internet of Things domain and not popular. This research addresses the problem of lack of resources in the IoT domain for data fusion. In this research design, data fusion techniques have been studied to propose a unique hierarchical architecture for data fusion Internet of Things.

The design solution in this research proposes a new solution for data fusion. This unique solution combines the techniques of different implementations to provide a novel approach for data fusion. The design is robust with distributed computation on various layers of the solution which reduces the computational costs. Along with that, features like dynamic configurability and context awareness has been not be observed in other data fusion techniques together. The scalability feature is also included in the design which is described using an example of a supermarket and a smart city. A design metric is proposed to compare various data fusion algorithms before implementation. This design metric checks all the parameters which might have a significant effect on the system architecture. Thus, the design solution provides a novel approach for data fusion implementation in IoT domain and gives design metrics which can be used to compare the solutions with other implementations.

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RELATIONSHIP OF BREASTFEEDING FREQUENCY RELATIONSHIP WITH IKTERUS INCIDENCE AMONG NEWLY BORN BABIES IN AURA SYIFA HOSPITAL KEDIRI REGENCY INDONESIA

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Abstract- Breastfeeding as often as possible during the first day of life, can release meconium in infants. Meconium have a bilirubin, when it discharges, it can increases reabsorption of bilirubin and cause jaundice in infants. On demand breastfeeding with frequencies between 8-12 times / day, is very important for infants to prevent jaundice in infants. The purpose of this research was to know the correlation between breastmilk frequency with jaundice in newborn baby. The research design used analytic survey by approach of cohort. The number of population were 30 respondents, taken by using accidental sampling with the number of samples were 28 respondents, which was suitable with inclusion criteria. The instrument used observation sheet of breast feeding and the incidence of jaundice. Analyzed by Fisher Exact test with p value is 0.33 and the error degree is 0.05 ($\alpha = 0.05$). The result obtained p value is $0.33 > \alpha = 0.05$ indicate s that there is no correlation of breastmilk frequency with jaundice in newborn baby. Based on the result , shape of nipple and breastfeeding technique are very influence toward release of breastmilk. The maturity of liver's function determines the jaundice in newborn baby or not.

Index Terms- Newborn baby , Breastmilk frequency, incidence, jaundice

I. INTRODUCTION

As soon as the baby is born, early contact between mother and baby is an effective early attempt to allow breastfeeding (Deslidel, 2011). Breast milk is naturally easy to digest by newborns, as it is the only food that fits the digestive tract of newborns. Breast milk also contains antibodies that can protect babies from disease during the first 6 months of life (Maryunani, 2010).

Breastfeeding as soon as the baby is born, which is done for 30 minutes - 1 hour, is the first step performed between mother and baby, to train the baby's reflex to look for the nipple (*rooting reflect*) so that the process of suckling can happen soon. Riskesdas's results show the IMD process has increased from 293% in 2010 to 345% in 2013. This indicates that Indonesia is quite successful in implementing IMD (Pusdatin, 2013).

In Indonesia, the incidence of jaundice that occurs in some education hospital such as in Cipto Mangun Kusumo, 58% occur in neonates at term and 29.3% occurred in preterm neonates. At the dr. Sardjito Hospital reported as many as 85% neonates sufficient months and 23.8% premature neonates experienced jaundice early in life, and at the Hospital of dr. Kariadi Semarang, jaundice incidence of 12.0% occurred in the Neonatal and 22.8% in preterm neonates. Hyperbilirubinemia-related mortality rate was 13.1% (Ningsih, 2013).

Based on a preliminary study conducted at Aura Syifa Hospital Kediri District, the incidence of jaundice in 2014 occurs in 5 infants and in 2016, 11 babies experience jaundice early in life. This suggests that the incidence of jaundice in newborns is still common.

One effort to prevent jaundice in newborns that can be done is to breastfeed as soon as possible in infants to reduce enterohepatic circulation work, maintain normal bacteria flora stability, and stimulate small intestine activity (IDAI, 2008). Breastfeeding as early as possible and as often as possible will increase intestinal motility and also causes the introduction of bacteria into the intestine. Bacteria can convert the direct bilirubin into non-reabsorbed urobilin. Thus, serum bilirubin levels will fall (Maria, 2013).

Based on the results of research Khairunnisak (2013) about "The Relationship of Breastfeeding with Genesis Ikterus in New Baby Born 0-7 Days in Hospital General Area Dr. Zainoel Abidin Banda Aceh Year 2013", it was suggested that from 35 respondents who frequently did breast feeding, the majority had jaundice (68,6%) with yellow color not seen within the first 24 hours after the baby was born and from 16 respondents who did not often give The majority breast milk 87.5% had jaundice with a yellow color seen in the first 24 hours after the baby was born.

According to Rufia Desi Maria (2013) study on the "Frequency of Breastfeeding with Ikterus Incidence at BBL 2-10 H in BPM" N "Padang Panjang T 2013", indicating that of 30 babies with physiological jaundice, 18 infants (60%) had jaundice because of the lack of breastfeeding and as many as 12 babies (40%) did not experience jaundice because they often breastfed.

Nofrida Pratistiyana (2011), the results of research on "*an association of Breastfeeding Frequency with Jaundice Neonatorum an incident in Surabaya Adiguna RSB*" showed that of 30 term infants, there were 7 term infants who had neonatal jaundice with a frequency of breast feeding <8 times per day, whereas 23 term infants did not have neonatal jaundice is almost entirely infants with a frequency of breastfeeding 8-12 times per day 22 infant (95.65%).

Based on practice experience in June 2014 at Gambiran Hospital Kediri for 2 weeks in baby room, found 5 babies who have jaundice. Sela y n received phototherapy, babies with jaundice also DIBE offered are in the form of infusion fluid and breast milk. While breastfeeding alone found 1 baby only.

Thus, breastfeeding in the early weeks of life, is very important for newborns who have jaundice. Breastfeeding is done on demand according to infant needs within 24 hours between 8-12 times. In addition to regular breastfeeding, babies are sunning every morning, or the use of phototherapy also helps lower high total bilirubin levels, thus preventing the jaundice of the newborn.

II. METHODS

The research method used in this research is an analytic survey using *cohort* research design. Analytical survey is a survey or research that tries to explore how and why health phenomenon that happens. Then perform the analysis of the correlation dynamics between phenomena or between risk factors and effects factors (Notoatmodjo, 2012).

III. RESULTS

This chapter shows the results of data collection that has been implemented on July 3 to 23, 2017 at Aura Syifa Hospital Kediri regency that discusses the relationship of frequency of breastfeeding with jaundice in the newborn with a total sample of 28 respondents.

In the results of this study, the data will be presented among them consists of general data and special data. General data in this study describes the characteristics of newborns consisting of sex and type of labor. While the special data describes the variables that exist in the study, among others, the frequency of breastfeeding and the incidence of jaundice in newborns.

Table 1 Frequency Distribution Binds Sex on New Baby L ahir at Aifera Syifa Hospital Kediri Regency.

No.	Gender	Amount (n)	Percentage (%)
1	Man	18	64.29%
2	Women	10	35.71%
Total		28	100%

Source: Primary Data from 3 - 23 July 2017

Based on table 1 it can be seen that most of the respondents are male, namely 18 newborns (64.29%).

Table 2 Frequency Distribution by Type of Labor on New Bay i Lirir at Aifeh Syifa Hospital Kediri Regency

No.	Type of Labor	Amount (n)	Percentage (%)
1	Spontaneous Birth	19	67.86%
2	Delivery of <i>Sectio Secarea</i>	9	32.14%
Total		28	100.00%

Source: Primary Data from 3 - 23 July 2017

In Table 4.2, the majority of respondents, ie 19 newborns (67.86%), were born spontaneously.

Table 3 Frequency Distribution Based on Frequency of Breastfeeding in Newborns at Aura Syifa Hospital Kediri Regency.

No.	Frequency of Breastfeeding	Amount (n)	Percentage (%)
1.	≥ 8 times / day	12	42.86%
2.	<8 times / day	16	57.14%
Total		28	100.00%

Source: Primary Data from 3 - 23 July 2017

Newborns were breastfed with frequencies <8 times / day more with 16 newborns (57.14%), whereas breast-fed bay with a frequency of ≥8 times / day of 12 newborns (42, 86%) as shown in table 3.

Table 4 Distribution of frequency based on the incidence of jaundice on day 2 and 3 on newborn at Aura Syifa Kabupaten Kediri Hospital

No	The incidence of Jaundice	Day 2 (n)	Percentage (%)	Day 3 (n)	Percentage (%)
1	Baby Jaundice	18	64.29%	22	78.57%
2	The baby is not Jaundice	10	35.71%	6	21.43%
Total		28	100.00%	28	100.00%

Source: Primary Data from 3 - 23 July 2017

On the 2nd day, 18 newborns (64.29%) had jaundice, and almost all respondents had jaundice on the 3rd day of 22 newborns (78.57%), as shown in table 4.

Table 5 Table of Relation of Frequency of Breast Feeding with Genital Jaundice in Newborns at Aura Syifa Hospital Kediri Regency

No.	Frequency of	The incidence of Jaundice	Total	%
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	Breastfeeding	Baby Jaundice		The baby is not Jaundice			
		Amount (n)	%	Amount (n)	%		
1	≥ 8 times / day	9	32.14%	3	10.71%	12	42.86%
2	<8 times / day	13	46.43%	3	10.71%	16	57.14%
Total		22	78.57%	6	21.43%	28	100.00%

Source: Primary Data from 3 - 23 July 2017

Based on table 5 it can be seen that almost half of the newborns who were breastfed with frequencies <8 times / day and had jaundice, 13 newborns (46.43%) were higher than breastfed babies < 8 times / day and do not have jaundice.

To analyze the relationship between frequency of breastfeeding and the incidence of jaundice in newborns, a statistical test using Fisher Exact obtained with values calculate equal to 0,33 with error level 0,05 ($\alpha = 0,005$), then got result calculate that is $0,33 > \alpha = 0,005$ then H_0 accepted and H_1 rejected which mean there is no relation between frequency of breastfeeding with incidence of jaundice in newborn in Aura Syifa Hospital Kediri Regency.

IV. DISCUSSION

Based on the results of research conducted on 3 to 23 July 2017 at Aura SyifaHospital Kediri district, from 28 newborns who were treated with his mother, 12 newborns (42.86%) were given breast milk with frequency ≥ 8 times / days. This is because during 24 hours the mother gives breastfeeding to her baby *on demand* . This is consistent with Hegar's (2008) theory which states that the frequency of breastfeeding is breastfeeding as often as possible according to the baby's needs at least 8 times within 24 hours, even at night the milk is also given. Breastfeeding at night can maintain breast milk supply because the hormone prolactin increases at night.

In the observation of frequency of breastfeeding, 16 newborns (57.14%) of 28 newborns studied, the frequency of breast feeding <8 times / day. Asih (2016) explains, breast milk in the baby's stomach will be empty within 2 hours. The statement is supported by Handy's (2012) revelation explaining that in the first 24 hours of life, the baby will only awake the first 2-4 hours, and sleep for up to 20 hours. It is important for the mother to wake the baby every two hours to breastfeed, so that the baby's need for breastfeeding is fulfilled.

The results of observation research showed, from 20 breastfeeding mothers, 17 mothers have a short nipple shape and 3 other mothers drown nipples. Monika (2016) says, the high amount of breastfeeding is one of the frequency factors of breastfeeding. Adequacy of breastfeeding expenditure may trigger the mother to breastfeed as often as possible. Breast milk that can be out in time but its production is not optimal due to several factors, one of which is the form of the nipple is less prominent / flat / immersed, thus blocking the flow of milk out through the nipple.

The lack of breast milk that comes out to be an initial problem for breastfeeding mothers postpartum. A total of 20 mothers said that the milk that came out was a little, so the mother found it difficult to give milk to the baby, because the baby is hungry while a little milk that comes out. Mom becomes anxious and lazy to give milk. According to research conducted by Amalia (2016) with the title "Stress Relation with the smoothness of breastfeeding in the mother breastfeeding after delivery in RSI A.Yani Surabaya" from 15 respondents experiencing stress, 11 respondents found the milk is not fluent, and 4 other respondents expenditure ASI classified smoothly. This is because the mother still feels exhausted postpartum, has pain

wound stitches perineum / SC which causes the mother to fear mobilization, and the mother worried about himself because he felt a heavy burden postpartum.

Not frequent breastfeeding given to infants, can make milk production decreases. Almost all respondents, have a short nipple shape so that the mother difficulties breastfeeding and difficult attachment. Because the milk produced a little, make the mother lazy to breastfeed her baby.

On the second day after the baby was found 18 newborns (64.29%) had jaundice and on the third day, the number of jaundiced babies increased to 22 newborns (78.57%). This is in accordance with the theory presented by Hidayat (2009) that physiological jaundice is jaundice that arises on the second day and the third day after birth and disappears in the first week, no later than the first 10 days after birth.

Increased number of newborns on the 3rd day after a jaundiced birth due to immature liver function. According to Sodikin (2011), the maturity of liver function affects the ability of the liver in conjugating bilirubin. The function of liver excretion and bile flow associated with excretion and recirculation of bile acids. Maturation of bile acid metabolic processes affects overall liver excretion function, including bile excretion. When unconjugated bilirubin is buried in the blood, the skin, sclera and mucous membranes settle into yellow called jaundice. The function of the heart starts matur, when the baby enters the age of 2 weeks. At 2 weeks of age the liver is able to perform bilirubin conjugation and remove bile.

The result of statistical test using Fisher Exact test yields value calculate equal to 0,44 with error level 0,05 ($\alpha = 0,005$), meaning H_0 accepted H_1 is rejected or there is no relation between frequency of breastfeeding with incidence of jaundice in newborn.

UDPGT (Uridine Diphospat Gluconide Transferase) enzyme and G6PD enzyme present in liver, are not actively working. Both enzymes work in bilirubin synthesis. Immature liver conditions interfere with the breakdown of red blood cells. In short the breakdown of red blood cells in bilirubin results in the accumulation of bilirubin on the skin so that jaundice can arise (Rahardjo, 2015).

with the title of the study "The association of breastfeeding with the incidence of Ikterus Neonatorum in UPT Sumberglagah Mojokerto Hospital" mentions that based on bivariate test with independent sample t - test between breastfeeding with neonaturum jaundice resulted in a group of $-0.46 > 0.005$ ($= 0.084$) with 95% CI $-0.097; 0.63$, and Mann Withney test $= 0.111$ by means of meaningless signification, so there was no difference between breast-fed and formula-fed groups.

After the baby is born, the baby must be able to defend themselves even without being breastfed. Newborns have glucose reserves stored in the liver in the form of glycogen. The chocolate fat that babies have for months, can help break down the fat into heat using glucose so babies can get energy without having to be breastfed. Babies can survive not breastfed as long as chocolate fat reserves are still abundant. The number or absence of brown fat produced, judging from the sufficient or less gestational age at birth

V. CONCLUSION

Based on the results of research and discussion in the previous chapter, researchers dance k conclusion as follows:

Most newborns are breastfed with a frequency of breast feeding <8 times / day. Most newborns develop jaundice on day 2 and almost all newborns develop jaundice on day 3. There is no correlation between the frequency of breast-feeding with an kejadi jaundice in newborns at Aura Shifa Hospital Kediri.

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Haematological and Biochemical profiles of West African dwarf goat fed diets containing cassava peels, brewers' spent grain and panicum maximum

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Abstract. Twelve (12) West African dwarf goats were fed for fifty six (56) days intensively with cassava peels meal (CPM), Brewer's spent grain (BSG) using panicum maximum (PM) as basal diet and maize based diet as control. Diet A is 52% maize-based diet while diets B, C and D are diets which replaced the 52% maize with 25% BSG/75% CPM, 50% BSG/50% CPM, 75% BSG/25% CPM respective. Results show that packed cell volume of diet C was not significantly higher ($p>0.05$) than A but significantly higher (<0.05) than D and B. Erythrocyte count of diet C was significantly higher ($p<0.05$) than B but not significantly higher than others. The percentage Neutrophil was significantly lower ($P>0.05$) in diet C than others. Percentage Monocyte of diet C was significantly higher ($p<0.05$) than others. Other parameters such as haemoglobin, red blood cell; white blood cell; Platelet. Lymphocyte, Eosinophil, Basophil, mean corpuscular volume; mean corpuscular haemoglobin; mean corpuscular haemoglobin concentration did not show any significant difference ($p>0.05$) among the diets. Serum biochemical profile results show that total protein (g/dl) did not show any significant difference ($p>0.05$) among the diets. Albumin (g/dl) of diet C was significantly higher ($p<0.05$) than others. The globulin (g/dl) of goats on diet C is significantly lower ($p>0.05$) than that of diet B but not of others. Creatinine (mg/dl) did not show any significant difference ($p>0.05$) between diets A and C but they were significantly higher than others. Calcium (mg/dl) was significantly higher ($p<0.05$) in goats placed on diet C than others. These results indicate that goats placed on these diets most especially diet C. could be used to fatten goat, reduce labour and feed cost associated in ruminant (goats) production.

products, meat is the major form in which goats are consumed in Nigeria (Alikwe *et al* 2011)[2]. The demand for goat meat is very high and it commands high market price than beef (Odeyinka 2000) [3]. They also noted that ruminants are capable of increasing the supply of food for humans by consuming materials that otherwise could contribute little or nothing to feeding people. These include forages from rangelands, plant by-products, and crop residues from which humans are unable to derive any energy. Cassava peel is an important by-product available from the processing of cassava root for food uses and starch and has been used in feeding various classes of livestock (Akinfala and Tewe 2004)[4]. These authors further added that ruminants can be fed on cassava tubers, leaves, peels, and residue obtained after processing cassava for garri, fufu, and starch. The potential of cassava as a grain substitute in livestock feed is yet to be fully explored as only a small portion of world total production is currently being used in compounding non ruminant diet. Brewers' waste grain is a readily available, high volume low cost by-product of brewing (Robertson *et al* 2010)[5] and has been reported to contain cellulose, hemicellulose, lignin, and high crude protein of 23.25% (Russel *et al* 1983).[6] These nutrients cause increased endogenous metabolism as well as high proteolytic activities (Ikurior 1995)[7]. These nutrients aid in utilization of feed for ruminants (Biasaria *et al* 1997)[8]. The utilization of cassava peel and brewers' spent grain has found a place in goat nutrition which not only reduces labour of fetching fodder but also create an outlet for these wastes. This study was therefore carried out to evaluate the effect of dietary inclusion of cassava peel and brewers' spent grain on haematological profile and serum biochemistry of WAD goats.

Index Terms: Haematology, West African dwarf goat, cassava peels, brewers' spent grain.

I INTRODUCTION

The demand for animal protein in Nigeria and other developing countries have been in the increase because of rise in human population. Goats are multipurpose animals producing meat, milk, skin, and hair (French 1990)[1], and out of these

II MATERIALS AND METHODS

A Experimental Site

The experiment was conducted at the goat unit of the Department of Animal Science, Akwa State University, Obio Akpa Campus which is situated between latitudes $4^{\circ}30'$ and $5^{\circ}30'N$ and longitudes $7^{\circ}30'$ and $8^{\circ}00'E$ of The Greenwich meridian (SLUS – AK, 1989)[9]

B Management of experimental animals

Twelve (12) females West African Dwarf goats between the ages of 6-9 months were purchased from small holder farmers in Obio Akpa and used for the experiment that lasted for 56 days. The goats were given long lasting antibiotics (oxytetracycline) and treated against ecto- and endo- parasites using ivermectin before the commencement of the experiment. A week to the arrival of the animals in the farm, the experimental pens were properly washed and fumigated. Thereafter, the cemented floor was covered with wood shavings which served as litter materials and bedding for the goats. Upon the arrival, initial weights of the animals were taken and they were randomly assigned to four treatments with three goats per treatment. Each goat was housed in separate pen equipped with water and feed troughs. Seven days adjustment period was given to allow the animals acclimatize to the new environment. During this period, the experimental diets were offered to them to clear the digestive tract of old feed residues.

C Experimental Diets and Feeding

Cassava peels were collected from processing units in the rural areas. The peels were sundried for 7 days then coarsely ground. Brewers' spent grain (BSG) was obtained from champion brewery Plc, Uyo. The wet grain was pressed using screw press to remove moisture before it was sundried for five (5) days. Diet A which served as control did not contain cassava peel meal (CPM) and BSG but 52% maize in composition. In diets B, C, and D the 52% maize was replaced with 25%CPM/75%BSG, 50%CPM/50%BSG, and 75%CPM/25%BSG respectively. The goats were given 500g of the experimental diets in the morning and chopped forage was served *ad libitum* in the noon in separate feeding trough. Fresh clean water was served daily.

D Chemical Analyses of Experimental Diets

Samples of the experimental diets and forage were analyzed for their proximate composition using standard procedure (AOAC, 2000)[10]

E Data Collection

On the last day of the experiment, blood samples (10ml) were collected for haematological studies from the jugular vein of the goats using needles and syringes and put in sample bottles containing ethylene diamine tetra acetic acid (EDTA) and there after analyzed for packed cell volume (PCV), haemoglobin, erythrocyte count, mean corpuscular haemoglobin concentration, total white blood cell count (eosinophils, neutrophils, lymphocytes, and monocytes).

F. Statistical Analyses

The experimental design used was a completely randomized design (CRD). Data were subjected to a one way analysis of variance. Means with significant differences were separated using Duncan Multiple Range Test (DMRT)

TABLE 1: COMPOSITION OF EXPERITAL DIETS

Ingredients	DIETS			
	A	B	C	D
Maize	52.00	--	-	-
Cassava peel	--	1300	26.00	39.00
BSG	--	39.00	26.00	13.00
Soybean meal	5.00	5.00	5.00	5.00
PKC	34.50	34.50	34.50	34.50
Molasses	5.00	5.00	5.00	5.00
Bone meal	2.50	2.50	2.50	2.50
Salt	1.00	1.00	1.00	1.00
Total	100.00	100.00	100.00	100.00

Diet A= 52% maize; Diet B =25% CPM/75% BSG
Diet C= 50% CPM/50% BSG; Diet D=75% CPM/25%BSG;
CPM = Cassava peel meal; BSG = Brewer's spent grain; PKC= palm kernel cake

III RESULTS AND DISCUSSION

Table 2: Proximate Composition of Experimental Diets

NUTRIENTS	DIETS					
	A	B	C	D	SEM	PM
DM(%)	91.30	92.45	91.88	91.54	1.91	35.46
CP (%)	13.25	15.82	13.72	11.57	1.09	8.89
CF (%)	5.51	10.16 ^{ab}	12.51 ^a	7.81 ^c	0.76	28.91
EE (%)	4.33	4.75	4.14	3.53	0.38	2.94
Ash (%)	7.05	7.65	9.34	6.34	0.75	2.70
NFE(%)	69.86	61.62 ^b	60.29 ^b	70.75 ^a	1.59	46.50
Energy	2630	2101	2327	2554	2.04	859 (kcal/kg)

a, b, c means on the same row with different superscripts are significantly different (P<0.05)

Table 3: Blood profile of goats fed diets containing Cassava Peel Meal, Brewers' Spent Grains, and basal *Panicum maximum* diets

Parameters	DIETS				SEM	Normal range
	A	B	C	D		
PCV (%)	29.75 ^{ab}	25.00	30.25 ^a	26.75 ^{ab}	1.38	22- 38
Hb (d/gl)	9.08	8.08	9.50	8.53	0.43	8-12
RBC ×						

10 ⁶ ul	18.30 ^a	15.63	19.78 ^a	18.15 ^a	0.64	8- 18
WBC ×						
10 ³ ul	13.30	10.65	11.20	11.65	1.75	4- 13
Platelet ×						
10 ³ ul	0.85	0.72	0.54	0.79	0.41	0.3- 0.6
Neutrophil						
(%)	19.50 ^a	19.25 ^a	12.00 ^b	19.25 ^a	1.34	12- 72
Lymphocyte						
(%)	77.75	77.25	81.70	78.25	1.73	20- 90
Eosinophil						
(%)	1.00	1.00	1.50	0.75	0.57	1- 80
Monocyte						
(%)	1.75 ^b	2.50 ^{ab}	4.50 ^a	1.25 ^b	0.70	0- 40
Basophil						
(%)	0.00	0.00	0.25	0.50	0.19	1- 2.5
MCV (fl)	16.28	16.35	15.40	14.75	0.85	16- 25
MCH(pg)	4.98	5.18	4.85	4.73	0.29	5- 80
<u>MCHC</u>						
(g/dl)	30.45	31.63	31.43	31.95	0.66	30-36

a, b means on the same row with different superscripts are significantly ($p < 0.05$) different. *Normal range values (Radostits *et al.*, 2000)[11].

PVC=packed cell volume; Hb=haemoglobin; RBC=red blood cell;

WBC=white blood cell; MCV=mean corpuscular volume;

MCH=mean corpuscular haemoglobin; MCHC=mean corpuscular

haemoglobin concentration

The effects of dietary inclusion of cassava peels and brewers' spent grain on haematological profile of West African Dwarf goat are shown in Table 3. There were significant differences among the treatments for packed cell volume, erythrocytes count, neutrophils, and monocytes. Packed cell volume values for diet A(29.75%) and diet D(26.75%) were similar ($P > 0.05$) and differed ($P < 0.05$) from other treatments. The range (25.50-29.75%) were within the reference value reported by Radostits *et al* (2000)[11] Haemoglobin values were between 8.08- 9.50g/dl and fell within the reference value indicating that cassava peel and brewers spent grain did not interfere with oxygen transportation. The red blood cell (RBC) value for diets A(18.30×10^6 ul), diet C(19.78×10^6 ul) and diet D(18.15×10^6 ul)

were similar ($P > 0.05$) but differed from diet B(15.63×10^6 ul). However, red blood cell value of goat on diets B, C and D fell within the reference value of $8- 18 \times 10^6$ ul reported by Radostits *et al* (2000)[11] for clinically healthy goats. This indicated that goats were not anaemic or diseased. The white blood cell values ($10.65-13.30 \times 10^3$ ul) were not significantly different ($P > 0.05$) among the treatments. White blood cell value of goats on diets B, C, and D were within the normal range for healthy WAD goats reported by Radostits *et al* (2000). This indicated that goats placed on diets containing cassava peel and brewers' spent grains were not struggling with any anti-nutritional factor in the diets. The little deviation from the normal range shown in diet A(18.30×10^6 ul) could be attributed to error during laboratory analysis of blood. This experiment has shown that a combination of these waste products (cassava peel and brewers spent grain) with a forage (panicum maximun) could be used to fatten goats without any adverse effect, reduce labour and feed cost associated with ruminant (goats) production.

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Impact of Employee Motivation on Work Performance

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Abstract

Employee motivation is the key factor to boost up the function of an organization. In the globalization phase, every company needs to sustain in the fierce competitive market. Employees are main factors to manifest the business goals into reality. Therefore, in today's world every organization tries to manage their human resource department to keep their employees motivated. In that context some of the management theories have been practicing by them. Business function or their performance in the market can be evaluated by assess the level of motivation of employees. Motivation can play a lead role to get the professional milestone in each financial year in less effort manner.

Index Terms - Business organization, Employees, Governance, Motivation, Outcome, and Performance

Introduction

In the present globalized era, business entities bulls eye on to earn massive revenue in each financial year. In that prospects those organizations set different kinds of agendas to get the competitive advantage in the fierce market competition. Business organizations establish a good corporate governance to reach on their every financial and nonfinancial goal. In order to reach to that target those companies are now take the initiative to keep motivated their skillful employees. Employee motivation brings success to any types of business enterprise, whether that is midsize organization or a multinational company. In order to run the functional process in smooth manner the companies are preparing some outstanding strategies to maintain the corporate governance and get the competitive advantage in certain way.

Any type of company has consisted with various department, such as the finance department, administrative department, public relation department, sells department and human resource department. The human resource department is responsible to manage the employees and to extracts Excellencies from the skillful employees; based on the employee performance report

Authorities take the decision to promote or demote the employees. Presently the human resource department has a major impact to bring large scale productivity for any organization by managing the employees. According to various researchers of this specific title that is the impact of the motivation of employees on work performance they have been stated that if the employees of any companies need to be motivated then their psychological factors need to be assessed by the authority of an organization. In other words some scholars said that employees can not engage with their assigned task until and unless they are pursuing the positive mentality.

Interpersonal communication intended purpose only can be fulfilled if the intrapersonal communication goes in systematic and satisfied manner. In the subject of communication interpersonal communication is such a factor which help person to communicate with themselves. If they are able to understand their needs transparently they can plan in systematic manner in their professional field.

This paper highlight over the different factors associated with the employee motivation process. In many companies there have been assigned some trainers and personality developer to motivate the employees but all those factors are willing to enhance the capacity of the employees not to motivate the employees from their inner perspective indeed. If worker do understand about the importance of the work and the professionalism then they automatically will be involved to their assigned work. The aim of this paper is to find out the effectiveness of the motivated employees for any business organization.

Research objectives

Research objectives make outline for the research work. In what way the research should be preceding that could be done by determining the objectives of any research work. The research objective of this paper is analyze the importance of the employee motivation for bring the large scale productivity in an organization. Whether the overall business performance depends over the employee motivation or depends on other factors will be analyzed and this is the objective of this research paper.

Hypothesis

Hypothesis assist a researcher to make assumption before proceed with the research elaboration. Based on the research hypothesis, the structure of the research work can be done. In that context the hypothesis of this paper are mentioned below:

H1: Motivation of employees plays the dominant role over the business performance of an organization

H0: Employee motivation is only a sub part for bringing the large number of productivity

The above mentioned hypothesis can be asses by the researcher to maintain the objective of the research and to fulfill the objective of the study.

Research Elaboration

Internal factors for employee motivation:

Employee retention and the employee motivation depend on each other. Efficient and proficient employees can be retained by default if they are motivated, without the motivation factor the results of the function would not be so encouraging. Thus at present many companies have been tried to manifest many process to inspire their employees through the human resource department. Moreover, if an organization tried to influence their worker in positive manner then they should assess the psychological factors of staffs. Intrinsic reward system keep motivate the employees in positive manner. The main perspective to give reward to the efficient employees is to manage a good operation and to build a higher brand value among the potential customers. Employee motivation not only helps an organization to earn the good amount of profit but also this can help the business entities to management their corporate governance system in systematic way. Corporate governance system is the set of rules and regulation applicable for all staffs manifested by the authority of an organization. Corporate governance is the system for the companies to reach over the stated goal within a specific time period and how the entire work functions can be done is also mentioned in this set of rules and regulation. In this context the corporate governance system can be followed properly if the human resource department plays an important role to keep motivate their employee based on their psychological perspective. Sometime in the corporate governance system the ethics of the employees also be mentioned because the corporate responsibility of an organization is based over the brand value acquired by the each and every business organization. Employee motivation is the key factor in this context. Employee motivation depends on the various factors of business entities. This is not the dependent variable of a company. These factors have been associated with many sub factors linked up with the organizational function. The sub factors related with the organizational function that have importance over the employee motivation are the financial and non financial aspects of the organization. In other words it can be stated that if the organization is much strengthen with the financial resource then they can offer more lucrative offers to their staffs and have been able to provide

more facilities to their employees, but if that is so then it was hard to maintain that employee satisfaction cost. The other factors which have direct impact over the employee motivation are the administrative functions. The administrative system or the corporate governance is the system that can help the employee to understand about the equal opportunities avail by the all employees. In general words if the authority or the administrative system have been consider the employee in unequal basic then it creates dissatisfaction among them and as a results the business performance became downwards. The level of performance of the employees are dependent on the other factors as well, such as work pressure and the technique of the work of the team leaders are directly involve to uplift the psychology of the team member. In this context it can be stated that, if a specific goals have been assigned to a specific team then the members of the team will be lead by the team leaders. The role of the team leader depends on his or her mentality and based on that he or she would be succeed to manage the team members functions. The action of the team members depends over the instruction of the team leaders. Whether the work agenda would be fulfill by the authoritative manner or in democratic manner. As per the previous studies done by the renowned researchers and scholars, the employees or the team members are generally motivated by the democratic style of leadership, where their voice also are empowered in the decision making policy for a company (Goleman, 2017).

Along with that the intrinsic reward system directly shows about the concern for the employees, According to Rafique *et al.* (2014), Intrinsic reward is an important factor for the employee motivation. Relationship among the appreciation, recognition and performance are directly proportional with the employees' motivation factors. In the distinct relationship among the appreciation and recognition majorly affects the overall performance of a business organization (Chapman and White, 2011). In other words when the appreciation is practically done by recognizing the effort done by the workers then it is benefited the organization in both perspectives such as by inspiring the employees and to set the business agendas for their corporate governance system. In any organization there are many factors which can lead the employees to obtain the Excellencies from their work agendas. This state or condition can be experienced when the staff of a company is enough motivated to do their work. In that context the focus of the study can be supported by the Maslow's hierarchy of needs theory and by the Douglas McGregor's X and Y theory of management. Another area which may influence the employee motivation is the work environment. Working place environment are the factors which derives any employee to obtain his or her goal required for the business Excellencies. If the employees are maintain a healthy relationship among them then the level of competency has decreased and they get support in their working agendas, in larger perspective those process of cooperation is beneficial for the organization development. Development will not occur only in economic perspective but also in perspective of the employee non-financial factors such as employee relation and loyalty for the work. The performance of the employees depends over this above mentioned internal factor. Although the world's has been changing rapidly and the aspect of the requirement of the service users is also get modified day by day. Therefore, it can be effortlessly assumed that the pattern of the employee management by the human resource department also changed its aspect (Cascio, 2018). Therefore the process of setting the agendas for the employees' motivation by the human resource department also need to be changed based on the working procedures of the organization in this globalized era. In present technological era it has become difficult for the business companies to manifest the anti-globalization in order to sustain the employees. The retention of the employees depends over the level of motivation they get from their workplace. Interpersonal communication is the main area for the employee motivation. In very simple word the difference between the employee performances vary over their psychology. The inner and outer world or the circumstances creates the difference among the employees. The opinion of the researchers of the psychological ground depicts about the fact that when an employee is not much engaged in their professional filled with a delightful mentality then both in personal and professional domain he or she may not devote themselves entirely (Korschun et al. 2014). Both it can create difficulties for their every personal and professional aspect. In order to motivate the employees the companies have been arranging different personality development training which not just only

limited for bringing the benefit for the organization but also develop the whole person as a human being. The specialized team is aiming to set a positive mind set among themselves among every opportunity and in every occurred challenge in their lives.

External factors for employee motivation:

Along with the internal factors for the employees motivation there also have some external factors for the employee motivation. Those external factors are circumstances and the level of competition. In detail it can be stated that the mindset of the employees depends over the circumstances from where they are belonging. In that order the companies have been tried to satisfy the employees by take necessary action to manage their personal problems, like giving financial support to the family members during the illness in a particular hospitals where the staff would be able to get the medical treatment assistant(Lazaroiu, 2015). These factors can retain an employee with their loyalty towards their office and exchange a healthy relationship among all the workers and the authority.

Another factor is the level of competition. The market conditions the competition among the workers force the employee to experience extra pressure for competition any task. Moreover, the human resource department in that context arranges meetings and workshops, where the skillful employees who have been able to perform their job role in excessive work pressure will be rewarded. This strategy can boost up the level of confidence of the employees. Positive mindset of the employees is not just rewarding for the organization but also boost up the personal skills of the employees which can pay them pertained with their personal skills for future purpose.

Literatures review

In the previous journals of this specific topic, there the different aspect of the employee motivation aspect have discussed in rational way. Among the other studies the most highlighted area, which get the attention of the academics and the other researcher of this specific title are the motivation factors to employees and performance level of an organization by the motivated employees.

Motivation factors to employees

As per the previous study done by the renowned researchers, an organization consisted with many factors that can directly the impact the level of motivation of the employees. The employee are belongs from different cultural background there according to the author Osgood's model, where he shed light over the circumstances. As per the opinion of the Osgood circumstances plays the dominant role to create the structure of mentality of a person (Osgood, 1966). Thinking pattern and the action of a person depends over that circumstances, therefore it is natural to become concern over the circumstances of an employee to gain the positive results from their business function. Other factors that can be directly linked up with the aspiration of the staff is inter- departmental collaboration. To understand this point we need to know about the facts of a company there are various kinds of department which a need to be constructed during their operation management and in each department there have been assigned many employees. Nevertheless there have no collaboration among those departments then it will create the challenges for the organization to achieve the business goal in effortless manner. Therefore as a results those employees also became de-motivated and frightened about their job security, but if their persist harmony among every departments then it will create the opportunity for true employees to know their working procedure in systematic way and healthy relationship among the staffs always bring positive outcome for the entire organization and in perspective of the employee then they can become motivated to to complete their work.

Performance level of motivated employees

Performance level of the employees can be understood during the assessment of each financial year. Motivated employees are always beneficial for the business organization in order to increase the production level and to boost up the frequency of the manufacturing, by maximizing the agendas in comparison to the previous works agenda. Performance level of the motivated employees can assist the business organization to get the competitive advantage. Motivated employees manage their working procedures in that manner by how companies can extravagantly get the advantage form perfect competitive arena.

Theories used for the employee motivation for improving business operation

Motivational factor for the employees to improve the business operation can be supported by some important theories of management field; those theories are the Abraham Maslow's Hierarchy of Needs theory, Herzberg's Two-factor theory, Expectancy theory and McGregor's X and Y theory.

Maslow's Hierarchy of Needs: Psychologist Abraham Maslow portrayed that in order to jump on the next level of psychological development, a person needs to satisfy himself or herself in all perspective, from where at present they existing, The characteristics of human life became satisfied when they can avail the psychological, safety, love, esteem and self -actualization process in their life span. Many organizations followed this theory to keep motivated their employees.

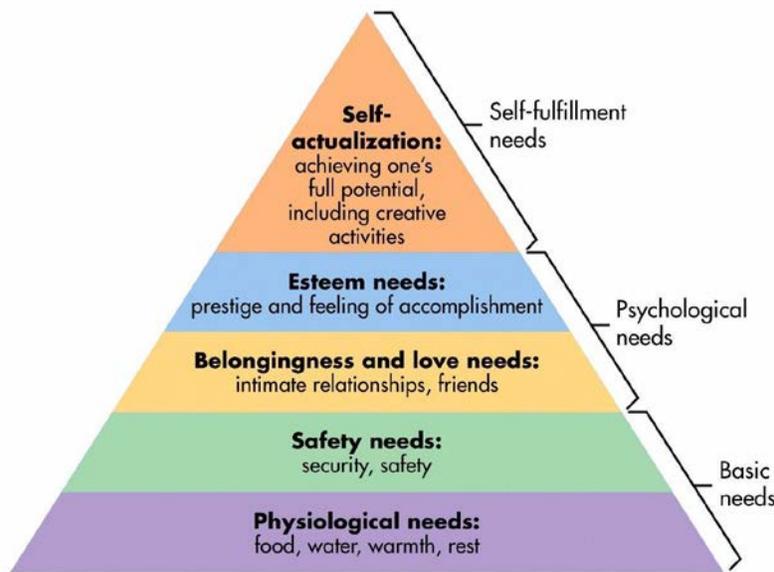


Diagram of Maslow's Hierarchy of Needs

(Source: Anderson, 2014)

Expectancy theory: The expectancy theory proposes that employees' behavior depends over the outcome the action. It suggests the aspects that when employees want hike in their salary increment they start working in longer hours. In this theory there have three main factors that are the expectancy, instrumentality and valence. In a workplace this theory can be executed by the authority, by giving reward to the employees for their good performance.

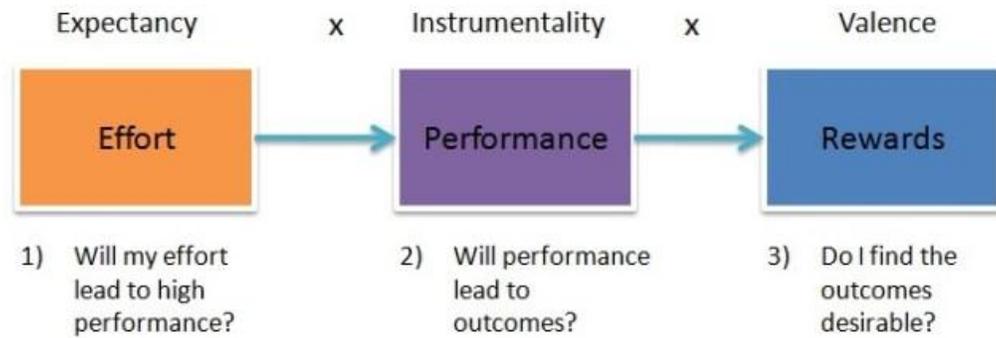


Diagram of Expectancy theory

(Source: Purvis *et al.* 2015)

Herzberg two factor theory:

- a) **Motivator factors:** The factors such like salary increment, good working environment motivate workers.
- b) **Hygiene factors:** Those factors which can de-motivate the employees, such as company policies, salary deduction, Unhealthy relationship with managers and coworkers.



Diagrams of Herzberg two factor theory

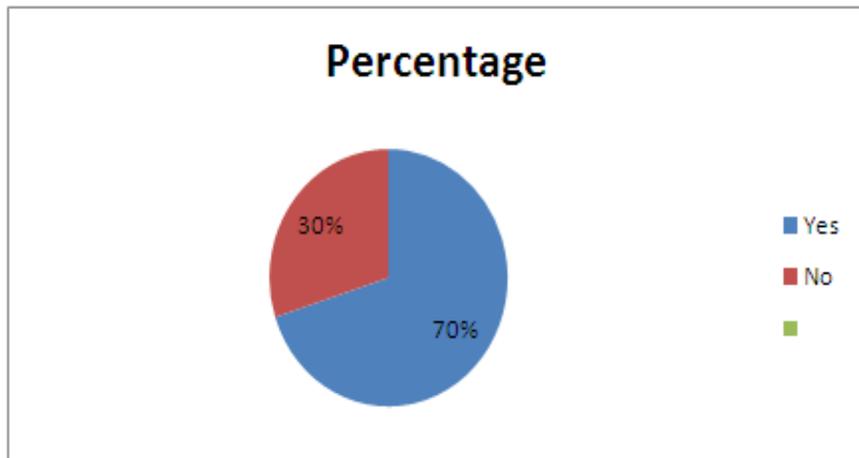
Source: Alshmemri *et al.* 2017

Research Methodology

Data source: In order to carry out the research, some important data need to accumulate from authentic source of information.

Primary data and secondary data can be gained by arranging the survey of the employees of private companies and have taken interview of the managers or to the chairperson of a organization.

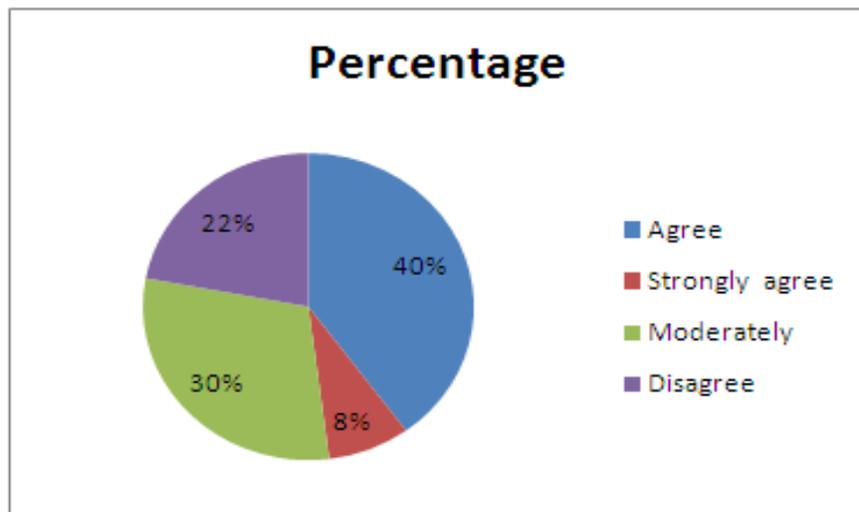
Secondary data can be gathered by assessing various kinds of books and journals over the topic of employee motivation from internet.



6. Do you agree that corporate governance system oppressive for the employees?

Options Responses Total Number of Percentage
respondents

<i>Agree</i>	<i>20</i>	<i>50</i>	<i>40%</i>
<i>Strongly agree</i>	<i>4</i>	<i>50</i>	<i>8%</i>
<i>Moderately</i>	<i>15</i>	<i>50</i>	<i>30%</i>
<i>Disagree</i>	<i>11</i>	<i>50</i>	<i>22%</i>



Qualitative analysis:

Based on the answers of the interview of the manager of XYZ Company, now a days the employees are now demanding for more facilities but the productivity also increasing rapidly in comparison to the previous years financial year results. The actually get the benefit in the context of gain competition and to retain their proficient employees for as long take after motivated them. As per his opinion motivated staffs can boost up the level of productivity.

Results or findings of the research work

After doing the entire study it can be understood that the employee motivation is not only an emerging factors in today's world but also it has some importance over the past years as well. In today's world where we find multinational companies with great brand value, behind of that the employee motivation existed performed by those organization. The above-mentioned study would depicts the fact that, employees generally want to work in their workplace with motivation and loyalty therefore the negative question of survey paper have less respondents. Along with that the interviewers also said that they get the enhancement in both financial and nonfinancial sectors after taking the initiative to keep motivating their worker.

Limitation of the research works

Conduction of research work is always accompanied by certain limitations that at certain point restrict the conduction of an in-depth evaluation of the concerned topic. However in concern to the research study on the impact of employee motivation on the work performance there were a few factors that developed as a limiting factor for the concerned researcher. With the execution of the study on the related topic the researchers could analyze that time and money were the two major factors that developed as a major challenge for the concerned researcher of the study. 9it was due to the limited time and small budget that restricted the researcher to lead the said research work to an upgraded version. In addition to this the ethical considerations were also another factor that enforced the researcher to limit the concerned research study. The researcher as had selected the secondary research method for the date collection process. Therefore this required authorization from the respective authorities which requires an ample of time. In addition to this the data collection and evaluation required a lump sum amount. This impelled the researcher to execute the research study within a stipulated budgetary cost. It was a challenging situation for the researcher to collect data from the secondary sources that could not be easily accessible without the respective authorization. Moreover it was difficult for the researcher to attain the access about the diversifying views of a range of other researchers and scholars about the influential impact of employee motivation on the work performance of a firm.

Recommendations

After the conduction of the specified research study it could be stated that it is pertinent for the employers of respective organizations to comprehend the significant importance of employee motivation and the level to which employee's commitment levels. Since, it is ultimately the employees of a firm that are responsible for the overall performance of an organization. The organization in the current scenario must undertake the initiatives that keep the employees of the firm, motivated so that they can deliver greater level commitment towards work. This would end up in increasing the work performance of not only the employees but also of the organization. Owing to the influential impact the motivation factor has on the employees the employers especially the human resource department of the organization must have an integrated approach towards nurturing the motivational levels of the employees. The employers of labor must know the diverse kind of strategies that could be used to influence their employee motivation standards to

perform well on a job. In more precise terms the relevance of the motivational factors depends not only upon the fact that meets up the needs of the employees but also on the fact that of the organization as well. The firm needs to assess the factors that have the ability to motivate an employee. With this assessment the organization would be able to develop a workplace culture in which the major motivational drivers are present (Raza *et al.* 2017). With the development of this type of workplace environment the organization would be able to retain a workforce that is both efficient and motivated and would act as a competitive advantage for the company in the market.

Summary of the research work

The hypothesis which states that employee motivation plays a dominant role in the business performance of an organization was accepted. This invariably signifies that the right kind of motivation is given to the workers of a firm then it has a significant influence on the workers performances which in turn impacts the overall business performance. This is in line with the empirical studies stated in the above sections that illustrate that favorable motivational factors tend to produce higher performance from the organizational workers. The research study even depicts that a motivated employee tend to demonstrate heightened level of work performance that in evidently has a powerful impact on the business performance of the company. Research study's evaluation collaborates with research objectives of the study that illustrate the importance of motivation on the performance of a firm. The research findings illustrate that it is the low consideration made by the organization in the employee motivation segment that contribute to low morale, lack of commitment and low productivity. Therefore the executed research study illustrates that the employee motivation should be recognized by the organizational authorities as a primary organizational need to enhance its overall work performance. The secondary data collected in respect to the concerned topic investigates the major factors that act as motivational drivers for the employees. The research demonstrates that the effective use of strategies in respect to improving the motivational levels of the workers could help the company increases their overall production rate. However, only the existence of the motivational tools would not cause an improvement in the work performance. It must be suitable applied by understanding the needs of the employees motivational needs only then there could be positive response in terms of business performance. The findings of (Lee *et al.* 2013) supported the concerned research work because the first hypothesis aligned with the concerned factors that the value of employee motivation consistently influenced organizational performance. The findings also showed that the individual employee that received intrinsic rewards performed better than those that did not received the rewards. In this respect the study illustrated that performance related appraisals and rewards has a significant impact on the workers motivational level and the standards of work commitment. Another major significant indication that has been made by the researcher in this concerned study is representing the financial factors that act as a important factor in influencing the overall motivation levels of the workers. The organization that tends to offer lucrative offers to its staff tend to expect higher standards of work performance, in lieu to this financial resources the organization is not only able to improve the performance of its workers. Instated it has tried to enhance the overall performance level of its firm thoroughly keeping the financial aspect as the major motivational drivers for the employees

Conclusion

As a conclusion it can be said that this paper will highlight over the shaded areas which need to be take into consideration by various organizations in order to enhance the business performance. In the phase of anti globalization era, a company can be effective to fulfill the desire of the employees. Which can assist the human resource department to understand about the various factors associated with the motivation factors of the workers. Then after doing the entire study it can be concluded that in positive and affirmative way it is a fact that the motivated employees can bring the desirable success for the various business organization to reach over the targeted

milestone in effortless manner. The importance of this paper can be understood when it can be a useful materials for the future researcher and for the academician as well. Moreover various business organizations can use this paper for strengthening their collaboration with employees.

Appendix

Survey Questions

Name:

Occupation:

1. How long you have been working in your present organization?

6 months	1 year	2 years	2-5 years
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2. Are you happy to deliver your effort in your workplace?

3. If your employer is in crisis situation, will you take the initiative to help them out, before asked by them?

4. Your like to be absent frequently for your work?

5. You would like to help your colleagues by professional assistance?

6. Do you agree that corporate governance system oppressive for the employees?

Agree	Strongly agree	Moderately	Disagree
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Interview Questions

Name:

Company:

Designation:

- What are the approximate numbers of employees in this organization?
- Maximum time duration an employee exists in this establishment?
- What kind of process do you adopt to keep motivating your employees?
- Is the employee motivation works as a positive factor for your business performance?

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Efficacy of Alimental Components in an Oral Supplement for the Treatment of Hair Fall, Hair growth, Skin & Nail Problems and Role of Hairvit Plus in their Composition Upgradation

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Abstract- The market of nutritional supplements is proliferating. Hair loss and skin related concerns are faced by everyone these days. To be able to provide effective treatment for [Hair loss](#), Hair fall, [Alopecia](#), Nail and Skin health, Gray hair and many other related issues, these herbal compositions should not only have correct balance of vitamins, amino acids and minerals but also should be upgraded time to time, in accordance to latest clinical findings or developments. Over time, the supplements should be reformulated or upgraded owing to the research confirming the benefits of specific nutrients like Methyl Sulfonyl Methane (MSM) and Green Apple Skin Extract. MSM is responsible for Keratin & collagen production for structuring skin, hair and nails. The antioxidants in green tea extract prevent hair-loss and boosts up hair-growth. The supplement can be upgraded by adding Saw Palmetto extract to treat Alopecia in men.

Index Terms- Biotin, Collagen Production, Keratin Production, Follicle Stimulation, Alopecia

I. INTRODUCTION

Effectiveness of Biotin & Zinc in Cases of Alopecia, Onychoschizia and Some Skin Conditions

Biotin is a water-soluble vitamin and an essential coenzyme for several important enzymes while zinc is an essential micronutrient that is responsible for the normal functioning of hundreds of enzymes¹. The use of these agents for hair loss is based on the observation that alopecia is one of many consequences associated with biotin and zinc deficiencies^{1,2,3}. In one case report, a child with alopecia due to zinc deficiency was administered a zinc supplement and her hair loss stopped in three weeks.⁴

Biotin deficiency leads to dry, irritated skin and cracking of nails. One study in women who had brittle nails or splitting of the nails (Onychoschizia) noted that oral supplementation of biotin at 2.5mg over the course of at least six months increased nail thickness by 25% (reaching normal/healthy control values).⁵ About half the group with brittle nails (4 of 8 subjects) also experienced reductions in nail splitting.⁵ All nails from

biotin-treated individuals showed some improvement when assessed by electron microscopy.⁵

Biotin deficiency leads to complications with the skin, primarily seen as scaly and red (erythematous) dermatitis.⁶ Biotin protects the skin from acne, fungal infections, rashes, severe dryness and cracking of nails. One preliminary study has noted that, in four subjects being given chemotherapy (*gefitinib* or *erlotinib*) known to induce skin rashes, administration of biotin reduced the severity of the rash.⁷

Amino Acids for Collagen Production and Hydration

In orthomolecular medicine vitamins and [amino acids](#) are suitable, easy and safe treatment of many skin and hair problems; especially acne, wrinkles, and hair loss. Amino acids promote collagen production⁸, increase hydration⁹ and promote healthy pH balance. Elevating the concentration of important amino acids, vitamins, minerals, trace elements and other compounds that are necessary to support hair growth, maintenance and protection will help to minimize hair loss.

Methionine strengthens the nails and helps prevent hair loss. [It](#) contains Sulphur which can build chains, which themselves create networks and this is exactly what happens in hair and nails. Methionine can therefore considerably strengthen the hair structure and nails. Methionine can also help against hair loss.¹⁰ Several publications indicate that the Arginine has an enormous effect on hair growth. As a precursor to nitrogen oxide, it is of vital importance for hair growth. The vasodilatory effect of Arginine promotes hair growth as the nitrogen oxide generated from Arginine opens the potassium channels of the cells. The blood supply to the hair root is then improves, which in turn stimulates hair growth.¹¹ Research has shown that hair loss can be reduced with lysine supplementation.¹²

Efficacious Effects of Minerals on Alopecia, Follicle Stimulation and Hair Regrowth

Zinc, Iron, Copper, Sulphur, Selenium are the minerals that largely influence hair growth. Zinc influences hair follicles and hair growth. It is enzyme activator stimulating protein transformation, which have sulfide bonds, necessary for hair building. Research shows its influence on hair cycle.¹³ Iron

deficiency has been associated with hair loss as in alopecia areata, androgenetic alopecia, and telogen effluvium¹⁴. Iron as hemoglobin component supplies energy to matrix cells being subject to division and differentiation which results in hair production, influences enzymes work responsible for hair build and growing rate. Copper Sulphate is very effective for healing sores and skin diseases.¹⁵ Copper also contributes to hair strengthening by influencing growth of proper horn like hair structure. Its deficiency causes lowered number of sulfur bridges responsible for strength and elasticity of hair resulting in brittle, weak, curly hair with tendency to early graying.¹⁶ Sulphur supports strong and thick hair, prevents hair loss and promotes hair growth. It promotes collagen production which helps in the production of healthy skin cells and hair growth.¹⁷ Selenium is a component of at least 35 proteins many of which are enzymes and with its deficiency in the body hair loss with pseudo albinism occurs¹⁸.

Antioxidants and Oligomeric Proanthocyanidin Complexes in Grape Seed Extract for Hair Growth and Skin Protection

Grape seed extract (GSE) is extremely rich in antioxidants and oligomeric proanthocyanidin (OPCs) complexes. Proanthocyanidins are natural chemicals that help in skin protection and hair growth.¹⁹ The extract [moisturizes and conditions the hair](#) by reducing dandruff. It prevents hair loss and strengthens the hair as well – enabling it to grow faster. [The vitamin E content](#) helps build the hair tissue, and linoleic acid promotes hair growth.

Soya Isoflavones for Hair Protection and Skin Nourishment

Soya Isoflavones can effectively reduce Dihydrotestosterone (DHT) in humans. DHT is known to influence the hair growth cycle: the follicles shrink and they no longer produce hair, the hair begins to fall out as the hair follicle cycle survival is shorter, and in the end, hair will stop being produced and microscopic scarring will result from this process. Current treatment for hair loss includes DHT blockers or vasodilators.²⁰

According to a research, isoflavones modify enzyme activity and protect from harmful properties of UV radiation, in deeper parts of skin. In the corium they influence the state of blood vessels and stimulate skin micro circulation which nourishes hair. Indirectly flavonoids increase absorption from the alimentary tract of vitamin C and protect functions conducted by it.²⁰ The flavonoids contained in herbs like Soya Isoflavones, inhibiting 5 α -reductase contributed to faster hair regrowth.²¹

Isoflavones may also be a powerful anti aging tool. The increase in blood vessels leads to better circulation of the scalp which helps in hair regrowth. A study on 30 postmenopausal women showed significant health benefits when isoflavones were supplemented by 100mg/day. The results showed that isoflavone treatment increased the epidermis thickness by 9.46% in 23 out of the 30 women who participated in the study; the collagen amount in the skin as well as the number of elastic fibres increased. Furthermore, the number of dermal blood vessels was increased significantly, which does suggest that isoflavones have a beneficial effect to the skin and the blood vessels.²²

Sulphur in Methyl Sulfonyl Methane (MSM) for Collagen and Keratin Production

The sulphur-based compound or organic sulphur is responsible for the Collagen and Keratin production in the body which serve as the building block for the structure of skin, hair and nails. Hair is made up of a protein called keratin, produced in the follicles in the outer layer of skin. As follicles produce new hair cells, old cells are being pushed out through the surface of the skin. MSM is necessary for the production of collagen and keratin.²³ It glues the keratin and collagen and plays a significant role in maintaining skin, hair and nail health. Researchers report rapid hair growth, and return of color in some cases.

Green Tea Extract with Antioxidants for Hair Growth

Green tea is one of food derived active ingredient potential as topical hair grower.²⁴ Green tea extract contains the antioxidant Epigallocatechin Gallate (EGCG) that has the ability to stimulate hair growth. It also contains catechins that help in repressing DHT or dihydrotestosterone, which is usually responsible for hair loss.²⁵ The compounds found in green tea extract, such as carotenoids, tocopherols, zinc, ascorbic acid, selenium, and manganese help to prevent hair loss and encourage hair regrowth. Its anti-inflammatory properties boost up hair growth.

Green Apple Skin Extract in Procyanidin Therapy for Hair Growth, Stronger Nails and Healthy Skin

Packed with vitamins and minerals, green apple extract offers potential natural remedy for strengthening the hair. It helps control hair fall and promotes hair growth as well. Several studies have shown that Procyanidin therapy promises a potential cure for male pattern baldness.²⁶

The richest known source of Procyanidin is the skin of immature (baby) green apples. Polyphenols from apples have an astonishing range of health effects, and may be nature's perfect antioxidant. Many people taking apple procyanidins in pill form notice faster hair growth, stronger fingernails, and softer, smoother skin.²⁶

Saw Palmetto Extract

Saw Palmetto (*Serenoa repens*) extract has been shown to inhibit both types of 5- α reductase and, when taken orally, has been shown to increase hair growth in Male Androgenetic Alopecia (AGA) patients.²⁷ There are two types of herb palmetto supplements available in the market. One type is dried Saw Palmetto berries and the other type Saw Palmetto extract in the form of tablets. Recommended dose is 160mg twice a day. Although saw palmetto is listed in the US pharmacopoeia, it falls under the guidelines for food supplements.²⁸

Table - Effects Of Nutrient Deficiency And Supplement Use On Hair Loss²⁹

Nutrient	Effect of Deficiency on Hair Loss	Studies of Supplementation
Iron	<ul style="list-style-type: none"> Chronic diffuse telogen hair loss with iron deficiency anemia. In the absence of anemia, studies are not clear whether there is a significant link between ID and hair loss. 	<ul style="list-style-type: none"> Insufficient evidence to recommend iron supplementation to all hair loss patients with iron deficiency in the absence of anemia. Approach on a case-by-case basis. Excess supplementation can cause hemochromatosis.
Zinc	<ul style="list-style-type: none"> Statistically lower serum zinc concentrations in a study of 312 patients with AA, MPHL, FPHL, or TE compared to 30 healthy controls. 	<ul style="list-style-type: none"> A case series demonstrated reversal of hair loss following oral supplementation in five patients with TE and zinc deficiency. Limited information on effects of zinc supplementation improving hair growth in the absence of deficiency. One case report with a patient with dry brittle hair and alopecia, without clear zinc deficiency, who experienced improvement in alopecia following oral zinc therapy. Excess supplementation can cause acute toxic effects including epigastric pain, nausea, vomiting diarrhea, and headache and chronic toxic effects including reduced copper status, interaction with iron, reduced immune function, and decreased concentrations of HDL cholesterol.
Niacin (Vitamin B3)	<ul style="list-style-type: none"> Diffuse hair loss with pellagra due to severe deficiency. No known studies regarding serum niacin levels in patients with hair loss. 	<ul style="list-style-type: none"> Limited information on effects of niacin supplementation improving hair growth in absence of deficiency.
Fatty acids	<ul style="list-style-type: none"> Loss of scalp and eyebrow hair. 	<ul style="list-style-type: none"> Limited information on effects of fatty acid supplementation improving hair growth in absence of deficiency.
Selenium	<ul style="list-style-type: none"> In animal studies, rats deficient in selenium display sparse hair growth, while knockout mice lacking specific selenoproteins exhibit progressive hair loss after birth, ultimately leading to almost total alopecia. One case report of selenium deficiency in a young child reported clinical manifestations of dry skin and sparse, light-colored hair, improving after supplementation. 	<ul style="list-style-type: none"> Limited information on effects of selenium supplementation improving hair growth in absence of deficiency. Toxicity from excess supplementation is well documented and can cause generalized hair loss.
Vitamin D	<ul style="list-style-type: none"> Serum vitamin D2 levels in a study of eight females with either TE or FPHL were shown to be significantly lower than in 40 age-matched female controls, with decreased levels correlating to increased disease severity. 	<ul style="list-style-type: none"> Limited information on effects of vitamin D supplementation improving hair growth in absence of deficiency.
Vitamin A	<ul style="list-style-type: none"> Deficiency has no known link to hair loss. 	<ul style="list-style-type: none"> Limited information on effects of vitamin A supplementation improving hair growth in absence of deficiency. Toxicity from excess supplementation has a strong known link to hair loss, as well as other effects on skin, vision, and bone.
Vitamin E	<ul style="list-style-type: none"> Deficiency has no known link to hair loss. 	<ul style="list-style-type: none"> Limited information on effects of vitamin E supplementation improving hair growth in absence of

Nutrient	Effect of Deficiency on Hair Loss	Studies of Supplementation
		deficiency. <ul style="list-style-type: none"> Supplementation in one study of twenty-one volunteers suffering from hair loss has showed significant increase in hair number compared to placebo. Toxicity from excess supplementation can result in risk of bleeding problems, decreased thyroid hormones, and decreased activity of vitamin K. Additionally, there is some evidence for adverse effect on hair growth with excess supplementation.
Folic Acid	<ul style="list-style-type: none"> No significant difference in serum folate levels in a study of 91 patients with diffuse hair loss and 74 healthy controls. 	<ul style="list-style-type: none"> Limited information on effects of folic acid supplementation improving hair growth in absence of deficiency.
Biotin	<ul style="list-style-type: none"> Deficiency can result in alopecia, eczematous skin rash, conjunctivitis, and candidiasis. 	<ul style="list-style-type: none"> Limited information on effects of biotin supplementation improving hair growth in absence of deficiency.
Amino Acids and Proteins	<ul style="list-style-type: none"> Protein malnutrition can result in hair loss. 	<ul style="list-style-type: none"> L-lysine supplementation in addition to iron supplementation has been shown to significantly increase mean serum ferritin concentration in some women with chronic TE who failed to respond to iron supplementation alone. Limited information on effects other amino acids and proteins improving hair growth in absence of deficiency.

Key of abbreviations: Alopecia areata – AA; Androgenic alopecia – AGA; Female pattern hair loss – FPHL; High density lipoprotein – HDL; Iron deficiency – ID; Male pattern hair loss – MPHL; Telogen effluvium – TE

II. CONCLUSION

The upgradation of nutritional supplements is becoming increasingly important to counter the ever-increasing issues related to hair and skin. It is worth monitoring and keeping a vigilant eye on this new and very rapidly developing food and pharmaceutical industry. The daily administration of nutritional supplement composed of the above mentioned components significantly increases hair growth and helps maintain skin and nail health. Continued improvements may occur with ongoing treatment. No adverse events are reported. The current research also demonstrated the ability of these components to decrease the hair loss, promoting nail growth and glowing of skin.

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CORRELATION BETWEEN CORNEAL CURVATURE AND AXIAL LENGTH IN MYOPIA CHILDREN AT ADAM MALIK GENERAL HOSPITAL MEDAN

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Abstract

Background : The axial length of the eye is one of the factor that determine a person's refractive status beside the curvature and strength of the corneal dioptr. In myopia, the axis of the eye is longer than normal and so is the dioptr of corneal and it was said that the elongation of the axis is directly proportional to the degree of myopia.

Aim : To determine the relationship dioptr power of the cornea with axial length of Myopia in children at Adam Malik General Hospital Medan.

Method :This research is observational analytic with total sampling method. Total sample of 59 children with 118 eyes who came to the ophthalmology polyclinic Pediatric Ophthalmology subdivision of Adam Malik General Hospital from March to May 2017. All children were assessed visual acuity, corrected and examined with slit lamp (Appasamy) to assess the anterior segment. Then calculated the average axial length each eye, then the result is compared.

Result : The average curvature of the cornea and the axial length of the eye to the degree of myopia is curvature of the cornea with myopia mild 43.121 diopters ± 0.722 , myopia was 43, 887 diopters ± 0.807 , myopia weight of 44.400 diopters ± 0.823 and the long axis of the eyeball with the degree of myopia is mild myopia 23.120 mm (SD 0.664 mm), myopia was 24.256 mm (SD 0.661 mm), severe myopia 25.038 mm (SD 0.762 mm).

Conclusion : there is a relationship between Mild, Moderate and Severe Myopia to Corneal Curvature with axial length of Myopia in children

Keywords: *corneal curvature, axial length, myopia in children*

I. INTRODUCTION

Myopia is a sensory disorder often affected in school-aged children. School-aged children have a high prevalence of myopia. According to research of Dulker Bj et al. in 2009, the main cause of blindness in the world due to unrepaired refraction disorder, in Europe as much as 19% children with myopia. In China, from the data of Jung M. Selt et al. In 2011, the number of childhood myopia is about 42% of the total number of school children and the axial length of the eyeball in school-age myopia of ± 23.14 mm.^{1,2,3}

In Indonesia, the prevalence of refractive abnormalities in school children first in cases of myopia and myopathic abnormalities in Indonesia in nearly 25% of the total school-aged population. Therefore, the researcher wanted to see the correlation between corneal curvature and the long axis of the eyeball in the child's myopia patient who went to the Eye Polyclinic of the Pediatric-Ophthalmology Division of RSUP H. Adam Malik Medan.⁴ Refracting by the curvature of the cornea is the strongest in the medium of refraction ranging from 42 to 44 diopters. Larger corneal congestion will result in stronger refraction so that the shadow falls in front of the retina. The normal axis length of the eyeball is 21.6-22.8 mm and the axial length in the child's myopia is longer than normal size and the average length of the eyeball in the child's myopia is ± 23.14 mm and depending on the weight mild degree of myopia In Korea, according to research data Sivian et al in 2009, the long axis of the eyeball in childhood myopia is ± 23.22 mm and the mean corneal curvature in school-age myopia is ± 41.98 diopters.^{5,6,7,8}

Research Rong Zao et al in India in 2011 said that large corneal curvature associated with the degree of myopia. This is caused by the surface of the cornea that greatly affects the magnitude of the cornea's dioptric strength. The larger the corneal bone, then the degree of myopia will also be more severe in refraction of light. According to M. Hosny et al in 2011 in Spain, the long axis of the eyeball greatly affects the degree of myopia and the average length of the eyeball axis in miopa school-age children is ± 23.07 mm. The longer the axis of the eyeball the degree of myopia will be greater and this study is also in line with the research of Meng Ling Yan et al in 2013 in Taiwan, there is a linear relationship between the corneal curvature and the length of the eyeball axis with the degree of myopia. Decai Wang et al in 2011 in China also said there is a relationship between large corneal curvatures and myopia degree especially in junior secondary students where the growth age of the eyebrow axis also begins to slow down over the age of 12 years and increase only about 0.02 mm until the age of 18 years.^{9,10,11,12}

II. METHODS

This research is observational analytic with total sampling method. Total sample of 59 children with 118 eyes who came to

the ophthalmology polyclinic Pediatric Ophthalmology subdivision of Adam Malik General Hospital from March to May 2017. All children were assessed visual acuity, corrected and examined with slit lamp (Appasamy) to assess the anterior segment. Then calculated the average axial length each eye, then the result is compared.

III. RESULT

This research was conducted at Haji Adam Malik General Hospital Medan from March 2017 until April 2017. The research subjects taken to be a research sample is a child of myopia aged 12-17 years who came to the eye clinic of Pediatric-Ophthalmology. division of Adam Malik General Hospital Medan which amounted to 59 people (n = 59). Childhood myopia age between 15-17 years old as many as 45 patients (76.27%) and age 12-14 years as many as 14 patients (23.73%). Myopia in boys were 25 patients (42.37%) and the most were girls as many as 34 patients (57.63%). The Most children with Mild Myopia on the right and left eyes of 45 patients (76, 27%) while the moderate myopia was 9 patients (15.25%) and severe myopia as many as 5 patients 8.48%).

Table 1. Relationship between corneacurvature (right & left eye) with degree of Myopia

Degree of Myopia	N (11 8)	Cornea Curvature of right eye	Cornea Curvature of Left eye	P-Value
		$\bar{x} \pm SD$	$\bar{x} \pm SD$	
Mild	90	42,940 ± 0,096	43,301 ± 0,709	*0,016
Moderate	18	43,546 ± 0,750	44,228 ± 0,747	*0,021
Severe	10	44,056 ± 0,376	44,744 ± 0,459	*0,034

*The mean is significant at the < 0,05 level

Mild, moderate and severe Myopia are significant with cornea curvature of right & left eye.

Table 2. Relationship between axial length (right and left eye) with degree of Myopia

Degree of Myopia	N (11 8)	Axial length of right eye	Axial length of left eye	P-Value
		$\bar{x} \pm SD$	$\bar{x} \pm SD$	
Mild	90	23,059 ± 0,628	23,180 ± 0,662	*0,027
Moderate	18	24,040 ± 0,754	24,473 ± 0,505	*0,032
Severe	10	24,622 ± 0,563	25,454 ± 0,746	*0,039

*The mean is significant at the < 0,05 level

Table 3. Relationship between cornea curvature of both eyes and axial length of both eyes with degree of Myopia

Degree of	n (11)	Cornea curvature of both eyes	Axial length of both eyes	P-Value
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Myopia	8)	$\bar{x} \pm SD$	$\bar{x} \pm SD$	
Mild	90	43,121 ± 0,722	23,120 ± 0,644	*0,014
Moderate	18	43,887 ± 0,807	24,256 ± 0,661	*0,018
Severe	10	44,400 ± 0,823	25,038 ± 0,762	*0,012

*The mean is significant at the < 0,05 level

IV. CONCLUSION

From the research conducted on the patient of myopia in children aged 12-17 years who went to the Ophthalmology polyclinic of Pediatric-Ophthalmology Division Adam Malik General Hospital Medan in March 2017 - May 2017, obtained some conclusions are:

1. Myopia in children most found at age 15-17 years old that is as many as 44 Children (74,57%) and found at age 12-14 year that is 15 children (25,43%)
2. The most common sexes were girls 32 children (54.24%) and boys 27 children (45.76%)
3. There was no significant mean difference from the degree of both eye with myopia in children aged 12-17 years
4. There was a significant relationship between mild myopia, moderate myopia and severe myopia with large corneal curvatures
5. There is a significant relationship between mild myopia, moderate myopia and severe myopia with the axial length of the eyeball.

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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Uganda Solar Energy Utilization: Current Status and Future Trends

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Abstract- Solar energy is gaining attention worldwide as the most promising alternative and reliable source of energy. With increasing population and development, Solar energy in Uganda is receiving increased energy demand which can only be met through exploring other alternative sources of energy rather than heavily relying on traditional sources like charcoal, gasoline firewood and hydropower. The country lies along the equator and has a very high potential for solar energy production. The government has started various projects on solar energy production, though it's not able to meet the demand especially in the rural areas of the country that are mostly not connected to national electricity grids. At the same time there are no huge investments in this sector especially from the private sector since they are associated with minimal returns and high cost of investment. Most consumers rely on small scale photovoltaic plants for domestic application which are at times regarded insufficient sources of power especially if one is considering using it for industrial production, The rules and regulations in place are not being implemented adequately making the situation not any better since they cross cut in all energy power generation industries, with no subsidies to encourage higher investments in solar energy. To effect investment in solar energy, local financial institutions opt to partner with international financial institutions dedicated to fund renewable energy specifically solar. This will help to offset some of the interest rates currently hindering most people from accessing renewable energy loans and will increase access to solar energy.

Keywords: Solar energy, photovoltaic (PV), solar energy technologies, renewable energy, Solar Energy Investments

I. INTRODUCTION

The sun is a natural nuclear reactor that releases energy called photons, they travel 93 million miles from the sun to Earth in about 8.5 minutes[1]. Enough photons impact our planet to generate enough solar energy in about sixty minutes to theoretically satisfy global energy needs for an entire year[2]. A 2017 report from the International Energy Agency shows that solar has become the world's fastest growing source of power, marking the first time that solar energy's growth has surpassed that of all other fuels (Krishna Engineers & Consultants 2016). Solar power is arguably the cleanest, most reliable form of renewable energy available[3]. In Uganda the sun's rays are almost directly overhead due to its location along the equator and has average temperature of 21 °C and 23 °C (70 and 73 °F)[4][5][6].

Uganda is endowed with 5-6 kWh M² radiation 7 per day on flat surfaces [7]. The insolation is highest at the Equator. However, varies up to a maximum of 20% from place to place away from the Equator, the dryer areas (north-east) have highest temperatures and lowest in the mountainous areas (south-west) of the country[8][6]. Cloudy weather influences solar radiation. Temperature variations throughout the year are little making it easy to use solar power as an alternative source of renewable energy.

The country is endowed with renewable energy resources for energy production and the provision of energy services. The total estimated potential is about 5,300 MW[9]. These resources remain largely untapped, this is due to the perceived technical and financial risks. Hydro and biomass still dominates electricity generation[10]. In the recent past solar power has received increasing attention by investors as well as a promising potential for exploitation of geothermal energy.

Solar energy has been used with appropriate technology for cooking food, water heating, refrigeration, lighting, telecommunications, and many others.

However, Solar is becoming an important source of electricity, because of the escalating tariffs and the scarcity of electricity from the conventional hydro- and thermal- power generation in the country[11]. This is attributed to the high operational costs of the existing and planned thermal power plants and the failure to develop other alternative electricity sources such as co-generation, wind and geothermal sources which have been seen as promising potentials for energy generation in Uganda[12].

This is further made worse by the recent separation and privatization of the energy sector into many entities, namely; Electricity Regulatory Authority (ERA), Uganda Electricity Generation Company Limited (UEGCL), Uganda Electricity Distribution Company Limited (UEDCL), Uganda Electricity Transmission Company Limited (UETCL) and concessionaires ESKOM and UMEME which

all depend on a single tariff for their operations and maintenance, resulting into excessively high prices and unaffordable tariffs that are currently being charged on the electricity[13]

Solar energy has the potential of reducing the current demand exerted on the existing national grid-based power and consequently eradicating Uganda has launched a 19 million and 19.6 million U.S. dollars solar power plants in the remote eastern districts of Soroti and Tororo respectively[14]. The projects which are the largest in East Africa are the latest addition to Uganda’s power generation plants, to feed its increasing demand for power as the east African country strives to fast track its development.

According to International Energy Agency (IEA), about 1.2 billion people worldwide lack access to electricity, with approximately over 620 million of these living in sub-Saharan Africa[15]. In terms of energy access, East Africa is greatly the affected region in the continent [16]. These statistics explain extremely serious situation faced by many East Africans, mainly those in rural areas. Even those that are lucky enough to have access to electricity, they also experience sporadic service flows and yet costly, hence this means that there is need to exploit all the available sources to get energy to ensure uniformity of access.

Demand for electricity has also been growing which is influenced by the increasing population. Statistics from the energy regulatory agency in Uganda indicate that peak demand for power is growing by 15% every year. This is crucial in an economy that is expanding fast and aimed to give half of its 41 million people access to electricity by 2017[4].

In Uganda, 85% of the population does not have access to electricity and that number is rising with the increase in population and urbanization[17]. The government has long regarded solar energy as the only feasible option for renewable energy generation. According to the renewable energy policy of 2013, the country has a solar electricity potential of about 200MW, 1650MW from biomass, 800MW from peat, 2200MW from hydropower stations and 400MW from geothermal energy.

Recent survey on use of solar power shows that there are more solar energy consumers in the south-west and central regions than in the other regions in the country. This is due to the government’s program that support use of solar energy called the Uganda Photovoltaic Pilot Project on Renewable Energy (UPPPRE) that was conducted in these regions and also due to the presence of Non-Governmental Organizations (NGOs) and churches in the regions that offered soft loans and credits to people interested in using solar technologies.

To increase the consumption of solar energy, the government has built two 10MW solar power plants, the largest in East Africa, in its eastern districts of Soroti and Tororo at a cost of USD 19 million and USD 19.6 million respectively that are estimated to connect electricity to around 75,838 (40,000 in Soroti and 35,838 in Tororo) residents[18]. It is Uganda’s first grid-connected solar plants as the country looks to raise power generation capacity to 1,500MW by 2020, from the current 850MW. The power plants have the potential to increase their net output capacity by further 20MW of solar energy[18]. Rural Electrification Agency (REA) estimates that so far over 30,000 solar PV systems have already been installed to in rural areas in the country and still there are huge unexploited solar energy resources. The figure below shows the solar PV data in terms of area in kilometers per year.

Table: 1 Solar Photovoltaic data

	KM ² OF CSP	PV
Total Area	241,278	241,278
Exclusion Area	30,828	30,828
1,800-2,000 kwh/m2/year	1,742	–
2000-2500 kwh/m2/year	203,108	210,450
2500-3000 kwh/m2/year	5,600	0

Source: HERMANN ET AL. 2014

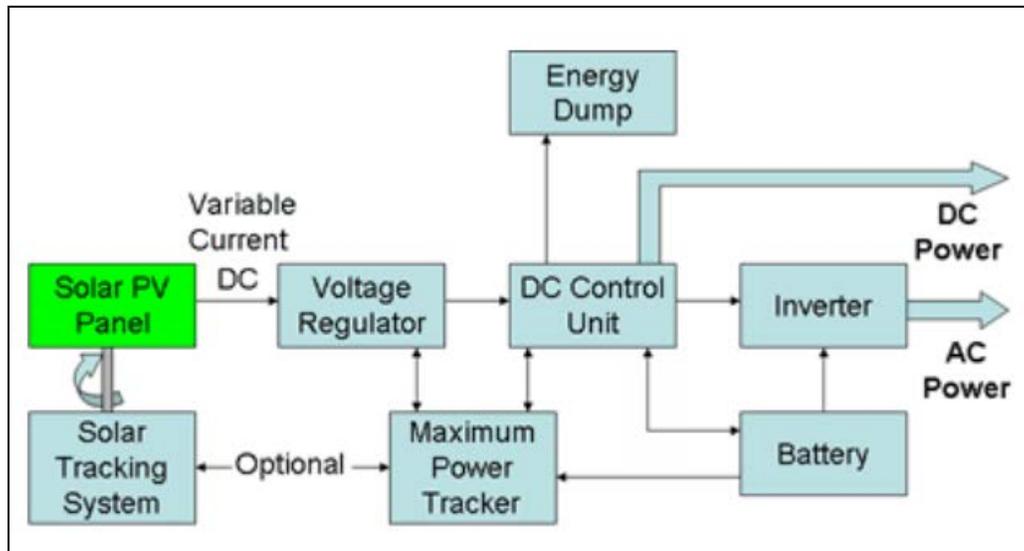
Solar energy can be converted to electricity on and off-grid through photovoltaic or concentrated solar power (CSP) technology. About 200,000 km² of Uganda’s land area has solar radiation exceeding 2,000 kWh/m² /year (i.e.5.48 kWh/m²/day) this is a high potential for solar power investment[12].

1.1. Generation and transmission of solar energy

Solar panels convert the sun's light into usable solar energy using N-type and P-type semiconductor materials. When sunlight is absorbed by these materials, the solar energy knocks electrons loose from their atoms, allowing the electrons to flow through the material to produce electricity[19][20]. This process of converting light (photons) to electricity (voltage) is called the photovoltaic (PV) effect. Current technology solar panels convert most of the visible light spectrum and about half of the ultraviolet and infrared light spectrum to utilized solar energy.

Most of the solar energy users have installed solar panels in their homesteads hence no need for power transmission. However, with the increased projects in solar energy production by the government, transmission lines are necessary to ensure that the power is supplied to the end users. Electricity lines are therefore constructed from the power grid and those that pay the initial connection fee are connected to the grid. The below diagram shows the basic building blocks of a small stand-alone off-grid PV power generating system.

Figure 1: Small Scale Photovoltaic Plants and Domestic Application.

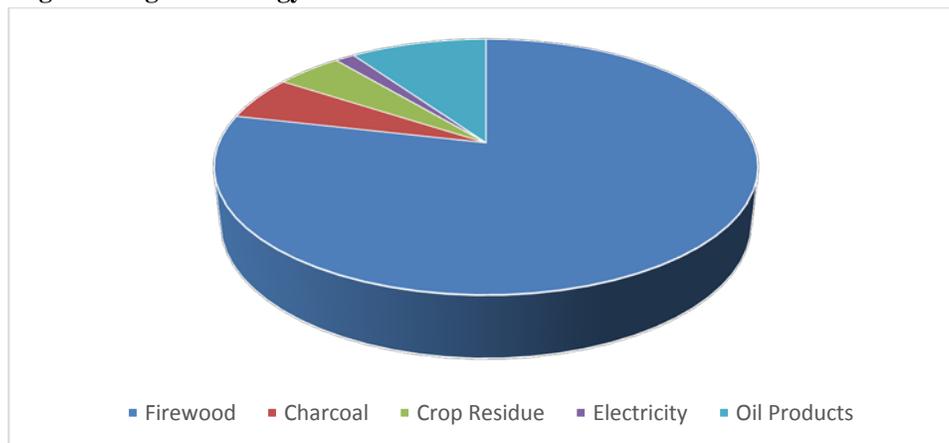


Source: Performance evaluation of hybrid adaptive neuro-fuzzy inference system models for predicting monthly global solar radiation

1.2 Total Energy demand in Uganda and contribution from each source

Uganda has a total primary energy usage of 0.0593 quadrillion Btu which equals to 14.94 million tons of oil equivalent[21]. Biomass is still the most viable source of energy for the majority of the Ugandan population especially in the rural areas. About 90 percent of the total primary energy consumption is generated through biomass, this includes firewood (78.6 percent), charcoal (5.6 percent) and crop residues (4.7 percent)[4]. This has accelerated to the high rates of deforestation to supply the ever increasing energy demand. Electricity contributes 1.4 percent to the national energy balance while oil products, which are mainly used for vehicles and thermal power plants, account for the remaining 9.7 percent.

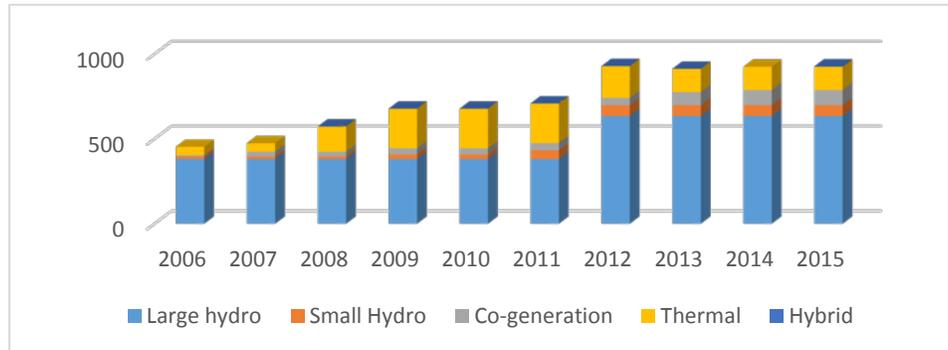
Figure 2: Uganda Energy Demand



Source: A. M. Mueller, Energy Sources in Uganda and Solar Radiation

The figure below shows the major sources of energy generation in Uganda, from 2006 to 2015, Hydro power generation still being used for industrial used, charcoal and firewood are highly consumed as a source of energy at household level both in rural and urban areas with very minimal utilization of the solar energy. The situation is however expected to be different by 2050[11].

Figure 2: Uganda’s Energy Generation Capacity by types 2006-2015 in MW



Source: MEMD 2015 Statistical Abstract.

1.3 The Energy Cost and its Effects on Economic development

The cost of energy in Uganda is relatively higher than that of most of the east African countries like Kenya and Tanzania. Although the country has a surplus that it supplies to its neighboring countries the end user ends up paying a larger amount than the beneficiaries.

The tariff for domestic consumption is at 520.6 UGX which ranked the highest in East Africa. This is as a result of the enormous(52%) price increase in 2012, almost the cost-covering end-users prices[22]. Currently, the end consumer retail tariff is based on consumer category as illustrated in the following table. However, to cater for the poor, the lifeline tariff was not increased and remains at UGX.100 per unit up to 15 kWh per month. The table below shows all the Umeme tariffs in 2014

Table 2: Energy Cost in Uganda in Uganda’s Shillings

Charge	Code 10.1 (domestic)	Code 10.2/3 (Commercial)	Code 20 (medium industrial)	Code 30 (large industrial)	Code 50 (street lights)
Average	520.6	474.4	458.9	310.4	488.8
Peak	-	569.7	542.3	373.7	-
Shoulder	-	475.0	452.2	311.6	-
Off-peak	-	354.0	371.0	232.5	-

Source: Energypedia 2018(https://energypedia.info/wiki/Uganda_Energy_Situation)

Maintaining the current economic growth and ultimately achieving sustainable development is a challenge that calls for proper and friendly energy pricing. Development is a key input in the overall strategic planning cycle and therefore energy policy and pricing makers should recognizes the linkages between the energy sector and the other sectors[3][23]. Considerations to address energy problems and prices have to be taken in specific policies such as economy, environment, water resources, agriculture, forestry, industry, health, transport, education, decentralization and land use.

1.4 Barriers to large scale development of solar energy

Despite the fact that a great percentage of the total required energy in Uganda can be generated from solar power this has not been the case mainly due to the various factors discussed below.

Table 3: barriers in developing large scale use of solar energy.

Category	Discussion	Source
Economic / financial barriers	High initial cost of installation, maintenance and repairs.as well as the risks related to the suitability and reliability of technologies and to the solvency degree of the project.	[24]
Legal / institution barriers	lack of stability of incentives for the adoption of photovoltaic like inconsistencies between policy measures and socio economic factors, or the sudden removal of existing subsidies	[25]
Political / policy issues	Lack of long term policies, lack of political will to diversify into clean energy, constantly changing of government and reshuffling institutions.	[24]
technology	The risks directly related to technology are high. Because the technology is at a development stage, the risks are not clearly known even if the same technology is working else where	[25]
Market	Competition from wealthier industries that benefit from subsidies and incentives and difficulties in market entry as most investors want large quantities of energy, ideally at times when solar aren't available.	[26]
Siting and transmission.	Locating solar farms in and transmission lines requires negotiations, permits contracts and community approval which increase the cost and duration of the projects.	[27]
Social/ behavioral	General information and awareness in relation to new technologies and understanding the practical Problems in implementing and maintaining projects is limited	[24]
Institutional barriers	Lack of coordination and cooperation within and between various ministries agencies, institutes and other stakeholders delays and restricts the progress in solar energy development.	[24]

II. SCALES OF SOLAR PV GENERATION IN UGANDA

Uganda government is committed to increasing the country's use of modern, renewable energy. Uganda has an electrification rate of 18%, with 8% recorded in rural areas, Uganda like most Sub-Saharan African countries rely most on traditional energy mostly hydro power generation, hence making the scale of photovoltaic solar generation minimal. However, in 2016, Uganda government through the Electricity Regulatory Agency (ERA) partnered with institutional donors such and private investors construct two large Solar PV plants in Soroti and Tororo in North-Eastern and Eastern Uganda respectively.

2.1 Soroti Solar PV Power Plant.

The rural Soroti region is heavily dependent upon subsistence farming and has high levels of unemployment. Gathered fuel wood is the main source of energy in the country. The Government of Uganda are commitment to increase the country's use of modern, renewable energy to 100% by 2040. Soroti solar power plant is a fixed tilt solar PV power plant. Solar power projects require long-tenor loans and can experience difficulty in attracting willing long-term capital investors Soroti Sola project cost USD 19 Million in total, a partnership between the government of Uganda through Electrification Regulatory Agency (ERA) and the Netherlands development bank, and the Emerging Africa Infrastructure Fund (EAIF), a facility of the Private Infrastructure Development Group (PIDG), which includes Australia, Germany, The Netherlands, Norway, Sweden, Switzerland and the United Kingdom, and the World Bank group. EAIF provided Access Soroti with a US\$5.35m loan with a tenor of 17 years. The project mobilized an additional US\$14.2m from commercial and development finance sources as well as GET FiT program. To ensure that the tariff for the electricity generated by Access Soroti can be competitive with other energy sources. Access Uganda Solar, will sell power to the Uganda Electricity Transmission Company Ltd (UETC Ltd) under a 20 year Power Purchase Agreement.

The plant will help Uganda to overcome its current energy shortfall. It is estimated that the project will cut Uganda's carbon emissions by 264,355 tons per annum. By adding 10MWp to Uganda's national grid, the plant is expected to benefit around 32,250 people. Electricity will be generated at a cost of USD 0.11/kWh, allowing energy prices in Uganda to remain low. By providing grid stability to Soroti, the plant will stimulate economic growth and increase productivity. As the largest privately owned solar plant in Uganda, Soroti will act as a catalyst for further solar projects in the country and other countries in the region.

2.2 Tororo Solar PV Power Plant.

Building Energy multinational company operating as a Globally Integrated IPP (Integrated Power Producer) in the Renewable Energy Industry, manages **Tororo Solar Plant**, its first photovoltaic system in Uganda, located at around 10 km from the border with Kenya. With a capacity of **10 MWp (16 GWh per year)**, the Tororo Solar Plant is among the largest in Eastern Africa. Uganda's 10MW solar power plant in Tororo will provide energy needs for 35,838 families a funding from the European Union and partners Consisting of **32,240 photovoltaic panels** distributed over a **14 hectare site**, the facility is designed to generate around 16 GWh of energy annually, catering to the energy needs of more than 35,838 people. In addition to covering the community's energy needs, the

Tororo Solar Plant is fostering clean industrial development in the town of Tororo and at the same time **save atmospheric emissions of more than 7,200 tons of CO₂** per year, corresponding to the consumption of around 2,800 petrol-powered.

Like the Soroti Solar Plant, the Tororo Solar Plant was developed under the Global Energy Transfer Feed in Tariff (“GET FiT”), a dedicated support scheme for renewable energy projects managed by Germany’s KfW Development Bank in partnership with Uganda’s Electricity Regulatory Agency (ERA) and funded by the EU-Africa Infrastructure Trust Fund, the governments of Norway, Germany, and the United Kingdom. The GETFiT program helps renewable energy sources become more affordable and therefore more accessible in Eastern Africa.

The EU-Africa Infrastructure Trust Fund has provided funds through the GETFiT Solar Facility equivalent to 7,08 million euros in the form of a top-up payment per kWh of delivered electricity over 20 years. The financing aimed at filling the gap between the generation costs and the feed-in tariff set by Uganda Electricity Transmission Company Limited (UETCL) through a Power Purchase Agreement (PPA).

The project cost an overall **\$19.6 million** investment at Tororo. Which was partially funded by **FMO**, the Dutch development bank which, as Mandated Lead Arranger, coordinated the provision of a **\$14.7 million** term loan facility. Fifty percent of the funding was syndicated to the Emerging Africa Infrastructure Fund (EAIF), while the overall equity contribution of the shareholders was \$4.9 million. EAIF is a member of the Private Infrastructure Development Group, which is funded by the UK, Switzerland, Australia, Norway, Sweden, Netherlands, Germany and the World Bank Group.

2.3 Green Technology Bank

The Green Technology Bank is a technological bank implementing the 2030 agenda for Sustainable Development in the green technology field. During the opening ceremony of the United Nations Climate Change Conference in Paris December, 2015, the Chinese President Xi Jinping stressed the need to establish a fair and effective mechanism to deal with climate change by focusing on the need to realize a high-level sustainable development of the world and constructing an international relationship of cooperation and mutual benefits. This later was conceived by the People’s Republic. Again Li Keqiang during his chairing the 2030 Agenda for Sustainable Development in New York’s UN Headquarters issued Chinese National Plan on implementing the Agenda 2030, which made clear that China the need for China to establish and implement the Green Technology Bank hence in 2016 GTB was launched and the construction commenced which was completed in 2017 and officially opened.

2.3 Green Technology Bank Major Focus.

The Bank focuses on Information, Financial and Technology Transfer platforms, the information platform looks at technical demand, technology transfer mainly concentrate on enterprise, institution and intermediary whereas the financial looks at industrial fund, Bank and other capital markets.

2.5 Green Technology Bank Main Business.

The Green Technology envisioned five major business models each with its function, these includes the following;

Providing green technology transfer and transformation services, these encompass, testing, screening, evaluation, system integration, as well as package systematic solutions by centering

Providing financial support to the whole chain of green technology transfer and transformation. This business establishes green technology financial services platform by developing suitable financial products for the whole chain green technology transfer and transformation, setting up the green industry fund, facilitating the capitalization and securitization of green technology as well as promoting international cooperation on green finance.

Providing Comprehensive Solutions for Corporate Green Technology Development. By innovating new modes and new products combining green technology with finance and other elements, assisting enterprises in using and developing green technology, supporting the reforms and upgrading of corporate green technology, and sharing the emission reduction benefits or corporate public offerings.

Providing Systematic Regional Green Development Solutions to Local Government. Proving regional green development plan and projects design and integrated supply of the technology system, allocating financial solutions, exploring the local financial investments and social capital cooperation mode, and offering one-stop service including project evaluation, screening, consulting, think tank platforms.

Providing the Internationalized Transfer and Transformation of Green Technology. Replicating and promoting the successful application of mode of green technology industrialization in China, expanding the green development markets in developing countries,

facilitating the international green technology storage and re-innovation towards developed countries, and building the international network for green technology transfer and transformation.

III. FUTURE TRENDS IN SOLAR ENERGY CONSUMPTION IN UGANDA.

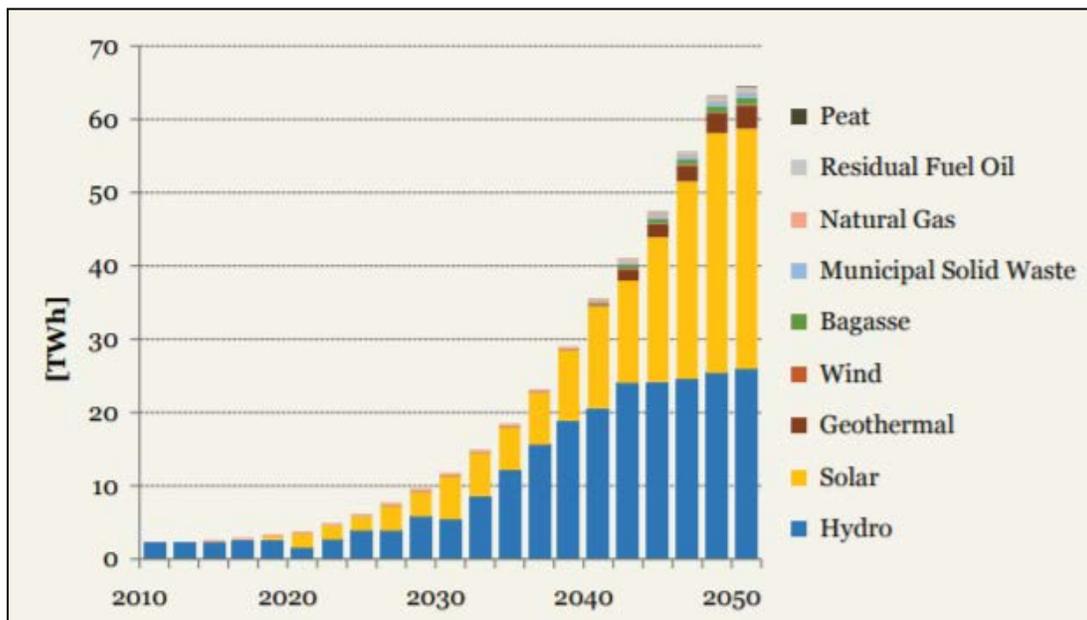
Uganda's economy and population is growing fast and so are its power needs, according to a report by ministry of energy it is expected that by 2050, electricity demand in the country will quadruple[28][8]. The need to use solar and other renewable sources of energy will be no longer an alternative but a must do thing.

The government has therefore started to partnership with the private sector energy providers that can build solar plants in Uganda learn them for agreed duration of time and later transfer them to the government[9]. Loans and grants to finance solar power projects is another undertaking that the government has come up with some of biggest multilateral lenders including the World Bank, the European Investment Bank, and the African Development Bank joined in with private financiers, such as South Africa's ABSA Capital and Standard Chartered Bank[28].

Ministry of energy has also come up with new Policies that are compatible with the global and regional energy policies. They acknowledge international and regional energy trends, especially in areas of energy investment, pricing and global impacts[29][30]. Since 2010, solar energy use has been gaining an upward trend[9][30].

Data available and projections indicate that by 2050 solar energy will surpass hydropower in terms of the most used renewable energy in the country[31]. Figure clearly shows the current situation and expected future trends.

Figure 4: Renewable Energy use Future Predictions.



Source: organization for economic, energy the next fifty years.

Solar energy is a global phenomenon on the upswing and Uganda is part of this, for a foreseeable future its growth is set to accelerate. However priorities and decisions that are made now will determine how future societies benefit therefore it's the responsibility of the government to ensure that progress is made in the right way.

3.1 Environmental impacts of solar power

Energy generation and transmission methods have significant effects to the environment. The conventional energy generation options have higher negative impacts that damage the air, water, climate, soils, wildlife, landscape as well as raise the levels of harmful radiation[32]. Renewable energy technologies are substantially safer hence offering a solution to many environmental and social problems associated with energy generation.

Solar energy does not pollute air, water or cause greenhouse gases. Solar energy can have a positive, indirect effect on the environment. Using solar energy replaces or reduces the use of other energy sources that have larger negative effects on the environment. Although, some toxic materials and chemicals are used to make the photovoltaic (PV) cells that convert sunlight into

electricity[33][34]. Some solar thermal systems use potentially hazardous fluids to transfer heat. Leaks of these materials which can harm the environment and cause health effects to human beings and animals.

However, environmental effects from solar energy technologies are usually minor which can be minimized by appropriate mitigation measures. The potential environmental burdens of solar energy are regularly site specific, depending on the size and nature of the project.

3.2 Recommendations

In Uganda the government should review the policies that are in place to favor investments in solar energy sector by changing the allocation of funds and proper control of revenues from the investments. The policies should outline and accommodate the role of investors in the energy sector; this will attract both international and local investors since the business environment will be accommodative.

Uganda government should also encourage partnership between local and international banks. As seen in the Green Technology Bank above, it can be an opportunity for Uganda local banks to benefit from the initiatives that the Green Technology Bank has put in place, the framework is so comprehensive in nature that it can address all problems related to technology diffusion in Uganda hence will lead to acceleration of investment as well as reducing the greenhouse gases (GHG).

The government should also consider reviewing laws and regulations and add articles/clauses that allow direct grants and investments in which funding can be transferred directly to recipients, especially at community level, thus making projects wholly owned by community initiatives. Experts can help in Management but at the same time the communities will be in charge to ensure transparency, free competition and non-discrimination especially when it comes to power distribution.

Change in Perception by the Policy makers is a very important factor for full utilization of solar energy to be achieved; they are often preoccupied with electricity and liquid fuels. Solar energy is associated with low income populations and low revenue making businesses, with accompanying concerns over environmental degradation, and as such is given low political priority.

Tax incentives and subsidies on solar related products, though there are no taxes levied on solar panels, other products that complete the package of solar energy generation are still taxed for example, batteries, by subsidizing these, access to solar energy will be affordable that help improve the economics of either initial investment or operations in solar energy technologies. Investors can make profits and at the same time the end user will be charged reasonable prices that will help them put into consideration using solar energy instead of the other non-renewable energies available in the country hence will lead to reduction of greenhouse gases (GHG) that cause global warming.

Political commitment of the government and financial institutions solar energy sector is a necessity since this is one of the major barriers towards achieving the utilization of solar energy. Politicizing this makes it difficult for the results to be achieved since each leader will argue on the basis of what is favoring their situation. It is therefore the responsibility of the government to ensure that decisions in the solar and other renewable energy sectors are not left in the hands of the politicians.

Ensure that the framework selected while implementing the solar energy projects has built-in provisions to allow for flexibility in the event of significant market changes or unintended consequences of incentive and tariffs schemes. This will ensure effectiveness for the long term and that the best interests of the country are met, some possibility for change is required. At the same time, any such change should be circumscribed within defined parameters that include mechanisms to measure progress toward solar energy goals, to allow for maximum predictability and minimal investment risk.

IV. CONCLUSION

Solar energy as one of the most promising renewable and environmentally friendly energy sources available in the world today. To meet the increasing energy demand there is need to diversify the energy sector through increased investment into other renewable energy sources, chief of which should be solar energy. Uganda inadequate access to modern energy services and safe supply of power is affecting the entire society. The Government and stakeholders in Uganda are working hard to tackle these challenges and one of the solutions towards achieving 100% renewable energy by 2040 is by increasing production and transmission of solar energy for off-grid citizens. On the other hand social and environmental benefits that derived from use of solar energy are already felt and are overwhelming.

APPENDIX

Abbreviation

- i. ABSA- Amalgamated Bank of South Africa
- ii. CO₂ – Carbon Dioxide
- iii. CSP – Concentrated Solar Power
- iv. EAIF—Emerging Africa Infrastructure Fund
- v. ERA--Electricity Regulatory Agency
- vi. EU- European Union
- vii. FMO- Financierings-Maatschappij Voor Ontwikkelinglanden (Netherlands Development Finance Company)
- viii. GET-FiT- Global Energy Transfer Feed in Tariffs
- ix. GTB- Green Technology Bank
- x. GWh- Giga watt hour
- xi. KM² – Kilometers Square
- xii. KfW-Kreditanstalt Fur Weideraufbau (German Development Bank)
- xiii. KWh/M²-Kilo watt hour per Meters Square
- xiv. Mtoe-Million Ton of Oil Equivalent
- xv. NGO- Non Governmental Organization
- xvi. MW- Mega Watt
- xvii. PIDG- Private Infrastructure Development Group
- xviii. PPA- Power Purchase Agreement
- xix. PV- Photovoltaic
- xx. UETCL-Uganda Electricity Transmission Company Limited
- xxi. UPPPRE-Uganda Photovoltaic Pilot Project on Renewable Energy
- xxii. UGX- Uganda Shillings
- xxiii. UN- United Nations
- xxiv. UK- United Kingdom
- xxv. USD- United States Dollars

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The entanglement of Disaster and Climate Change with special reference to Flood

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Abstract- *Since the Industrial revolution in the World, there has been tremendous increase in the vulnerable activities of humankind to the climate and environment of our Planet. In particular, during the last 100 years, the astronomically fuel consumption in various technological and household utilities have aggregated devastating impacts on the environment, like global warming, ozone layer depletion, volatile weather etc. This resulted adverse effects on our climate, resulting it more erratic and volatile in various forms of disasters across the World. This paper discusses the effects of climate change on the flood disasters in India and World level. It also discusses my case study on the devastating flood in Kawas (Barmer) in the Thar Desert, which struck during August month of 2006, from the perspective of execution of Disaster Management. Though the case study is not linked directly to climate change aspect, however, the extreme weather in Kawas region during flood may be due to climate change. Therefore the presented case study is just aimed to show the indirect adverse effects of climate change in the form of Flash Flood in the desert area, which has led to great challenge for the people and the administration which are normally do not accustomed to Flash Flood.*

Index Terms- *Climate Change, Flood Disaster, Kawas Flash Flood, Disaster Management*

I. INTRODUCTION

The problem of human induced climate change was hypothesized in the early 1890s by Swedish Scientist Svante Arrhenius, who warned about the possibility of a so called “enhanced” green house effects caused by excess carbon dioxide in the atmosphere [1]. In the late 1980s, the World Meteorological Organization /International Council of Scientific Unions/ UN Environment Programme/ Advisory Group on Green House Gases identified two main temperature indicators or threshold with different levels of risk. Based on the available knowledge at that time, 2 °C increase was determined to be “An upper limit beyond which the risk of grave damage to Ecosystem and of Nonlinear response, are expected to increase rapidly” [2]. The earth’s temperature is expected to increase by 1.8-4 °C by the turn of the century owing to increase in greenhouses gas emission if one were to go by the estimate of the Intergovernmental Panel on Climate Change (IPCC) [3]. Results from a wide range of climate model simulations suggest that our planet’s average temperature could be between 2 and 9.7 °F (1.1 to 5.4°C) warmer in 2100 than it is today [4].

Earth’s climate has never been stable over extended period of time. Climate change represents the changes in the variability or average state of the atmosphere over time (decades to millions of years) and over region (local to global scale) or in other words all forms of climatic in consistency [5]. As per the definition of the American Meteorological Society, “climate change is any systematic change in the long terms statistics of climate elements (such as temperature, pressure or, winds) sustained over several decades or longer. Climate change may be due to natural, external forcing, such as changes in solar emission or slow changes in the earth’s orbital elements, natural internal processes of the climate system, or anthropogenic forcing” [6].

Climate change will exacerbate the adverse impacts of the un-sustainable resource’s utilization. Fresh water and other natural resources were under constant threat from pollution and depletion due to un-sustainable consumptions. Higher temperatures, intense floods, severe droughts, sea level rise, cyclones, hurricanes, glacier retreat, and spread of climate sensitive diseases were the consequences of climate change [7]. Climatic studies have shown that warming trends are linked to global changes in the hydrological cycle [8]. One of the main consequences is an increased extreme precipitation event such as flooding and droughts as described by many experts [9-13]. As noted by Bats et al (2008) [8], floods are affected by various characteristics of the climatic system, most notably precipitation (intensity, duration, amount, timing, phase rain or snow), but also temperature patterns responsible for such phenomena as soil freezing, snow affected by drainage, rivers, the snow and ice cover, the soil character and status (permeability, soil moisture content and its vertical distribution), the rate of urbanization, and the presence of dikes, dams and reservoirs, close to sea level, river flooding may be concurrent with storm surge or extreme tide events [14].

Recent experiences with extreme events show that many societies are severely exposed to loss and damage during extreme events such as floods [15]. Flood disasters account for about one third of all natural catastrophes in the World (by number and economic loss) and are responsible for about one half of the fatalities [16]. In terms of exposure to flooding, about 800 million people worldwide (i.e., over 11% of the global population) are currently living in flood prone areas and about 70 million of those people (i.e., 1 % of the global population) are on average, exposed to floods each year [17]. There is an increasingly alarming trend in the number of people affected by natural disasters with an average of 147 million affected per year (1981-1990) rising to 211 million per year (1991-2000), with flooding alone accounting for over two thirds of those affected

[18]. For the period 1980-2011, reported flood losses have increased from an average of US \$ 7 billion per year in the 1980s to some US \$ 24 billion per year in the period 2001-2011, of which an average of 9 % was insured [19].

Several headlines events have piqued concerned about extreme weather disasters in the recent years. Record-Setting storms, flooding, drought, and heat wave all had for reaching consequences [20, 21]. Here are some recent major Flood Disasters which occurred across the World:

- The major flood event at the turn of the 21st century, and the most economically destructive disaster in Europe's history, occurred in 2002. Flood took place along the Danube and Elbe rivers, affecting much of the Central Europe; there was also significant flooding in the UK and France. 6 lakhs people were affected and 80 were killed in the 11 countries. Economic losses were at least 15 billion euro [22].
- In the Amazon region in South America, the July 2009 flood set record high in the 106 years of data for the Rio Negro at the Manaus gauge site [23].
- Soong and Zhao (Soong and Zhao (1994) [24]) reported that in nearly 2000 years of recorded history, the Yellow River has had seven major course changes and 1593 levee branches. In the 1990s the frequency of flooding along the Yangtze River increased, with tremendous damage occurring in the floods of 1991,1994,1996,1998 [25]. During the summer of 1998 Yangtze River flood began in early June when the seasonal rains arrived earlier and were heavier than usual. The 1998 flood killed over 200 people and left 14 million homeless [26].
- Bangladesh seems to be one of the worst of the victims of climate change ravaged by major disaster events like 1998 flood, 2000 flood, 2007 cyclone SIDR and 2009 cyclone AILA [27-28]. Mirza (2000) [29] stated that global warming introduced changes in Monsoon precipitation that would increase the magnitude, depth and extent of flooding in Bangladesh. As a result, the land area under extensive inundation would increase and agricultural productivity might decrease.
- A record-breaking, destructive flood occurred in Thailand, where the 2011 monsoon season was

exceptionally heavy and led to extensive and long-lasting flooding in the Chao Phraya and Mekong river basins. Flooding was exacerbated by the rapid expansion of urban areas into flood plains. The flooding lasted from July 2011 to mid-January 2012 and was the costliest natural disaster in the country's history, with direct damages estimated at US\$45 billion. As a result, Thailand's annual 2011 economic growth was slashed to 1.5% from a pre flood estimate of 3.5-4%. In part, the severity of this event was due to failure of flood control structures and systems that had effectively alleviated the damages from smaller events in the past. The 2011 flood in Thailand caused the most expensive insurance loss ever, worldwide caused by a flood, with the total liability estimated at US\$ 15 billion [30].

II Climate change and Flood disasters in India

Floods are natural feature of India's river basins. They are very important as they form the lifeline of India whose economy is still dominated by Agriculture. However, due to climate change in the last 30 years, India has also become more vulnerable to flood related disasters. According to World Bank report [31], "the Ganges-Brahmaputra and Indus river systems are highly prone to flooding. The magnitude of flooding has increased in recent decades, from approximately 19 million hectares affected 50 years ago to 40 million hectares in 2003, about 12% of India's geographic area. Floods have occurred almost every year since 1980, and their extent substantially increased in 2003 due to widespread rains, which affected even some of the most drought-prone areas. In recent years an increase in population in vulnerable areas, inadequate drainage and deforestation has all contributed to the rise in flood damage". In the last 10 years India has received many deadly floods which have created a great concern because of their spatial and temporal irregularities. Here, I would like to discuss Mumbai Flash Flood (2005), Koshi flood (2008) and recently Uttarakhand Flash Flood in 2013. These types of flood are unprecedented in the recent past therefore I am describing them.

- Severe flooding occurs in Mumbai in July, 2005 after 944 mm rainfall in a 24 hour period [32]. This has created huge disruption in the normal life of Mumbai causing huge havoc to the city itself and made it standstill for couple of days. According to Ranger et al [33], Mumbai experienced unprecedented flooding, causing direct economic damages estimated at almost two billion US\$ and 500 fatalities.
- The Kosi River is known as the "Sorrow of Bihar" as the annual floods affect about 21,000 km² (8,100 sq mi) of fertile agricultural lands thereby disturbing the rural economy [34]. According to UNDP, India report (2009) [35], the valuation of houses damaged stands at around Rs.880 crores (US\$ 195 million). Enormous amounts of goods were lost, including food grains and domestic items estimated to be worth Rs.400 crores (nearly US\$ 88 million) and Rs.155 crores (US\$ 34 million) respectively. It further pointed out that 493 people died due to this flood in 40 villages in which they surveyed. Around 3.78 lacs people were affected due to this flood.
- Recently, the Flash Floods triggered by very heavy rainfall and cloudburst in Uttarakhand on 16-17 June 2013, affected 12 out of the 13 districts in Uttarakhand. The 4 districts that were worst affected were Rudraprayag, Chamoli, Uttarkashi and Pithoragarh. The deluge has washed away roads, bridges and other infrastructure. Many people either died or went missing. In Kedarnath alone about 75,000 pilgrims had been stranded due to landslides and Flash Floods [36]. South Asia Network on Dams, Rivers and People has published a report in which the main culprit for such a Flash Flood is various human activities. The report cites NIDM:[37] "Thus, the natural terrain conditions combined with climatic / weather conditions and haphazard human intervention made a conducive

environment for such a hazardous process to take place in this valley."

The above mentioned unprecedented deluges are due to direct/indirect effects of climate change because they are extreme weather conditions which are normally not a part of their climate conditions. Since flooding in India is directly related to the Monsoon which is related to climate related parameters like sea level temperature, pressure, wind direction etc. Therefore the volatile nature of flooding is directly/indirectly related to climate change. In 2003, World Meteorological Organization had warned of an increase in frequency of extreme weather events because of climate change. Further, the article in [38] clearly relates the Flash Flood in Rajasthan in 2006 with the global warming by saying "The deluge in Rajasthan was caused by a low pressure zone over the area, itself a result of extreme heat conditions, experts note. Low Pressure area in deserts that result from the extreme heat is referred to as thermal low in meteorological parlance. Such conditions could be caused by global warming. The thermal low caused southwest monsoons to bring rain over Barmer and Jaisalmer".

I present here the case study of the Flash Flood in Kawas region of the Thar desert in August, 2006. The case study is mainly focused on the various aspects of the Disaster Management Policy and its execution. It is not linked directly to the climate related issues. Many studies have pointed out that the extreme weather conditions are due to direct/indirect climate change. The above mentioned references in the previous paragraph also pointed out the possible role of climate change in the Rajasthan deluge in 2006, in particular in the Kawas region of Barmer district. Therefore, my aim is to present this case study of the Flash Flood on the affected people is not directly linked with the climate change. However, the Flash Flood, like in Kawas, is the result of the climate change in the World and thus making a burden on the Disaster Management policy. This case study should be seen from this perspective. At the end of the day, it is the common people who have to pay the price of climate change due to human intervention to nature. The Kawas region is located in the Barmer district of the Thar desert with the arid climate. The flooding for them is normally an unusual phenomenon. The

devastating Flash Flood in Kawas in 2006 was a nightmare for that area.

III CASE STUDY ON KAWAS FLASH FLOOD (2006)

Rajasthan is one of the driest states in the country. Though the State is generally deficit in rainfall, it has also experienced floods in many areas during monsoon period. The erratic and temporal occurrence of floods in Rajasthan adds to the difficulty of formulating an effective system to cope up the flood related disasters. The average normal rainfall of India is about 883 mm, whereas the average normal rainfall of Rajasthan is 531 mm. Western Rajasthan receives average rainfall of 279 mm and Eastern Rajasthan receives average rainfall of 631 mm [39].

In 2006, the monsoon has created formidable situation in many parts of Rajasthan. Barmer was deluged with heavy downpour in the last week of August 2006. Thirty-six hours of non-stop rains have converted village Kawas in Barmer district into the biggest mortuary in the Thar Desert. Barmer district had a severe intensity of rain-spell between 19 - 23 August with a total rainfall of 426 mm at Barmer teshil, 392 mm at Ramsar, 383 mm at Gadraroad, 364 mm at Baitu, 311 mm at Sheo and 306 mm at Gida. Floods claimed 85 lives including 50 alone in Barmer district, while media reports claim 300 people have died in the state. Approx 75,000 cattle heads perished besides property and monsoon crop damage amounting to Rs. 13 billion. Being a desert state, prone to droughts, the floods were unprecedented and the worst in 200 years (see NIDM data for further details). As shown in the figure 1, the affected area of Kawas is located in the desert region of Rajasthan and, normally, is an arid region. Though the warning was given to people in advance, regarding heavy rainfall and chances of floods, villagers didn't believe the possibility of flood in a desert. The water level went up to 25-27 feet above ground level; villages in a radius of 60 km were under water without road, rail, phone and electricity. There was huge loss of livestock which is the mainstay of the local economy (NIDM) [40].

Normally the western part of Rajasthan is a desert area and always prone to drought. The devastating flood of 2006 in

Kawas (Barmer) was not expected as this area receives scanty rainfall during monsoon season. Kawas was the worst hit by the flood. Houses were submerged 15 feet in water for quite long time. Ironically, the region has rich Gypsum deposits which became curse for it [42]. As this area is not vulnerable to such types of sudden floods, the people and administration were probably not had enough expertise and experience to cope up with this menace. This warrants looking into the disaster policies with proper planning to handle such types of disasters.

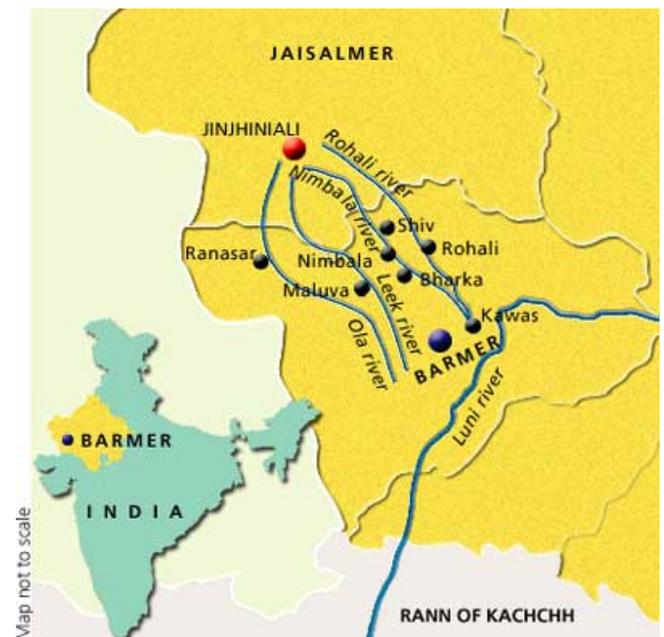


Figure 1: Geographical location of Kawas area (Barmer) [41].

III.(a) Research Methodology

The Flash Flood in the Kawas is an unusual phenomenon because the area is drought prone and located in the desert region. Therefore, the people are, largely, not prepared enough to cope up with such type of Flash Flood. This has created a huge havoc for the region at psychologically, economically and ecologically. Kawas is located in Baytoo Tehsil in Barmer District of Rajasthan State. It is located 49 KM towards East from Barmer [43]. I chose this area for the survey because of the reasons mentioned above. Further, instead of relying on the secondary data, I found it more appropriate to collect primary data through the random survey from the perspectives of Disaster

Management. I briefly describe the Methodology adopted for the study as per follows:

(i) Coverage:

The reported case study, mainly, relied on the primary data, collected from the interviewees of the Kawas region. The survey was kept random in nature so that everybody could give their feedback and inputs. A total of 250 respondents were drawn as a sample size in the process of survey which belonged to various strata of the society, like persons from the under-privileged section, government employees, NGO workers, local

representatives, shopkeepers, house wives, students etc. The questionnaire was designed in such a manner that it should reflect the actual picture of Disaster Management and also highlights the shortcomings of Disaster Management plan of whatever form, like discrimination in the relief and rehabilitation work, mismanagement in the execution in the Disaster Management, lack of information etc. The primary concern was with vulnerability to short term disaster, in particular impacts to flood.

Table 1: Socio-economic data of the respondents in Kawas region

	Questions related to	Kawas Response
1.	No. Of Males and Females	Male: 221, Female: 29
2.	Age group of respondents	10-20 years: 20 %, 20-30 years: 33.3% 30-40 years: 20 %, More than 40 years: 26.7 %
3.	Marital status	Married: 73.3%, Unmarried: 23.3% Widows: 2.67%, Widowers: 0.667 % Divorced-nil
4.	Education background	Illiterate: 13.2%, Barely literate: 19.9% Primary : 26.5%, Secondary: 33.1% Higher : 7.28%
5.	Per Capita monthly Income	Less than Rs. 1000: 5.43%, 1000-3000: 59.8% 3000-5000: 21.7%, More than 5000: 13%
6.	Status of Family	Nucleus : 33.3%, Joint: 66.7%
7.	Head of Family	Male Head: 90%, Female Head: 10%

(iii)
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from. The questionnaire was divided into two parts, viz-a-viz, socio

(ii) Research Questions

The philosophy of the questions was based on the execution of the Disaster Management Policy within the perspective of its main pillars, viz-a-viz Mitigation, Preparedness, Response and Recovery. It was also based on the economical, social, psychological, ecological implication of Disaster on the local area. The socio-economic status of the affected area was covered in the Questionnaire. Personal feedback and suggestions etc. are taken care as a separate section in the Questionnaire.

economic data of the respondent and Disaster related data. The socio-economic data have been presented in the Table 1. The Disaster related data have been presented in Tables 2-4. The responses have been projected on percentage basis. The questionnaire also gave the respondents to give their suggestions for the improvement of mitigative measures for any future Flash Flood in the region. Many people gave their suggestions. I compile their best suggestions and present it them in the next Section.

III.(b) Results and Discussion

In the Table 1, I present the Socio-economic data of the Kawas region. The table is self explanatory so I refrain from its

discussion. Apart from the Socio-economic data, I have asked 19 questions related to the Disaster Management cycle, viz. Preparedness, Response, Recovery and Mitigation, in the questionnaire. I compiled the data of the survey and present them in Table 2, 3 and 4.

From Table 2, I summarize my findings as:

1. Since they were not prepared for the Flash Flood due to arid climate of the region. They were not able to effectively fight against the Flash Flood resulting huge loss in the livelihood stocks (see the Table-2).
2. Similarly, the administration was also seemed to be not prepared enough to manage this disaster. It took more than 5 hours to build up the flooding in the region, the administration would have managed the disaster effectively, had it equipped enough to fight the Flash Flood. Relief and rescue works were badly managed due to poor facility in dissemination of flood warning, transportation for the evacuation of the affected people, and the electricity and communication system.

Table 2: Statistics of Kawas flood in 2006

Q.No.	Question	Response
1.	What types of frequent disasters did you face recently?	Drought: 98.6%, Earth quake: 46.6% Flood: 73.33%, Others: 11.33%
2.	Which of the following losses did you meet during the flood?	Food grain: 75.33%, Animal: 74.66% Human loss: 29.33%, Others: 38%
3.	How long did it take to reach flood situation?	3 hours: 2.01%, less than 3 hours: 9.41% Between 3 and 5 hours: 1.34% More than 5 hours: 87.2%
4.	(i) Did government warn you about the possibility of flood? Q4(ii) If yes to Q 4(i) then by which mode they have warned you?	Yes: 8.2%, No: 91.8% Using :Siren: 25%, Using radio: 25% Through Panchayat: 37.5% Others: 12.5%
5.	Did you find yourself a way to recede the area after finding more than average rain? Q5(ii) If yes to Q5(i) then which of the following modes you have used:	Yes: 89.8%, No: 10.2% Migrated on feet: 89.7% Migrated using personal vehicles:5.88% Migrated using Govt. vehicles: 3.68% Migrated using Community vehicles: 0.7%
6.	What was the operational condition of communication and electricity during flood?	Uninterrupted:0.66%, Good: 3.33% Insufficient: 87.3%, Don't know: 8.67%

The Table 3 is related to the Relief, Rehabilitation and Gender related issues. The findings can be summarized as follows:

1. The immediate reliefs were not equally distributed to the affected people. Only 11.1% people got all the assistance like food, cloths, medical attention and temporary houses (see Question No. 7 of Table 3). Normally we expect all the necessary aids should be extended by the administration immediately after the flood. Naturally this was not the case for Kawas region.
2. There was also a Lacuna in the long term development of the affected area. The survey clearly showed that it took more than 6 months to remove the water from the area. The then administration did not take interest to pump out the water. The stagnated water was vulnerable to their houses, farms, water born diseases and other essential services.
3. They were assisted, mainly, by the Army and NGOs. They also got help from their respective community based organization. The NSS/NCC like youth organizations should be brought into the Disaster

Table 3: Statistics of Kawas flood

Q.No.	Question
7.	During the disaster what types of government aids were received?
8.	How long did it take to remove the water from Kawas region?
9.	Apart from government assistance, which of the following organizations assisted you?
10.	(i) Did you find any problem in the assistance during the disaster due to woman? Q10(ii) If Yes to Q10(i) then what types of problems were faced?
11.	(i) Did you receive any type of governmental aid? (ii) If yes to Q11(i) then what types of aids did you receive from the government?
12.	(i) Whether any rehabilitation policy implemented in Kawas region? (ii) If yes to Q12(i) then what types of rehabilitation policies were implemented during post disaster period?

Management aspect as there was no contribution reported in the survey.

4. The gender related issues were raised in the survey. Most of women found difficulty to get the assistance due to their gender (76.5%), especially in medical services. They also found very little assistance from the government in terms of house, finance. The administration has not taken interest to set up the Women's group for their economic upliftment and empowerment.

5. Most respondents got the benefit of the rehabilitation policy related to housing. However, they were not properly aided financially as well as other aspects shown in the data related to the question 12 (see Table 3). The quality of housing was also questioned by many people.

Table 4 is related to post disaster works and mitigative measures. It is also related to their readiness to face such types of Disasters in near future (question no. 19). The summary of the findings are as follows:

Table 4: Statistics of Kawas Disaster

Q.No.	Question	Response
13.	Apart from government administration, which of the following organizations have helped in the rehabilitation of affected people?	NGOs: 78% Local Organization: 42.66% Neighbouring Villages: 20.66% Educational Institutes: 6%
14.	(i) Were there any medical camps organized by the civil administration regularly? (ii) If Yes to Q14(i) then what was the frequency of the camp?	Yes: 80.1%, No.: 19.9% 1 month: 21.6%, 3 months: 48.6% 6 months: 18% More than 6 months: 11.7%
15.	Whether there was any proper coordination between civil administration and NGOs during relief works?	Yes: 2.86%, No: 67.9% Do not know: 29.3%
16.	Give your opinion about present water drainage System?	Proper arrangement: 3.33% Improper arrangement: 10.7% Under construction: 3.33% No arrangement: 82.7%
17.	What types of loopholes did you find in the aid you received?	Lack of basic needs in the allotted houses: 94.66% Delay in financial aids: 70.66% Lack of people's participation at local level: 72% Corruption and lack of transparency: 77.33%
18.	Does Government organize following practices to cope up with natural disasters?	Warning before Disaster: 88% Training to survive during Disaster: 90% Information about Government role: 66% All of the above: 51.33%
19.	Are you prepared enough to face this type of disaster (i.e., 2006 flood)?	Yes: 14%, No: 86%

1. Most people got assistance mainly from NGOs, local organizations, like Nehru Yuva Mandal, Mali Samaj, Jodhpur or neighboring villages and educational organizations (see question no. 13 in the Table 4).
2. Most people appreciated the Medical Camps organized by the administration after the flood.
3. The coordination between the Govt. and NGOs are essentially good for better management in the rehabilitation process. However, my findings clearly shows that people found no coordination between Govt. agencies and NGOs (67.9%, see question no. 15 in the Table 4).
4. They have shown their resentments about the present drainage system. Around 83% people told me that they do not have any drainage system to channelize the excessive water in case they get similar Flash Flood in near future. This is really a serious concern for them as they had been stranded earlier in the Flash Flood.
5. People are not satisfied with the Government aids they received. Around 94.7 % people have complained about the lack of basic needs in the allotted houses. They had also general feeling about various lacunae in financial aids, corruption and lack of transparency as well as lack of people's participation at local level (see question no. 17 in the Table 4).
6. People have now better awareness about the various Disasters and have more skill to cope up the natural disasters because many people have responded positively that the Government has been organizing various training camps to enhance the capabilities of the

local people to face the disaster (question no. 18 in the Table 4).

7. Despite of the training, 86% people are not prepared enough to face such type of disaster in near future. I find this a very worrisome situation, especially after facing the 2006 Flash Flood.

III.(c) Feedback and suggestions from Respondents

I have left question number 20 of the schedule to collect their feedback and suggestions regarding present system for the prevention of 2006 flood like situation. I have got enormous response from the people. I compiled their suggestions. Their main suggestions and feedback are summarized as follows:

- (i) The stagnated water, which caused the flood in 2006, originated from Jaisalmer should be channelized properly possibly using Canal.
- (ii) The most vulnerable village prone to the stagnated water has to be identified and the stagnated water from the village has to be channelized to Sindhi-Luni river.
- (iii) The affected villages have to be equipped with the Disaster Management Centres.
- (iv) There has to be physical verification of disaster aids.
- (v) Rehabilitation policy 2005 should be implemented.
- (vi) The ex-gratia to the next of kin to the deceased person should be uniform in India.
- (vii) The allotted houses are small and designed not as per family requirement.
- (viii) Make the affected agriculture land fertile again.
- (ix) Boats should be kept at Panchayat level.
- (x) The District level committee charged for disaster specific matters should include persons from village level with women participation.

III.(d) Findings and Future Prospects of the case study

As per present findings, the Kawas flood situation was very ill-managed by the government and the management work was not as per desired in the Disaster Management plan.

Suggestions can be summarized as per following points:

- Education of the community plays an important role in its empowerment, its goal is to change people's apathy concerning disasters. "Hazards education attempts to increase protective actions by people, groups and institutions by presenting information about hazard and risk" (McEntire and Myers (2004) [44]).
- Disaster Management process must incorporate people's participation at the local decision making level. Participation of community has been successfully tested in several programmes around the World. ((Pearse (2003) [45], Osti (2004) [46]).
- Communication and team work are the key elements of successful Disaster and Emergency Management (Trim (2004) [47]). It is advisable that the committees should have well defined communication channels within the village and with county (state) authorities. It is important that the person in charge of communications to be equipped with adequate radio or telephone devices in order to keep with the county (state) authority (Newport and Jawahar (2003) [48]).
- A contingency plan for emergency has to be prepared involving all groups.
- The immediate government aid is necessary for rescue and relief operation. The Kawas study has shown that the people were not given immediate aids of Food, Cloths and Temporary logistic arrangements by the government administration. They also complained huge delay in the given aids. Again this finding reflects the apathy and casualness of the then Barmer District administration to the disaster.
- For effective implementation of any disaster management plan it is required to have proper coordination between civil administration and NGOs in the relief and rescue works. The case study of Kawas found that almost all people found no proper coordination between them. The outcome here is alarming and serious. There has to be coherent coordination between these two agencies and has synergy between their operations during the disaster.

IV CONCLUSION

In this paper, I presented a brief study related to the climate change and its effects on disasters, especially on flood related disasters. Various reports on climate change has clearly shown that during last 30 years, there has been growing tendency in the global warming resulting more disasters and their adverse effects on economy, ecosystem, development, environment and other related issues. This paper also highlights few flood disasters in the World as well as in India. The Indian subcontinent is more vulnerable to climate changes because of its unique Monsoon pattern coupled with highly densed population with pathetic economic conditions of majority of its population. The Utrakhand Flash Flood in Kedarnath region is the recent testimony of adverse effects of climate change. I also presented a detailed case study of Kawas (Barmer) Flash Flood in 2006, which was one of the unprecedented floods in India in the 21st century. The case study surfaced many issues related to the Disaster Management policy and its execution. I threw light on these issues and also suggested some points for the improvement of better management of Disaster Management. The recent erratic extreme weathers in many parts of World make this issue at global level. The awareness of the climate change and its effects on flooding should be brought to the grass root level with holistic approach, both at local and global level, so that people can be aware of controlling the activities which finally lead to the climate change.

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Analysis of Management Policy on Internal Customer Satisfaction Level in RSUD Jombang

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Abstract- Internal customer is one component of the hospital that must also be considered of the satisfaction. Many influential factors, one of which is management policy (payroll / reward system strategy, career development system and promotion system) to internal customer satisfaction level. The purpose of this research is to know the influence of management policy (payroll / reward system strategy, career development system and promotion system) to internal customer satisfaction level in RSUD Jombang. The research design used correlation analytics with the approach used is cross sectional. The population of all internal customers in RSUD Jombang are 481 internal customers with ASN status with 217 respondents taken with proportional cluster random sampling technique. Independent variables of management policy (payroll / reward system strategy, career development system and promotion system) and internal customer satisfaction are collected by questionnaire and analyzed by multiple linear regression. From the result of the research, it is found that most of the respondents considered that the payroll strategy is sufficient category, that is 143 respondents (65,9%), most of respondents assess the career development system including enough category that is 135 respondents (62,2%) and most of the respondents feel quite satisfied as customer is 138 respondents (63,6%) from total 217 respondents. The result of analysis is the influence of payroll to the level of satisfaction (p value 0,000 <0,05) with regression equation $y = 29,201 + 2,369x_1$, there is influence of career development to satisfaction level (p value 0,000 <0,05) with regression equation $y = 29,201 + 0,357x_2$, there is influence of promotion to satisfaction level (p value 0,000 <0,05) with regression equation $y = 29,201 - 0,677x_3$. and there is influence of management policy to internal customer satisfaction level (p value 0,000 <0,05) with regression equation $y = 29,201 + 2,369x_1 + 0,357x_2 - 0,677x_3$. This is because payroll systems, career development and promotion are the needs of every employee. It is concluded that in order to satisfy the internal customer, the management must pay attention to all aspects of management policy ranging from payroll system strategy, career development system and promotion system. It is recommended that the hospital manage the management system with careful planning and transparency.

Index Terms- Management policy (payroll, career development, promotion), internal customer satisfaction

I. INTRODUCTION

Hospitals as a public service unit should be able to provide quality services for the achievement of patient satisfaction. For that one of the influential components is the human resources as executive staff, in addition to being demanded by the progress of science and technology. For the sake of the realization of a quality service in the management of hospital resources must be created a good quality of internal service because it is seen as a very decisive element in providing satisfactory service to the customer (customer satisfaction) (Indrayanti, 2011). A review of previous internal customer satisfaction data at Permata Bunda Hospital Medan in 2016 found that internal customers (nurses) were not satisfied with salary or reward of 18 people (58%), dissatisfied with 13 people (41,9%) promotion, dissatisfied to supervision 16 people (51,6%), not satisfied with the work itself 13 people (41,9%) while the most colleagues are satisfied as many as 13 people (41,9%); (42.1%), dissatisfied with the promotion of 9 people (47.4%), dissatisfied about the supervision of 10 people (52.6%), not satisfied with the work itself 7 people (36.8%) but they are satisfied with colleagues that is 6 people (31.6%); the quality of services provided by internal customers (nurses) on the most external customers is good category that is 18 people (43.9%) and the quality of service provided by internal customers (administrative staff) is the most good category is 17 people (41.5%) Castle, 2017.

Furthermore, the study of internal customer satisfaction data at RSUD Jombang East Java there is a tendency that employee job satisfaction (internal satisfaction) also decreased. This can be seen from the lack of employee attention to work time, tasks and tools, and increased levels of absenteeism in general (Study Introduction, 2017). Based on the factors that influence employee job satisfaction (internal satisfaction) among others according to Mangkunegara Minar (2009) job satisfaction related to management policy in terms of payroll, career development and effective promotion of employees in the organization. Other sources explain many factors that affect job satisfaction in an organization or company such as motivation and reward, opportunity to advance / promotion position, job security, salary, company and management, working conditions, reward and communication (Gilmer in Azka, 2015). The awarding of awards from the company or the organization is very instrumental in improving employee work satisfaction, because basically employees have the desire to get recognition for the results of his work (Azka, 2015).

The impact of internal dissatisfaction is the performance of employees to be down and ultimately impact on low customer satisfaction that eventually customers will not be loyal to the health care unit (hospital), will even spread negative news to other customers. According to Hallowel (Indrayanti, 2011), employee job satisfaction has a stronger linkage to the quality of internal services (non-economic needs) than to the economic needs of employees as well as wages and benefits. Ardana, et al. (Kusuma, 2014) states that low job satisfaction can cause negative impacts such as decreased work discipline, decreased enthusiasm and passion, and often make mistakes in the work resulting in decreased work productivity. Given the above issues, to increase internal satisfaction according to (Minangkaregara) (2009) implementation of a system of payroll and promotion fair and can meet the needs of workers in an organization will be able to improve job satisfaction, work motivation, performance, and work productivity. Based on the above description, the researcher is interested to conduct research by formulating in the title: "Management Policy Analysis (Payroll System Strategy / Reward / Career System and Career Promotion System) to Internal Customer Satisfaction Level at RSUD Jombang".

II. MATERIALS AND METHODS

The research design used is correlation analytic design is a research design that aims to examine the relationship between variables. The approach used is cross sectional. According to Sandu Siyoto (2015), cross sectional research is a study to study the correlation dynamics between resiko factors with effects, by approaching observation or collecting data at a time (point time approach). In this study, the measurement of management policy variables (payroll / reward system strategy, career development system and promotion system) and internal customer satisfaction level are collected only one measurement and simultaneously or one time.

Location in this research is at RSUD Jombang. The study was conducted on December 17, 2017 to 17 February 2018. Independent variables were reward, career development, promotion and attachment level of internal customer satisfaction collected by questionnaire. Statistical analysis was performed using statistical techniques using multiple linear regression.

III. RESULTS

This research applied with a sample of 217 respondents from RSUD Jombang. The result of univariate analysis was found that most of the respondents considered that the payroll strategy was sufficient category of 143 respondents (65.9%) of the total 217 respondents, the majority of respondents rated the career development system as sufficient category, 135 respondents (62.2%), most of respondents feel quite satisfied as internal customer in RSUD Jombang that is as many as 138 respondents (63.6%) from total 217 respondents. The result of multivariate analysis shows that there is influence of payroll / reward system strategy to internal customer satisfaction level in RSUD Jombang (p value 0,000 <0,05 then Ho is rejected.) The regression equation is $y = a + b_1x_1$ or $y = 29,201 + 2,369x_1$ This means that without the addition of payroll system strategy scores

(1) it will provide the possibility of increased satisfaction of $29,201 + 2,369 (1) = 31,57$, there is influence of career development system to internal customer satisfaction level (p value 0,000 <0,05 then Ho is rejected.) The regression equation is $y = a + b_2x_2$ or $y = 29,201 + 0,357x_2$. That means without any addition of career development score (1) it will give the possibility of increase of satisfaction equal to $29,201 + 0,357 (1) = 29,558$, promotion to internal customer satisfaction level in RSUD Jombang (p value 0,000 <0,05 then Ho is rejected) .The regression equation is $y = a + b_3x_3$ or $y = 29,201 - 0,677x_3$ meaning that without adding promotion score position (1) will provide a possible decrease in satisfaction of $29,201 - 0,677 (1) = 28,524$ and there is the influence of management policies (payroll / reward system strategy, career development system and promotion system) to internal customer satisfaction level at RSUD Jombang (p value 0,000 <0,05 then Ho is rejected). The regression equation is $y = a + b_1x_1 + b_2x_2 + b_3x_3$ or $y = 29,201 + 2,369x_1 + 0,357x_2 - 0,677x_3$, meaning without adding salary score, career and promotion it will give satisfaction possibilities equal to $29,201 + 0,357 (1) + 0,357 (1) - 0,677 (1)$ or 31.65.

IV. DISCUSSION

Payroll / Benefit System Strategy

The results showed most respondents considered that the payroll strategy is sufficient. This is because there are still respondents who stated that the salary received from this hospital has not been given in accordance with their work performance that is 91 respondents (41,9%) although most have stated according to achievement that is as much as 126 respondents (58,1%). Similarly, there is still a saying that the salary received from this hospital has not been able to meet the primary needs of 89 respondents (41%) although most have stated can meet the primary needs of 128 respondents (59%) of a total of 217 respondents. Furthermore, most of the respondents stated that the salary received from this hospital has not been guided by the government's minimum wage limit of 121 respondents (55.8%) although almost half of respondents stated that they have been guided by the government's minimum wage limit of 96 respondents (44, 2%). Likewise, most respondents stated that the salary received from this hospital has not been based on internal and external considerations of the institution of 109 respondents (50.2%) although a small proportion stated that the salary received from this hospital is based on internal and external considerations of the institution ie 108 respondents (49.8%) of a total of 217 respondents.

Likewise, there are respondents who stated that the service in this hospital is received to the executor yet, according to the performance of 102 respondents (47%) although most respondents stated that they have the same performance as 115 respondents (53%). Including almost half of the respondents stated that the reward or reward in this hospital has not run in accordance with the achievement of the employee that is 76 respondents (35%) although most have stated in accordance with the achievement of the employee that is as much as 141 respondents (65%) from a total of 217 respondents. Similarly, hospital points have not given rewards in the form of status, recognition, praise, satisfaction, self esteem, learning

opportunity, responsiveness, comfortable environment, 91 respondents (41.9%), the rest of the respondents stated that they have given reward in the form: status, recognition and so on that is as much as 126 respondents (58.1%). Similarly, there are still respondents who stated that the compensation as income in the form of money has not been given to the employee that is as much as 100 respondents (46.1%) the rest mostly stated that the compensation as income in the form of money has been given to the employee that is 117 respondents (53, 9%) out of a total of 217 respondents.

Including there are also employees who stated that the compensation as income in the form of direct goods has not been given to employees that is as many as 84 employees (38.7%) and the rest as many as 133 respondents (61.3%) stated already given to employees. Similarly, the compensation in the form of holiday allowance, pension money, clothing service, and excursion) a small number of respondents stated to the employees that as many as 76 respondents (35%) while the rest mostly stated already that as many as 141 respondents (65%) of the total 217 respondents.

The existence of various variations of respondents' answers about the reward system can be influenced by various factors such as respondent's gender, educational background and years of service. Based on the analysis results obtained at most almost half of female respondents with a payroll system assessment including enough category that is as much as 80 respondents (36.9%) of a total of 217 respondents. This is because women generally have high subjectivity to the problem of revenue. Therefore, the majority of them only judge sufficiently to the reward system that the hospital has given so far. Likewise with the educational background of the respondents, a bit much also affect the amount of rewards that they receive their current. Based on the analysis results obtained the most respondents educated DIII and S1 with assessment of the payroll system including enough categories of 57 respondents respectively (26.3%). This is due to the level of education D III or S1 of Nursing then they judge that the level of education including already high enough, should the payroll system should also be better. However, the reality is still not in accordance with the expected, so the majority judge that the reward system is still quite good.

Another factor that affects the assessment of the reward system is only sufficient category is related to the employment. Based on the analysis results obtained most respondents have tenure of 10-20 years by assessing that the payroll system including enough category that is as much as 90 respondents (41.5%). This is due to the 10-20 year working period is considered that they have worked long enough and certainly have much contribution to the progress of the hospital, so it should be more than what they receive today. On the other hand hospital also has not given reward more feasible considering the hospital as a unit of organization that is capital intensive, solid human resource requirement, and solid problem to be solved which all require funding support.

Career Development System

The results showed that most of the respondents considered that the career development system is insufficient category. This is caused by almost half of respondents stated that

not every employee get equal opportunity in every promotion position that is as much as 81 respondents (37,3%) from total 217 respondents. Similarly, almost half of respondents expressed disagreement if employees are satisfied with the existing promotion system in the company (hospital) with 76 respondents (35%). Also only half of the respondents who agreed if the training gained useful in developing career that is as much as 62 respondents (28.6%). Then, there are still a small number of respondents who strongly disagree and disagree if the training obtained enables employees in doing work at a higher career level that is each of 53 respondents (24.4%). Including only half of the respondents who agreed if his career could increase if diligent increase knowledge that is as much as 60 respondents (27.6%).

Position Promotion System

The results showed that most of the respondents considered that the promotion system of job title included enough category. This is due to a small percentage of respondents stated that the promotion system of employees in this hospital has not yet adhered to the principle of removal in positions higher than before that is 91 respondents (41.9%) although most of them stated that 126 respondents (58.1%) . Likewise, there is still a stating that the employee promotion system in this hospital has not adhered to the principle of relocation in a position that poses greater challenges than previous positions that is as much as 88 respondents (40.6%) although most stated already that as many as 129 respondents (59,4%). Another reason is that most of the respondents stated that the employee promotion system in this hospital has not embraced the principle of transfer in a position that gives greater responsibility than the previous position of 120 respondents (55.3%) and almost half of respondents stated that there are 97 respondents (44.7%). Including there are still a small number of respondents who stated that the employee promotion system in this hospital has not adhered to the principle of transfer in a position that gives greater authority than the position they occupied previously as many as 105 respondents (48.4%) although most stated already that is as many as 112 respondents (51.6%).

Another contributing factor is that there is still a small percentage of respondents who stated that the employee promotion system in this hospital has not yet adhered to the principle of transfer in a position which gives a higher status than the previous occupation of 100 respondents (46.1%) although most stated already that as many as 117 respondents (46.1%). Besides the above causes are also caused by a small number of respondents who stated that the employee promotion system in this hospital has not followed the principle of transfer in a position that provides greater benefits from the position they occupied previously as many as 74 respondents (34.1%) though most respondents stated that there were 143 respondents (65.9%). Including there are still a small number of respondents who stated that the employee promotion system has not been designed by the management in a fair and fair by giving equal opportunity and equal treatment to every employee achieving and fulfilling the requirement that is 89 respondents (41%) although majority of respondents stated that as many as 128 respondents (59%).

Another cause is almost half of the respondents stated that the employee promotion system has not considered the skills, abilities and responsibilities carried by the employee that is as much as 100 respondents (46.1%) although most respondents stated that 117 respondents (53.9%). Similarly, almost half of the respondents stated that the employee's promotion system at this hospital has not considered the experience, education, loyalty, honesty, responsibility, intelligence, work achievement, initiative and creative of 84 respondents (38,7%) although most respondents stated already that with 133 respondents (61.3%). The last factor is almost half of the respondents stated that the promotion of employees in this hospital has not considered the seniority system of employees that is as much as 75 respondents (34.6%) although most respondents stated that they have considered the seniority system of employees of 142 respondents (65.4%) from a total of 217 respondents.

The emergence of variation of respondents' answers about the promotion system of positions in the hospital is of course also influenced by various factors related to the characteristics of respondents either sex, educational background and years of service. Judging from the factors of sex, based on the analysis results obtained the most respondents female sex by assessing the promotion of positions including sufficient category that was 76 respondents (35%). This is because the majority of employees are also women and the competition among them is also accumulated so large that there are only among those who feel getting a good promotion and some who have not. Therefore, in general they also considered that the promotion system in this hospital is still sufficient. Judging from the educational background, based on the analysis results obtained the most respondents DIII educated by assessing that the promotion of positions including sufficient category that is as many as 57 respondents (26.3%). This is due to the proportion of employees with DIII education level is large enough that the opportunity to get a good job promotion also can not be done to all employees DIII. Therefore there are those who feel that the promotion system has been running well and of course there are also feel not run well. Therefore, the accumulation of promotion system in this hospital is still considered sufficient.

Judging from the factor of working period, based on the analysis results obtained most respondents have tenure of 10-20 years by assessing that the promotion of positions including sufficient category that is as much as 94 respondents (43.3%). This is also due to the fact that the majority of the respondent's working period is 10-20 years old, so it is only natural that someone has received a good job promotion and there are still some who have not. Therefore also there is a stating that the promotion system well, and of course there are also states that have not run well. Therefore, the accumulation of promotion system in this hospital is also considered sufficient by the respondents.

Level of Internal Customer Satisfaction in RSUD Jombang

The results showed most respondents feel quite satisfied as an internal customer. This is because almost half of respondents stated that they are very dissatisfied with the work tasks at the hospital, which is 79 respondents (36%) and most of them are dissatisfied on this matter as 138 respondents (63,6%). Similarly there is still a very dissatisfied with the job assignment is called

giving the opportunity to learn that is as much as 39 respondents (18%) although most express satisfied to this matter that is 70 respondents (32,3%). Including almost half of the respondents were not satisfied with the work tasks while in this hospital enough train to accept responsibility that is as much as 85 respondents (39.2%). Similarly, almost half of the respondents expressed disagreement if the education obtained able to develop his career with 62 respondents (28.6%). Including disagreed with the assertion that the work achievement becomes a consideration in career development of employees that is 55 respondents (25.3%). Also do not agree if the opportunity to develop career open to all employees that is as many as 57 employees (26.3%). Including those who stated less agree if good cooperation and supported a good network will support the development of a better career that there are still 55 employees (25.3%), even disagree if the loyalty to the organization is also a benchmark in employee career development that is 79 respondents (36.4%).

Another reason is that there are still very dissatisfied if it is said that there is attention from the leadership to subordinates, that is 46 respondents (39.6%) although most stated very satisfied on this matter that is 86 respondents (39,6%). Including also almost half of respondents expressed very dissatisfied on the existence of good relationship from the leadership to subordinates that is as much as 75 respondents (34.6%).

In addition to these factors, other causes are still many respondents who are very dissatisfied to the good relationship of the leadership to subordinates that is as much as 75 respondents (34.6%), very dissatisfied with the supervision of 17 respondents (7.8%) and not satisfied as much as 50 respondents (23%) although most stated very satisfied that as many as 97 respondents (44,7%), including also very dissatisfied to opportunity to gain experience during work in this hospital that there are still 17 respondents (7, 8%) although very satisfied enough as many as 93 respondents (42,9%).

Similarly, other satisfaction indicators, such as very dissatisfied with the opportunity to improve their ability to work at this hospital are 23 respondents (10.6%), although there are 75 respondents (34.6%), including very dissatisfied with the opportunity to increase income while working in this hospital that is still there are 38 respondents (17,5%) although there are already very satisfied as much 81 responders (37,3%). Such conditions also occur in other satisfaction indicators. The existence of this variation of internal customer satisfaction is of course also influenced by many factors related to the characteristics of the respondents both sex, educational background and years of service. Judging from the factors of sex, based on the analysis results obtained the most respondents female sex with internal customer satisfaction including the category quite satisfied that is as much as 74 respondents (34.1%). This can be due to the female gender so in general there is not much demand for salary, career or other things from the organization, so that with the conditions that exist today the workplace is acceptable with full wisdom so that the feeling arises quite satisfied.

Judging from the educational background, based on the analysis results obtained the most respondents DIII educated with internal customer satisfaction including the category is quite satisfied as many as 60 respondents (27.6%). This can be caused by the level of education DIII then in career, reward, and other

support of course also there are still limitations. Therefore, according to its assessment the existing system is not yet fully able to provide maximum satisfaction, so in general only until the category of quite satisfied. Judging from the factor of working period, based on the analysis results obtained most respondents have a working period of 10-20 years with internal customer satisfaction including the category is quite satisfied that is as much as 79 respondents (36.4%). This is caused by the working period of 10-20 years then the respondent feels able to get facilities, career, rewards that fit with the needs and expectations. It turns out that obtained did not fully meet these expectations. Therefore, in general, the satisfaction rate only until the category is quite satisfied. This means that there is still a system that is considered not meet the needs and expectations of both aspects of payroll, career development and other facilities.

Effect of Payroll System Strategy on Internal Customer Satisfaction Level

The influence of payroll / reward system strategy to the internal customer satisfaction level due to salary or income becomes one of the basic needs of every worker to meet the needs of life both primary and secondary needs and even tertiary. Everyone will want this and always expect an increase in income. If the expectation or need for income through the payroll / reward system matches or exceeds expectations, then the internal customer will be satisfied and vice versa if the expectations or needs are less or not appropriate it will result in dissatisfaction even very dissatisfied. The results of this study are in accordance with previous studies by Javed. et. al.; (Syahril, 2016) indicating there is a significant influence between intrinsic rewards and extrinsic on job satisfaction. Another study by Edirisooriya ; Syahril, 2016) also shows the same thing that there is a positive relationship between extrinsic rewards and intrinsic rewards on employee performance and satisfaction. The results of this study also in accordance with the opinion Ostroff (in Azka, 2015) which suggests that employee satisfaction and good working conditions have a significant relationship, then employees who feel satisfied usually they work harder and better. The results of this study also in accordance with the opinion of Wibowo in Kusuma (2014) which suggests that employees work in order to get reward or compensation. Mistakes in applying compensation or payroll systems will result in the emergence of de-motivation and the absence of job satisfaction among workers. If it happens then it can cause a decrease in performance both to workers and organizations. This is further reinforced by Khan, et al. and Gardner, et al. (Kusuma, 2014) who say that employee salary levels affect self-esteem and employee satisfaction, which ultimately affects employee performance.

Effect of Career Development System on Satisfaction Level

The existence of the influence of career development system to the internal customer satisfaction level due to career development in general become the desire of every employee. Along with the increase of working period, work experience, competence and even education, the employees hope to develop a career well. If the career development system runs objectively, well, transparently and fairly then it will meet its expectations. The fulfillment of such expectations will bring satisfaction to the

employee and will otherwise be dissatisfied when the career development system is not objective. The results of research have shown significance relationships which means the better career development system hence more satisfied employees and vice versa. The result of this research is in line with previous research done by Ekayadi (Parimita, 2015) using three variables, namely motivation, career development and job satisfaction. In his research found that career development will increase employee job satisfaction. The results of this study are also in line with the concept that suggests that other factors that affect job satisfaction is career development. It is explained that clear career planning and career development in the organization can improve the work motivation of employees in conducting their work, so as to create a sense of satisfaction in carrying out their work (Nugroho and Kunartinah in Utomo, 2014).

The results of this study are also in line with previous research results by Ekayadi (Utomo, 2014) and Nugroho and Kunartinah (Utomo, 2014) who revealed that career development has a positive and significant impact on employee job satisfaction. This means that when an employee feels competence, achievement, a lot of work, and a developing career, it will meet expectations so they are satisfied with the existing system. Conversely, if the system of career development is not objective it will cause dissatisfaction among workers.

Influence of Promotion System on Satisfaction Level

The existence of the influence of the promotion system on the internal customer satisfaction level due to promotion in general is transferring the ladder to a new position that ideally better, more secure, more respected and various other advantages. Surely this becomes the desire or hope or need each employee. If the desire or hope or the need can be fulfilled it will provide satisfaction to employees and vice versa. The results of this study in line with Hasibuan (2012) which suggests that the promotion of positions useful to provide recognition, position, and rewards services increasingly large to employees who work higher achievement. This can lead to personal satisfaction and pride, higher social status, and greater income. Therefore the results of the analysis also show the same thing with this opinion. Based on the analysis, it is known that the promotion system has an effect on the internal customer satisfaction of 0.9% (R Square Linear = 0.009). This shows there is a tendency of influence between the two variables ie the greater the score of promotion system positions the greater the internal customer satisfaction score and vice versa.

The results of this study are also in line with Simamora (2009) who said that the benefits of promotions are able to bring satisfaction. The results of his research show that opportunities for job promotion and very high levels of job satisfaction have significant clarity. This will strengthen the consistency of relationship or influence of promotion of position to internal customer satisfaction in a workplace, including in the hospital. The better the promotion of position in a hospital will be more satisfied internal customer and vice versa, when promotion is not objective, then employees will be more dissatisfied.

Influence of Management Policies (Payroll System / Rewards Strategy, Career Development System and Promotion System) on Internal Customer Satisfaction Level
The result of analysis shows that both payroll / reward system

strategy, career development system and promotion system all have a significant influence on internal customer satisfaction. However, it can be seen that the most dominant factor as determinant customer satisfaction internal is the payroll system strategy / reward. This can be caused if the payroll is a payroll / reward system strategy that will feel the impact will be more because it will be felt by all employees. In contrast to the problems of career development systems and promotion systems, generally only perceived by certain employees. It can happen the system according to employees less open, less objective, not even close possibility there is a special message. This is a constraint to the creation of internal customer satisfaction although there is still significance of influence on internal customer satisfaction. Domination can be seen from the value of constants for each variable that is $2.369x1 + 0.357x2 - 0.677x3$. This shows that the greater the constant value, the higher the internal customer satisfaction score and vice versa.

V. CONCLUSIONS AND RECOMMENDATIONS

Most respondents considered that the payroll strategy was inadequate. Most respondents considered that the career development system was insufficient category. Most of the respondents feel quite satisfied as an internal customer in RSUD Jombang. There is influence of payroll / reward system strategy to internal customer satisfaction level at RSUD Jombang (p value 0,000 <0,05 then H_0 is rejected). The regression equation is $y = a + b1x1$ or $y = 29,201 + 2,369x1$. There is influence of career development system to internal customer satisfaction level (p value 0,000 <0,05 then H_0 is rejected). The regression equation is $y = a + b2x2$ or $y = 29,201 + 0,357x2$.

There is influence of promotion system to internal customer satisfaction level in RSUD Jombang (p value 0,000 <0,05 then H_0 is rejected). The regression equation is $y = a + b3x3$ or $y = 29,201 - 0,677x3$. There is influence of management policy (payroll / reward system strategy, career development system and promotion system) to internal customer satisfaction level in RSUD Jombang (p value 0,000 <0,05 then H_0 is rejected). The regression equation is $y = a + b1x1 + b2x2 + b3x3$ or $y = 29,201 + 2,369x1 + 0,357x2 - 0,677x3$, meaning without adding salary score, career and promotion it will give satisfaction possibilities equal to $29,201 + 0,357(1) + 0,357(1) - 0,677(1)$ or 31.65.

In order for this research is more useful it is advisable should the next researcher conduct research with the same theme with this research so that the results can be used as a comparison material with the results of this study. It is expected that the researcher will further study the internal customer's expectation of payroll / reward system, job promotion system and career development system that really expected by them through qualitative research.

Identify the constructs of a Journal – Essentially a journal consists of five major sections. The number of pages may vary depending upon the topic of research work but generally comprises up to 5 to 7 pages. These are:

- 1) Abstract
- 2) Introduction
- 3) Research Elaborations

- 4) Results or Finding
- 5) Conclusions

In Introduction you can mention the introduction about your research.

VI. IDENTIFY, RESEARCH AND COLLECT IDEA

It's the foremost preliminary step for proceeding with any research work writing. While doing this go through a complete thought process of your Journal subject and research for it's viability by following means:

- 1) Read already published work in the same field.
- 2) Goggling on the topic of your research work.
- 3) Attend conferences, workshops and symposiums on the same fields or on related counterparts.
- 4) Understand the scientific terms and jargon related to your research work.

VII. WRITE DOWN YOUR STUDIES AND FINDINGS

Now it is the time to articulate the research work with ideas gathered in above steps by adopting any of below suitable approaches:

A. Bits and Pieces together

In this approach combine all your researched information in form of a journal or research paper. In this researcher can take the reference of already accomplished work as a starting building block of its paper.

Jump Start

This approach works the best in guidance of fellow researchers. In this the authors continuously receives or asks inputs from their fellows. It enriches the information pool of your paper with expert comments or up gradations. And the researcher feels confident about their work and takes a jump to start the paper writing.

B. Use of Simulation software

There are numbers of software available which can mimic the process involved in your research work and can produce the possible result. One of such type of software is Matlab. You can readily find Mfiles related to your research work on internet or in some cases these can require few modifications. Once these Mfiles are uploaded in software, you can get the simulated results of your paper and it eases the process of paper writing. As by adopting the above practices all major constructs of a research paper can be written and together compiled to form a complete research ready for Peer review.

VIII. GET PEER REVIEWED

Here comes the most crucial step for your research publication. Ensure the drafted journal is critically reviewed by your peers or any subject matter experts. Always try to get maximum review comments even if you are well confident about your paper.

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X. CONCLUSION

A conclusion section is not required. Although a conclusion may review the main points of the paper, do not replicate the abstract as the conclusion. A conclusion might elaborate on the importance of the work or suggest applications and extensions.

APPENDIX

Appendixes, if needed, appear before the acknowledgment.

ACKNOWLEDGMENT

The preferred spelling of the word "acknowledgment" in American English is without an "e" after the "g." Use the singular heading even if you have many acknowledgments.

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A Status of Health and Safety to Small Scale Mineworkers in Singida Region, Tanzania

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Abstract- Mining is viewed as one of the lucrative economic activities which have the potential of contributing to the development of economies. At the same time, health and safety impacts of mining to the mineworkers have been a major concern to governments, the general public, stakeholder organizations and individuals. While the contributions of mining activities to economic development of Tanzania is well acknowledged, others contend that, the gains from the mining sector to the economy is achieved at significant health and safety costs to the mineworkers in the country. The research examines the health and safety impacts of Londoni gold mining to the mineworkers in Manyoni District. In total, 90 small scale gold mineworkers were involved for data collection through questionnaire survey. In addition, 10 key informants from institutions and organizations which hold stake in the mining and related health and safety issues were involved through key informant's interviews. Likewise, 10 people were involved to give information through Focus Group Discussions. Furthermore, field site visits and documentary review were used to get data. The research revealed that, gold mining has resulted in health and safety problems to the mineworkers due to lack of miners protective gears, poor mining technology, and unsafe sexual intercourse. These have led to the loss of lives and properties due to spreading of both pandemic and epidemic diseases, ergonomic problems, and machine accidents. As a recommendation, there is a need for the mining company to make regular pits and equipments checkups, supply adequate and quality person protective equipments, and raising community awareness on health and safety aspects in mining extraction.

Index Terms- Gold Mining, Health, Safety.

I. INTRODUCTION

To achieve rapid economic development, many countries resort to various activities to exploit natural resources. One of such activities is mining. The mineral sector plays a major and important role in the development of nations endowed with minerals (Saxena, *et al.*, 2005; URT, 2014). Currently, mining industry is the rapid developing sector due to increasing mineral extractions following the increasing demand for mineral products in the world (URT, 2003; TSM, 2012). However, until fairly recently, sustainable mineral extraction has been a matter of concern to the public domain as the health and safety of mineworkers and the surrounding communities have been

negatively affected by mining. This has paved a way for discussions on the trade-offs between mining and human health. Discussions have routinely termed that, mineral sector is the most risky and hazardous sector worldwide. The discussions builds that, mineral sector involves many works-related accidents and diseases. This is acknowledged by Jennings (2000) that, about 250 million of accidents occur in a year and at least 335,000 people die as a result of mining accidents and about 160 million cases of mining occupational related diseases are reported.

In developing countries similarly, mineral is the leading sector encompassing risks (Mpedi & Nyenti, 2015). Many accidents and fatalities in mineral sector have been occurred and increasing each year affecting both directly and indirectly mining workers (MOHSW, 2011). Most of the mining activities are inherently risky to workers health and safety as they work at long height, working underground, working in confined spaces and close to falling materials, handling heavy loads manually, handling hazardous substances, noises, dusts, fire and direct exposure to electric cables (TSM, 2012). In practice, the problems of health and safety to mineworkers have increasing notably due to lack of appropriate technology and insufficient health and safety awareness to mineworkers (Lockhart, 2002).

Furthermore, Tanzania is one of the countries in Africa which is highly endowed with minerals resources. In terms of mineral resources the country is ranked fourth after South Africa, Democratic Republic of Congo and Ghana (URT, 2014). Mining activities in the country are categorized into three main types of large scale, medium and small scale operations. The Economic Commission for Africa of 2008 and Ministry of Energy and Minerals, (2011) pointed out that, the small scale mineworkers are found in many areas in the country including Sambaru Londoni in Singida Region.

Moreover, in Tanzania, health and safety of mineworkers are also associated with extreme fragile conditions which expose mineworkers to physical, chemical, psychosocial, and mechanical shortfalls (Dolbear, 2012). These problems exist regardless whether it is a small scale or large scale mining project. As with many small scale mining projects in the country, Londoni gold mine project in Singida Region host many mineworkers (JICL, 2008). Gold extraction in Londoni started way back in 2004 (URT, 2014). However, few contemporary studies have focused on health and safety problems in small scale mining projects in Tanzania including Singida Region. Many studies (Maliganya & Paul, 2016; Lugoe, 2012; Magai &

Márquez-velázquez, 2011) have paid more attention to the socio-economic and governance aspects, yet health and safety impacts are termed to be escalating. These health and safety effects of mining activities have been attracting attention recently, hence, need to be addressed. To unveil this gap, this study assesses (i) causes of health and safety problems to the mineworkers (ii) impacts of health and safety problems to the mineworkers, and (iii) suggest strategies to curtail health and safety problems in the study area.

II. MATERIALS AND METHODS

2.1 The study area

Manyoni District is one of the Districts of Singida Region in Tanzania mainland. The District is located at 05°45'S and 34°50'E. The District is rich in minerals including gold (URT, 1997). The District is bordered to the North by the Ikungi District, to the East by the Dodoma Region, to the South by the Iringa Region, to the Southwest by the Mbeya Region and to the West by the Tabora Region (URT, 2008). Londoni gold mining project is situated at Londoni Village in Manyoni District. The project covers 2 km².

The geology of the area encompassed the Archaean granitoid terrain of Tanzania which is underlain by Archaean greenstone rocks similar to those dominating in the Lake Victoria goldfield. Greenstone rocks in the area include mafic volcanic, micaceous schist, intermediate schists, mafic schist, banded iron formation (BIF), quartzites and gneisses. Sandstone and unsorted colluvialarkose occurs at the immediate northern vicinity of the tenements. All these units are set in an extensive basin like-graben which is locally known as *Mpondi* fault graben exhibiting undulating structural trend with a prominent NW-SE and NE-SW strike.

2.2. Data collection and analysis

Data was gathered using questionnaire surveys and complimented with key informants interviews, documentary reviews, field site visits, and focus group discussions.

2.2.1. Questionnaire survey

Researchers administered face to face questionnaires to 90 respondents. The questionnaires consisted both closed and open-ended questions. Open-ended questions gave respondents room to give their own views without being influenced by researchers. On other hand, closed-ended questions gave options to respondents and were good in collecting quantitative data, hence simplified data analysis. Mineworkers and residents resided close to mining sites were interviewed. Respondents were randomly picked from the households which were very close to Londoni gold mine project and to the mineworkers in the mining sites. Questionnaires pre-testing were done to check wording, sequencing and lay out. Issues asked to the respondents involved socio-economic characteristics, existed safety and health problems to the mineworkers, factors led health and safety problems to the mineworkers, measures taken to overcome those problems, and suggestions to overcome the problem.

2.2.2. Key informants interviews

Key informants interviews were held with key people. These people were Londoni Gold Mine Project Director, Ward Development Officer, Ward Executive, Ward Health Officer, Village Head, and the Chairperson of the Village Health Committee. Interviews were guided by checklists which encompassed various topics including health and safety problems faced mineworkers, effects of those problems to the mineworkers, ways used to overcome them, and the way forward to ameliorate the effects.

2.2.3 Documentary review

Review of both published and unpublished reports, conceptual materials, and debates relevant to the topic under study was carried. This helped to triangulate the gathered primary data from other methods of data collection.

2.2.4. Field site visits

Researchers visited mining sites to observe visible issues which were stated in the questionnaires, focus group discussions and interviews. Visits were held at the mining pits, village government office, and to the ward health center. At the same time, researchers were able to meet people who were affected by gold extraction in the study area. Camera was used to take photos. Visits were organized in collaboration with mining officers and local government leaders.

2.2.5. Focus group discussions

Discussions with different people were held. The discussions considered inclusion of various categories including sex (male and females), age (18-35, 36-59, and >60), and occupation (mineworkers, health officers, and development officer). These groups were involved in order to capture views as they perceived issues differently even for the same problem or issue. During the discussions, the researchers were mainly facilitators and this has the advantage that, participants were able to discuss issues freely without fear. Issues discussed were the existed health and safety problems to mineworkers, factors exacerbated those problems, their impacts, measures taken to address those impacts, and the suggestions to overcome those problems.

2.3 Data analysis and presentation

The collected data were mostly qualitative in nature hence necessitated the use of qualitative data analysis including content analysis and memoing. Statistical Package for Social Sciences (version 16.0 for windows) was used in the analysis particularly to the data from household questionnaires. Qualitative data from Key Informants Interviews and Focus Group Discussions were analyzed through themes and content analysis. The analyzed data were presented in chart and graphs.

III. RESULTS AND DISCUSSIONS

3.1 Causes of health and safety problems to mineworkers

Factors exacerbated health and safety problems to mineworkers were assessed. Results unveiled that, lack of protective gears and inappropriate mineral extraction and processing technologies were the main factors. Other factors

were unsafe sexual intercourses and use of alcohol and drugs (Figure 1).

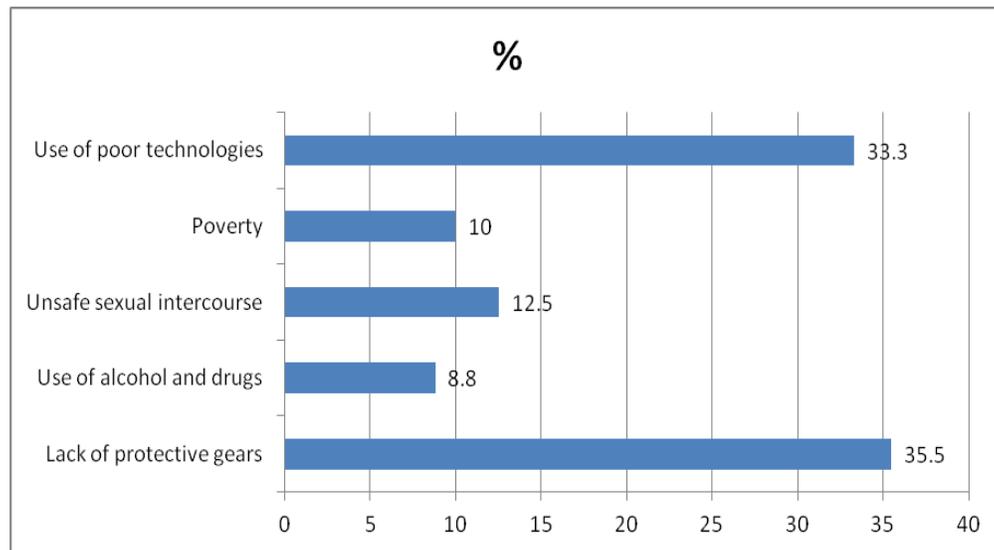


Figure 1: Causes of health and safety problems to mineworkers.

Results indicated that, mineworkers were exposed to health and safety risks due to lack of protective gears. Respondents revealed that, these protective gears include earplug for noise, gloves for dusts and chemicals contamination, nose and mouth masks to reduce dust and toxic gases, etc. Discussions with the Ward Health Officer and the Chairperson of the Ward Health Committee added that, mineworkers were faced with skin cuts, grazes or rashes from hazardous chemicals, fire burns, frostbite, sunburn, and wind burn just to mention a few. Intensity of these events was influenced by lack of protective gears. In the light of these arguments, provision of adequate protective gears was decisive to be in place. Africa Newsletter, (2011) holds that, person protective gears shall be adequately provided to the mineworkers to maintain sanitary and reliable condition wherever it is necessary by reason of hazards protection of human, environment, chemical hazards, radiological hazards, or mechanical irritants encountered in a manner capable of causing injury or impairment in the function of any part of the body through absorption, inhalation or physical contact.

Furthermore, respondents disclosed that, technologies used in gold extraction were rudimentary consequently exacerbated health and safety problems to the mineworkers. Discussions with Manyoni District Development Officer and Londoni Gold Mine Project Director revealed that, most of the tools used by the mineworkers were manual hand equipments which required massive physical strengths of the mineworkers. During site visits, simple tools like hoes, ropes, and hammers, were observed used to extract gold. Further, mineworkers affirmed that, these tools were tiresome and less productive. Jennings, (2012) corroborate that, there has been an increase in serious injuries in to less development countries due to the use of unsophisticated technologies in minerals extraction. Also, reports by Lockhart, (2002) and ILO, (2006) holds that, worldwide in the mineral sector, workers safety and health are compromised by the application of poor technology.



Figure 2: A miner using a rope to come out of pit in the study area.

Moreover, results portrayed that, unsafe sexual intercourses in the mining sites have also influenced the spreading of Sexual Transmitted Diseases (STDs). During the course of key informants' interviews, it was aired out by the Ward Health Officer and the Chairperson of the Village Health Committee that, transmission of STD's was fueled by alcoholism in the study area consequently influenced prostitution. In the same way, smoking of marijuana was mentioned to escalate prostitution. Likewise, in the course of focus group discussions (FGD), female participants aired out that, women faced practical challenges and safety issues on a daily basis, such as verbal harassment and physical abuse in the form of rape, which either goes unreported hence influenced spreading of STD's. This concedes the argument presented by one of the female respondent during FGD who remarked:

"In some instances, women in this area have to perform sexual favors to get income and those who refuse, they fall to be victim of sexual harassment...." "We are mindful that, women are

exposed to harassment and abuse from males due to patriarchal tendencies”.

These views are echoed by Peterson, (2010) which has emphasized that, unprotected sexual intercourse in mining camps result into unwanted pregnancy and exposure to STD's including HIV/AIDS which affect more women than their counterpart men. Meanwhile, studies on mining communities suggest that, women in mining are more vulnerable to STD's due to socio-economic problems. This has also observed by (Nancarrow, Lockie, & Sharma, 2008; Oxfam, 2009; Sharma, 2010) that, the conditions under which women showed greater vulnerability to STD's encompass economic dependency on their husbands, less pays on jobs they did, and poor quality of family life. These views correspond with URT, (2009) where it was noted that, women face economic and socio-cultural barriers which restrict their effective involvement in mining activities, as a result they receive minimal benefits and fall into health menaces.

Additionally, results revealed that, mineworkers were working in the small scale mining project which was associated with health and safety risks because of poverty. During an interviews with Londoni Gold Mine Project Director and Ward Development Officer, it was unveiled that, most of the mineworkers were migrants to the area who came to extract gold so as to get income. In the same manner, youth respondents put straight during FGD that, they were extracting gold so as to avoid thieving which could associate with their poverty. Further to that, poverty could have influence them to engage in prostitution and alcoholism which could result to diseases and accidents. These

views are in line with the arguments corroborated by Petkova, (2006) and Kyessy, (2011) that, the poor are associated with earning their livelihood in a precarious way in the formal and mostly informal sectors.

Not only poverty, but also the use of alcohol and drugs have caused health and safety risks to the mineworkers. Discussion with Londoni Village Chairman hold that, most of the mineworkers used to mix different alcohols in a single bottle locally called “Mpiko” (cocktail). As a result, this has influenced their brains to act unconditional consequently their thinking capacity reduced hence fall into accidents and unnecessary fights. Subsequently, the study went further to explore if mineworkers were tested if they took drugs and alcohols. Discussions with Londoni Gold Mine Health and Safety Officer revealed that, attempts to control presence of drugs and alcohol through testing were not widespread across the mining sites. In practice, whilst the mining legislation does not specify testing as a control measure, many sites have chosen testing as the primary control measure. WorkSafe Victoria report, (2009) goes to great length to emphasize that, testing of drugs and alcohol to the mineworkers is crucial to ensure good condition of health and safety. Similarly, the report pinpointed out that, testing can be done to the mineworkers' urine, breathing, and saliva.

3.2 Impacts of health and safety problems to the mineworkers

Impacts associated with health and safety problems to the mineworkers were explored. Results disclosed that, spreading of pandemic and epidemic diseases, ergonomic problems, and machine accidents were remarkable (Figure 3).

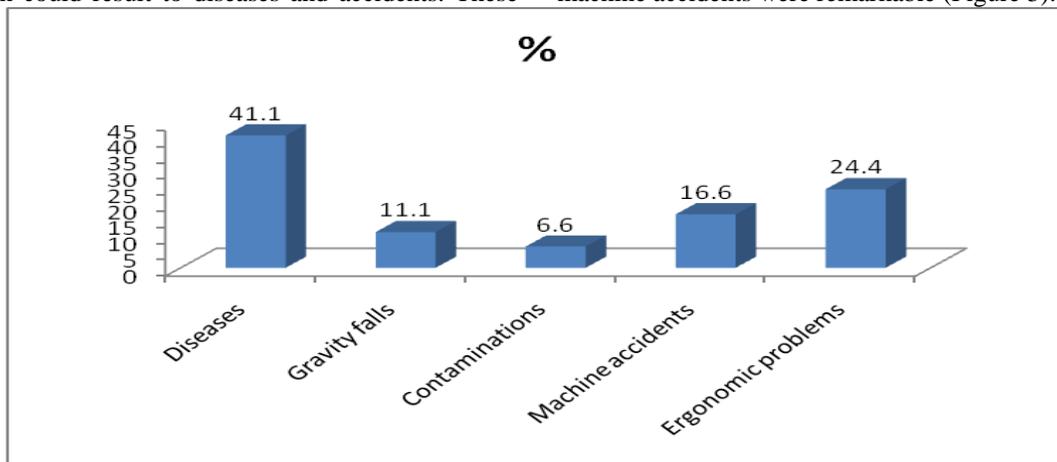


Figure 3: Impacts of health and safety problems

Results depicted the occurrence of epidemic and pandemic diseases in the study area including STD's, diarrhea, flue, and backbone pains. As for diarrhea, Ward Health Officer asserted that, when diarrhea erupt in the mining sites, it affect both mineworkers and the villagers living close to the mining sites. Similarly, STDs including HIV/AIDS have also noted to spread in the Village and in the mining sites because of high population in a small geographical area and moral decay. In addition, results indicated that, mercury have affected mineworkers' health through chemicals contamination. During focus group discussions, it was disclosed that, mineworkers were exposed to mercury through inhaling and direct skin contact. In that case, Londoni Ward Health Officer reported that, mercury have caused

respiratory diseases such as TB, Asthma and frequent flues to mineworkers. Researchers (i.e Jennings, 2000; Carolyn & Mike, 2001) have found that, mineworkers are most vulnerable to health risks due to their exposure to toxic gases, pollutions, chemical contaminations, and moral decay.

Moreover, respondents revealed that, there was a gravity fall of the materials into the mining pits. This was locally called 'shutu'. These materials were sands, debris, and stones which were carried out the pits by the mineworkers. The factors which were aired out to cause falling of these materials were the nature/design of the pits (longevity, cornering and thinness of the pits), careless of the mineworkers, and use of rudimentary technology. Under these circumstances, when these materials

fallen back to the pit, there were two things involved; firstly, either causing injuries to the mineworkers or secondly, causing death. These results concede with the argument by Jennings, (2000) that, among the economic sectors which cause deaths and disabilities is mineral sector. The author further ascertained that, deaths and disabilities in mineral industries have been exacerbated by natural and man-induced factors.

In the same way, results portrayed that, mineworkers were facing ergonomic problems and machine accidents. Respondents posed that, ergonomic risks were felt differently by the mineworkers depending to their ages (years old) and longevity of the time (years) spent in mining extraction. Discussions with gold mineworkers during FGD disclosed that, the use of rudimentary tools, alcohol, and drugs have influenced ergonomics problems and accidents in the mining pits. What is more, results unveiled that, ergonomic shortfalls and machine accidents were diverse at both mineworkers and the surrounding community. In spite of their diversity, it is perhaps not too far from the truth to say that, each of these problems is in some way connected with moral decay (use of alcohol and drugs), technological shortfalls, and physiographic setting of the mining pits. These views are clearly corroborated by a report by Drake, *et al.*, (2001) and Thomas, (2003) that, ergonomic related risks in mining sites included awkward body posture, manual materials handling, repetitive motions, force and vibration due to working in an awkward posture, handling manual materials, and working in a confined space.

4.4. Remedies to safety and health problems to the mineworkers

Mineworkers and key informants suggested various measures to be in place to improve health and safety conditions to the mineworkers. The main measures included regular pits and equipments checkups, supply of adequate and quality person protective equipments, and to raise community awareness on health and safety aspects in mineral extraction (Figure 4).

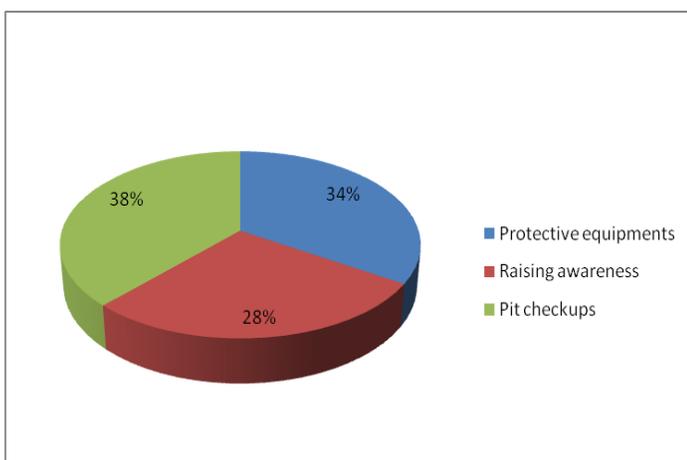


Figure 4: Measures to ameliorate health and safety problems

Frequent pits and equipments checkups are instrumental to reduce the occurrence of health and safety risks. Not only reduction of the occurrence of health and safety risks, but also the reduction of the intensity of health and safety risks in case happened. Mining Health and Standard Officers have to be in

place to check the pits before mineworkers enter in to the pits and when mineworkers come out the pits. Where necessary, when these officers detect any health or safety shortfalls have to prohibit mineworkers to get into the pits. Similarly, the detected health or safety shortfalls have to be addressed timely. Additionally, there should be regular checkups of the quality of water and air quality in and outside the mining pits.

Person protective equipments are crucial to be adequately supplied to the miners. These include masks, gloves, boots, glasses, helmets, radio calls, etc. These instruments are crucial to share timely information when emergency/hazards are occurring or are likely to occur. Similarly, they are decisive to protect mineworkers from the problems of skin, noise, dusts, and chemical contaminations among others. Londoni Gold Mining Company management is the one responsible to ensure that mineworkers are getting adequate and quality protective equipments.

Raising health and safety awareness to the mineworkers and the surrounding community is vital to curb health and safety problems. Awareness has to be strongly provided on the negative repercussions associated with the use of alcohol, drugs, and unsafe sexual intercourse to the mineworkers and their repercussions to the mineworkers' health, mining company facilities, as well as on gold extraction. Awareness in the study area can be provided by the available man power including Health Officers at Ward, Village, and mining company levels.

IV. CONCLUSION

Health and safety effects associated with mining activities are noteworthy. The research revealed that, extraction of gold mine in Londoni project has associated with health and safety problems to the mineworkers. Further, the study unveiled complexity of the occupational health and safety risks faced by mineworkers, both from the products they mine, the processes they use, and the other products they encounter as they mine. This have revealed that, in the establishment of development interventions, there are trade-offs in which there are winners and losers. This shows that, there is still a long way to go before mining becomes a healthy work or a healthy development activity to take place in a community. There is also a long way to go before the mining industry, the workers and the community agrees over the real health impacts of the sector and the real responsibility of each of the actors in the sector. In most cases, a way forward is to remedy the situation by balancing gold mining and safety of the workers and the community living around them.

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The Analysis about Behavior Intention of Customers on Using Smartphone

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Abstract- Smartphone is the telecommunications media that support the changing of technology development and the users growing very rapidly as the number of smartphone companies increasing. The differences on the list of company market leader in Indonesia and in the world shows the different criteria that required by smartphone users in Indonesia and in the world. Since customer's needs and wants are different and always changing, the smartphone producers have to be sensitive to these changes and due to a very tight competition. The aim of this research is to test the factors inside modified UTAUT2 model; Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Condition, Hedonic Motivation, Price Value, and Habit, that influence the Behavioral Intention and also whether age, gender and income are affecting the factors inside modified UTAUT2 model in the context of Smartphone in Indonesia.

I. INTRODUCTION

Smartphone is a combination cell phone and a handheld computer that created the greatest tech revolution since the Internet. A smartphone can do everything a personal computer can do, and because of its mobility, much more^[1]. It contains functions such as instant messaging, downloading applications, utilizing information services such as Wi-Fi and global positioning system (GPS) and entertainment^[2].

Smartphone users are currently growing very rapidly. Because of the great need for telecommunication's devices, the number of companies that sell smartphones increases. This rapid growth of smartphone users is influenced by the increase of internet users. The needs of information, communication, entertainment and also health become the reasons why internet users in the world are increasing. They are competing to lure buyers with features and attractive offers which can meet customer's requirements that always changing. Because customer needs and wants are always changing, the smartphone producers have to be sensitive to these changes. Not only because customer needs is always changing, but the smartphone producers also must keep sensitive to changes due to a very tight competition. Among the brands of smartphones, Apple and Samsung hold almost 40% of the world market in 2016^[3].

Beside the brand of smartphone that become the market leader, the fact that Indonesia is the largest smartphone user in Southeast Asia also became my concern. Indonesia is the largest smartphone user in Southeast Asia, with 65.2 million units^[4]. The most favorite brand in

This research is a quantitative with causal study. Likert scale used to measure each item in the questionnaire as main data collection tool. Structural Equation Modeling (SEM) with Partial Least Square (PLS) is the data analysis technic in this research, and SmartPLS 2.0 as the statistic tools.

The result shows that Habit, Performance Expectancy, the factors in modified UTAUT 2 model that influence the Behavioral Intention of customers on using smartphone in Indonesia are Performance Expectancy, Price Value, and Habit. And all moderate variables are proved not influence the construct in this research.

Index Terms- Behavior Intention, Smartphone, Technology Acceptance, modified UTAUT 2

Indonesia is Samsung, and followed by OPPO and ASUS^[5]. The preference of Indonesian people in choosing smartphone is not the same as the average world smartphone users. So, Behavior of people on using smartphone in Indonesia is the concern of this study.

Intention is a key predictor of behavior in a wide range of health domains, intention considered as one of the most useful theories to study the cognitive determinants of behavior^{[6][7]}. Measuring behavioral intentions of the customers on using smartphone can be the best way to predict future buying behavior^[8].

UTAUT has distilled the critical factors and contingencies related to the prediction of behavioral intention to use a technology and technology used primarily in organizational contexts^{[9][10]}. UTAUT explained about 70 percent of the variance in behavioral intention to use a technology^[10]. To match with the analysis about consumer or individual use of technology, Venkatesh et al. (2012) integrate hedonic motivation, price value, and habit into UTAUT and develop UTAUT2^[10].

Based on the research phenomenon, the research question as follows:

- 1) How big is the consumer's assessment of factors based on the modified UTAUT 2 (Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Condition, Hedonic Motivation, Price Value, and Habit) towards Behavior Intention of customers on using Smartphone in Indonesia?
- 2) How big is the Behavior Intention of customers towards Smartphone in Indonesia?

- 3) Based on the modified UTAUT 2, what are the factors that influencing customer's Behavior Intention in the context of Smartphone in Indonesia?
- 4) Do Age, Gender, and Income differences affect the influence of modified UTAUT 2 model factors towards Behavior Intention of customers in the context of Smartphone in Indonesia?

Can this proposed modified UTAUT 2 be used for predicting the Behavior Intention of Smartphone in Indonesia?

II. LITERATURE REVIEW

Marketing is a social process involving the activities necessary to enable individuals and organizations to obtain what they need and want through exchanges with other and to develop ongoing exchange relationship [11]. Basically, the objective of marketing is to get new customers with a promise to give value by creating the satisfaction [12].

Based on several definitions above, we can say that marketing is a searching activity where customer's needs and wants can be fulfill by consume or use products or services, and the producer get the profit and value from that consuming result. If the marketer understands consumer needs; develops products that provide superior customer value; and prices, distributes, and promotes them effectively, these products will sell easily [12].

The field of customer behavior is the study of individuals, groups, or organization and the processes they use to select, secure, use and dispose of products, services, experiences, or ideas to satisfy needs and the impacts that these processes have an the customer and the society [13]. Consumer behavior is a complex, multidimensional process. Consumer decisions often involve numerous steps and are influenced by a host of factors including demographics, lifestyle, and cultural value [13].

In the Theory of Planned Behaviour of Ajzen in Amireault et al. (2008) [7], considered as one of the most useful theories to study the cognitive determinants of behaviour, intention is a key predictor of behaviour in a wide range of health domains [7]. According to Amireault et al. (2008) [7], Intention was found to be a significant determinant of behavior.

Intention was found to be a significant determinant of behavior [7]. Behavioral intention refers to the degree to which a person has formulated conscious plans to perform or not perform some specified future behavior(s) [14][15]. Many of the prior studies have still proven that the behavioral intention plays a significant role in actual behaviors [15][16].

UTAUT has distilled the critical factors and contingencies related to the prediction of behavioral intention to use a technology [10]. Venkatesh et al. (2012) also stated that, UTAUT explained about 70 percent of the variance in behavioral intention to use a technology [10].

The Unified Theory of Acceptance and Use of Technology (UTAUT) is a technology acceptance model that combines key elements of eight different technologies and behavioral models to evaluate the likelihood of successful integration of technology, the factors that determine the acceptability and appropriate interventions to facilitate better adoption with new initiatives [9]. In UTAUT there are 4 constructs that play a direct role in determining

Behavioral Intention, namely: Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions [9]. UTAUT has distilled the critical factors and contingencies related to the prediction of behavioral intention to use a technology and technology used primarily in organizational contexts [10].

To match with the analysis about consumer or individual use of technology, Venkatesh et al. (2012) integrate Hedonic Motivation, Price Value, and Habit into UTAUT and develop UTAUT2 [10]. UTAUT2 appears to adapt to the acceptance and use of ICT by consumers in a particular market, it integrates three new constructs and new relationships (transforming the seven constructs from a consumer perspective rather than defining from the perspective of employees of an organization) [10].

The model in this study is adopting modified UTAUT2 model by Indrawati and Haryoto (2015) [17], and modified by author. For the more, author modified this model by eliminating variable Content. The object of study conducted by Indrawati and Haryoto (2015) is TV Streaming [17], while the object of this study is Smartphone. So, the variable Content is not suitable for this study. Author also adding variable Habit that adopting from the original UTAUT2 model proposed by Venkatesh et al. (2012) [10]. Variable Habit added because the population of this study is Indonesian people that already used the smartphone, which mean the population have experience in using smartphone. Habit is a perceptual construct that reflects the results of prior experiences [10], so author would like to add Habit variable to this research framework.

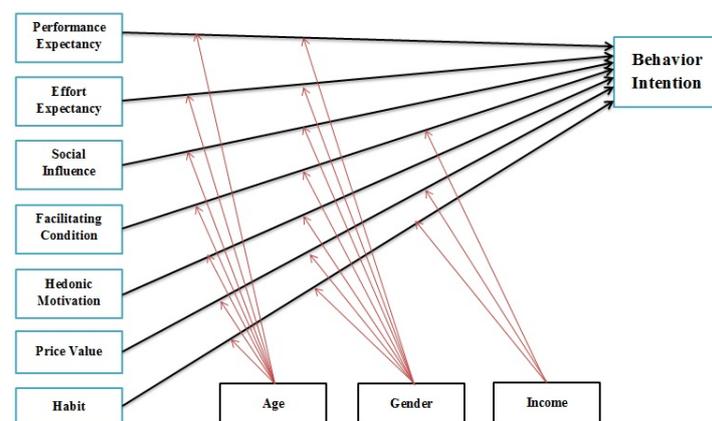


Figure 2.1 Proposed Modified UTAUT2 Model

Source: Processed by author

III. METHODOLOGY

This research is a quantitative research with Behavioral Intention on using smartphone in Indonesia as a research object. The type of research used in this research is descriptive research with nonprobability sampling method. Researchers obtained data from questionnaires distributed to 120 respondents who are the samples of this study and drawn conclusions based on existing theories. Based on the research purpose, this research used causal research and a correlational type of investigation. Furthermore, based on the time horizon, this research is the cross sectional research which data are gathered just once between September of 2017 and February of 2018 in order to answer the research questions. Data analysis used in this study is Structural

Equation Model with Partial Least Square (SEM-PLS) with the help of SmartPLS 2.0 software.

IV. RESULTS AND DISCUSSION

4.1 Descriptive Analysis

Descriptive statistics are statistics used to analyze data by way of describing or describing data that has been collected as is without intending to make conclusions that apply to the public or generalization [18]. Descriptive analysis in this study aimed to get the percentage of each variable so that the important variable related to the search problems can be seen. The researcher then develops the assessment criteria for each question and gets the result for continuum as shown by the Figure 4.1.



Figure 4.1 Continuum Line

Descriptive analysis can be described as the respondent's answers about the variables of the research by conducting the measurement through questionnaires. In the study there are 7 independent variables and 1 dependent variable. Based on the results of the calculations, the results show that three namely variables Performance Expectancy with 87.7%, Effort Expectancy with 87.1%, and Hedonic Motivation with 86.6% are categorized as "Very High" category and five variables namely Facilitating Condition with 82.4%, Habit with 80.8%, Behavior Intention with 80.4%, Social Influence with 78.4%, and Price Value 72.5% are in the "High" category.

4.2 Data Analysis

The data analytical analysis in this study use Structural Equation Model with Partial Least Square approach and the help of software SmartPLS 2.0. PLS-SEM analysis usually consists of two sub models, those are measurement models or often called as outer models and structural models or often called as inner model.

4.2.1 Outer Model

The Outer Model is used to determine the validity and reliability of connecting reflective indicators with latent variables tested using three methods of measurement: convergent validity, discriminant validity and composite reliability conducted on all data from 120 respondents.

1) Convergent Validity

Convergent validity test in this research based on the criteria of factor loading value and Average Variance Extracted (AVE), where value for factor loading > 0.5, and AVE > 0.5. The result of loading factor in convergent validity can be seen in Table 4.1.

Table 4.1 Loading Factor Result

Latent Variable	Indicator	Loading	Conclusion
Behavior Intention (BI)	BI1 ← BI	0.8910	Valid
	BI2 ← BI	0.9438	Valid
	BI3 ← BI	0.8852	Valid
Effort Expectancy (EE)	EE1 ← EE	0.9014	Valid
	EE2 ← EE	0.9014	Valid
	EE3 ← EE	0.8980	Valid
	EE4 ← EE	0.8965	Valid
Facilitating Condition (FC)	FC1 ← FC	0.7968	Valid
	FC2 ← FC	0.8692	Valid
	FC3 ← FC	0.7849	Valid
	FC4 ← FC	0.7263	Valid
Hedonic Motivation (HM)	HM1 ← HM	0.9405	Valid
	HM2 ← HM	0.9525	Valid
	HM3 ← HM	0.9291	Valid
Habit (HT)	HT1 ← HT	0.8983	Valid
	HT2 ← HT	0.8947	Valid
	HT3 ← HT	0.8785	Valid
Performance Expectancy (PE)	PE1 ← PE	0.7993	Valid
	PE2 ← PE	0.8968	Valid
	PE3 ← PE	0.8729	Valid
	PE4 ← PE	0.8326	Valid
Price Value (PV)	PV1 ← PV	0.8372	Valid
	PV2 ← PV	0.9194	Valid
	PV3 ← PV	0.9158	Valid
Social Influence (SI)	SI1 ← SI	0.9003	Valid
	SI2 ← SI	0.9266	Valid
	SI3 ← SI	0.9203	Valid
	SI4 ← SI	0.8508	Valid

Source: SmartPLS 2.0 Result Processed by the Author

Based on Table 4.1 the test results show that the value of all items has a loading factor value greater than 0.5. So it can be concluded that all indicators of the variable constructs are valid.

The next test in convergent validity is calculating the AVE value of each latent variable. AVE results on convergent validity can be seen in Table 4.2.

Table 4.2 AVE Result

Latent Variable	AVE	Conclusion
Performance Expectancy (PE)	0.7246	Valid
Effort Expectancy (EE)	0.7944	Valid
Social Influence (SI)	0.8100	Valid
Facilitating Conditions (FC)	0.6335	Valid
Hedonic Motivation (HM)	0.8850	Valid
Price Value (PV)	0.7950	Valid
Habit (HT)	0.7931	Valid
Behavioral Intention (BI)	0.8227	Valid
Use Behavior (UB)	0.7246	Valid

Source: SmartPLS 2.0 Result Processed by the Author

According to Table 4.2, the value of AVE in each latent variable is greater than 0.5, which means it can be declared as valid and meets the criteria of convergent validity.

2) Discriminant Validity

To test whether unrelated constructs do not have a corresponding relationship, then discriminatory validity is done. In this study, discriminant validity is tested using Cross Loading method by using smartPLS 2.0 with the criterion of the correlation value of cross loading factor with its latent variables must be greater than correlation to other latent variables. The result of loading factor in convergent validity can be seen in Table 4.3.

Table 4.3 Cross Loading Result

	BI	EE	FC	HM	HT	PE	PV	SI
B11	0.8910	0.3600	0.5266	0.6535	0.7261	0.5022	0.4529	0.4875
B12	0.9438	0.3472	0.5497	0.6158	0.7973	0.5529	0.4919	0.5566
B13	0.8852	0.2243	0.4756	0.4586	0.7075	0.4809	0.6022	0.5128
EE1	0.2441	0.9014	0.4744	0.3169	0.2644	0.3404	0.2269	0.2604
EE2	0.3322	0.8689	0.5042	0.3775	0.3061	0.4485	0.2017	0.4183
EE3	0.2896	0.8980	0.4922	0.3735	0.3084	0.3526	0.1367	0.3090
EE4	0.3375	0.8965	0.5571	0.4264	0.3601	0.4347	0.2422	0.3699
FC1	0.4522	0.4075	0.7968	0.2986	0.3900	0.4425	0.3703	0.6248
FC2	0.4136	0.5359	0.8692	0.2767	0.3277	0.4047	0.3519	0.5430
FC3	0.4262	0.4007	0.7849	0.4000	0.3664	0.4736	0.3295	0.5477
FC4	0.5035	0.4708	0.7263	0.4505	0.4026	0.4284	0.2234	0.5779
HM1	0.5556	0.3654	0.3921	0.9405	0.6367	0.3328	0.3435	0.2930
HM2	0.5999	0.4756	0.4685	0.9525	0.6651	0.4349	0.4154	0.3553
HM3	0.6332	0.3568	0.4221	0.9291	0.7269	0.3640	0.4547	0.3300
HT1	0.7449	0.4029	0.4522	0.7111	0.8983	0.4124	0.4399	0.4120
HT2	0.7395	0.2432	0.3777	0.6044	0.8947	0.4151	0.5288	0.3745
HT3	0.7083	0.2929	0.4325	0.6094	0.8785	0.4764	0.4688	0.4196
PE1	0.5248	0.3192	0.4772	0.3320	0.4376	0.7993	0.2578	0.5067
PE2	0.4749	0.3386	0.4497	0.3482	0.4066	0.8968	0.1941	0.4475
PE3	0.4221	0.3656	0.4238	0.3466	0.3741	0.8729	0.2128	0.4324
PE4	0.4855	0.5019	0.5182	0.3389	0.4279	0.8326	0.3297	0.5700
PV1	0.3774	0.1531	0.2361	0.3645	0.4356	0.1857	0.8372	0.2475
PV2	0.5270	0.2040	0.3944	0.3935	0.4898	0.3008	0.9194	0.4561
PV3	0.5783	0.2374	0.4031	0.3988	0.5068	0.2833	0.9158	0.3544
SI1	0.5300	0.3916	0.6791	0.3079	0.4657	0.5522	0.3877	0.9003
SI2	0.5440	0.3834	0.6728	0.2898	0.4202	0.5135	0.3168	0.9266
SI3	0.5291	0.3778	0.6526	0.3546	0.3987	0.4861	0.3441	0.9203
SI4	0.4528	0.2321	0.6076	0.3003	0.3306	0.5408	0.4216	0.8508

Source: SmartPLS 2.0 Result Processed by the Author

Based on Table 4.3, it can be seen that the value of cross loading of all indicators on its own construct has a greater value than the loading factor of the indicator in other constructs. So it is concluded that the all unrelated constructs are not related and meet discriminant validity criteria.

3) Composite Reliability

Reliability is performed by the composite reliability method seen from Cronbach's Alpha (CA) and Composite Reliability (CR) values with CA > 0.7 and CR > 0.7. Composite Reliability is done with the help of SmartPLS 2.0, and the results can be seen in Table 4.4.

Table 4.4 Composite Reliability Result

Variable	Cronbach's Alpha (CA)	Composite Reliability (CR)	Conclusion
Performance Expectancy	0.8728	0.9131	Reliable
Effort Expectancy	0.9141	0.9392	Reliable
Social Influence	0.9216	0.9445	Reliable
Facilitating Conditions	0.8057	0.8732	Reliable
Hedonic Motivation	0.9351	0.9585	Reliable
Price Value	0.8728	0.9207	Reliable
Habit	0.8695	0.9200	Reliable
Behavioral Intention	0.8918	0.9329	Reliable
Use Behavior	0.8728	0.9131	Reliable

Source: SmartPLS 2.0 Result Processed by the Author

Based on Table 4.4, the value of Composite Reliability (CR) of each variable is greater than 0.6 and Cronbach's Alpha (CA) of each variable is greater than 0.7. Thus, it can be concluded that all variables are considered reliable to be included in hypothesis testing.

4.2.2 Inner Model

After testing outer model, next Inner Model testing is done in PLS. The Inner Model defines the specification of the relationship between a latent construct and another latent construct. The model test is done by observing the value of R2 on the variable latent endogen and the significance test of the construct using the path coefficient (t-value) in each path.

1) R-square Test (R2)

R-square test is used to measure the level of variation of dependent variable changes to independent variables. The higher the R-square values are, the better the model can predict the object of research.

From result of data processing using SmartPLS 2.0, the R-Square value in this research is shown in Table 4.5

Table 4.5 R-Square Result

Dependent Variable	R-Square value	Conclusion
Behavioral Intention	0.7542	Substantial

Source: SmartPLS 2.0 Result Processed by the Author

Table 4.5 is shown that the R² value for the dependent variable (endogenous latent variable). The R² score of Behavioral Intention is 0.7542, which conclude this research model is fall under "Substantial" category. It means that the dependent variable, Behavior Intention, is 75.42% influenced by the independent variables of this research, Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Condition, Hedonic Motivation, Price Value, and Habit, and the rest 24.58% is influenced by other variables that did not examined in this research.

2) T-value Testing

In this study, author using a right one-tailed test with an error rate of 5%. From statistical Table data known t Table for alfa = 0.05 is 1.65. Based on the research processed model, the result of t-value is summarized in Table 4.6

Table 4.6 Path Coefficient and T-value

Hypothesis	Path Diagram	Path Coefficient	T-value	T-Table	Conclusion
H1	PE → BI	0.1334	1.8848	1.65	Ho rejected
H2	EE → BI	-0.0812	1.3824	1.65	Ho accepted
H3	SI → BI	0.1183	1.3011	1.65	Ho accepted
H4	FC → BI	0.1130	1.1998	1.65	Ho accepted
H5	HM → BI	0.0622	0.6273	1.65	Ho accepted
H6	PV → BI	0.1211	1.8582	1.65	Ho rejected
H7	HT → BI	0.5678	6.9391	1.65	Ho rejected

Source: SmartPLS 2.0 Result Processed by the Author

Based on Table 4.6, the result can be summarized:

- Performance Expectancy (PE)
Performance Expectancy has a positive influence towards Behavioral Intention of customers on using smartphone in Indonesia and consistent with result of technology adoption research which have been done before by Marhaeni (2014) [19] and Indrawati & Haryoto (2015) [17].
- Effort Expectancy (EE)
Effort Expectancy has no positive influence towards Behavioral Intention of customers on using smartphone in Indonesia and consistent with result of technology adoption research which have been done before by Marhaeni (2014) [19] and Indrawati & Haryoto (2015) [17].
- Social Influence (SI)

Social Influence has no positive influence towards Behavioral Intention of customers on using smartphone in Indonesia and consistent with result of technology adoption research which have been done before by Jun et al. (2015) [20].

d. Facilitating Conditions (FC)

Facilitating Conditions has no positive influence towards Behavioral Intention of customers on using smartphone in Indonesia and consistent with result of technology adoption research which have been done before by Venkatesh (2003) [9] and Indrawati & Haryoto (2015) [17].

e. Hedonic Motivation (HM)

Hedonic Motivation has no positive influence towards Behavioral Intention of customers on using smartphone in Indonesia and consistent with result of technology adoption research which have been done before by Harsono & Suryana (2014) [21].

f. Price Value (PV)

Price Value has a positive influence towards Behavioral Intention of customers on using smartphone in Indonesia and consistent with result of technology adoption research which have been done before by Marhaeni (2014) [19], Jun et al. (2015) [20] and Indrawati & Haryoto (2015) [17].

g. Habit (HT)

Habit has a positive influence towards Behavioral Intention of customers on using smartphone in Indonesia and consistent with result of technology adoption research which have been done before by Marhaeni (2014) [19] and Jun et al. (2015) [20].

Expectancy, Price Value, and Habit on Behavioral Intention show a relationship that is not moderated by age

b) Moderated effect of Gender

From the test results of each group on the moderate variable "Gender", conducted Chin formula with the results shown in Table 4.8.

Table 4.8 Moderate Variable of Gender T-value Result

Path Diagram	T-value	Conclusion
PE → BI	1.455675	There is no significant difference
PV → BI	1.27035	There is no significant difference
HT → BI	0.95062	There is no significant difference

Source: SmartPLS 2.0 Result Processed by the Author

In Table 4.8, the results of the moderate variables "Gender" hypothesis on the influence of Performance Expectancy, Price Value, and Habit on Behavioral Intention show a relationship that is not moderated by gender.

c) Moderated effect of Income

From the test results of each group on the moderate variable "Income", conducted using Chin formula test with the results shown in Table 4.9

Table 4.9 Moderate Variable of Income T-value Result

Path Diagram	T-value	Conclusion
PV → BI	0.316346	There is no significant difference
HT → BI	0.75569	There is no significant difference

Source: SmartPLS 2.0 Result Processed by the Author

In Table 4.9, the results of the moderate variables "Income" hypothesis on the influence of Price Value and Habit on Behavioral Intention show a relationship that is not moderated by income.

4.2.3 Moderate Variable Analysis

In this research model there are three moderate variables that influence independent variables to dependent variable that is age, gender, and income. To test the influence of each of the moderate variables on the influence of independent variables to the dependent variable, multigroup analysis is done through the bootstrapping process with the help of SmartPLS and compare using Chin Formula [22].

$$t = \frac{Path_{sample_1} - Path_{sample_2}}{\sqrt{S.E.^2_{sample1} + S.E.^2_{sample2}}}$$

Where,

Path sample 1 = the path of group 1

Path sample 2 = the path of group 2

SE sample 1 = standard error value of group 1

SE sample 2 = standard error value of group 2

a) Moderated effect of Age

From the test results of each group on the moderate variable "Age", conducted using Chin formula with the results shown in Table 4.7.

Table 4.7 Moderate Variable of Age T-value Result

Path Diagram	T-value	Conclusion
PE → BI	1.43042	There is no significant difference
PV → BI	0.464145	There is no significant difference
HT → BI	1.39754	There is no significant difference

Source: SmartPLS 2.0 Result Processed by the Author

The results of the moderate variables "Age" hypothesis on the influence between Performance

V. CONCLUSIONS AND SUGESTIONS

5.1 Conclusions

1. Based on modified UTAUT2 model, the variables affecting Behavioral Intention on using Smartphone in Indonesia are Habit, Performance Expectancy, and Price Value (listed from greatest influence).
2. Based on the results of this study, the moderating variables, such as Age, Gender, and Income difference proved to have no moderate effect on all constructs' influence on Behavioral intention.
3. Factors that influencing the Behavioral Intention on the customers Behavioral Intention on using smartphone in Indonesia are:
 - a. Habit with the highest t-value score, 6.9391
 - b. Performance Expectancy with the t-value score is 1.8848
 - c. Price Value with the t-value score is 1.8582
4. Based on the demographic factors, There are no variables' influence on Behavior Intention that moderated by the moderating variables.
5. This proposed UTAUT 2 model can be used for predicting the Behavior Intention of smartphone in Indonesia, since the explanatory power of the model is 75.42%, which means that Behavior Intention of customers on using smartphone in Indonesia 75.42% is influenced by the factors that proposed in this research.

5.2 Suggestions

5.2.1 Suggestions for Company

1. Based on the effects generated by Habit, the smartphone company should show customers the benefits of smartphone for customer's daily life by making advertisements that contain of benefits on using smartphone itself.
2. Based on the effects generated by Performance Expectancy, smartphone company should provide features that can increase the users' productivity.
3. Based on the effects generated by Price Value, company should conducting product development oriented to customer needs. So, the customers can feel that the money that they spend is equal to the product that they get.

5.2.2 Suggestions for Future Research

1. For further research, it is necessary to explore the continuity of usage (use behavior) of smartphone.
2. This study has proven that Habit, Performance Expectancy, and Price Value has positive impact on the Behavioral Intentions on using smartphone. The further research is expected to find other variables that might influence the use behavior of smartphone.
3. The result of this study shows that the moderating variables have no influence, so the further research find another moderating variables that might have influence to the study.
4. This study was conducted in Indonesia. So the further research can focus in the areas or cities with the high number of smartphone users.

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Numerical solution of Solving Higher order Boundary Value Problems using Collocation Methods

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Abstract: This paper deals with the numerical solutions of solving higher order Boundary Value Problems by Standard Collocation and Perturbed Collocation Methods. We mention the two collocation points as equally-spaced points with boundary points inclusive and equally-spaced points with boundary points non-inclusive. Also, we observed that the accuracy obtained by Perturbed Collocation Method was reasonable when compared with the exact solution. Numerical examples were given to illustrate the performance of the work.

Keyword: Boundary Value Problem (BVP), Collocation Method, Standard and Perturbed Collocation

Methods, Ordinary Differential Equation (ODE)

1. INTRODUCTION

Numerical analysis is a branch of mathematics that deals with providing approximations and solutions to problems in Mathematics, especially those for which analytic solutions do not exist (i.e. are not readily obtained)

Some methods that are currently used in Numerical Analysis include- the Interpolation Methods, Iteration Methods, Finite Difference Methods e.t.c. We used the Standard and Perturbed Collocation Methods in solving Differential Equations in higher order Boundary Value Problems, as it will be seen later in this work.

Mathematical problems arise in numerous practical situations, particularly in Science and Engineering, for many of these problems, the most appropriate method of solution may not be purely mathematical. There are so many different methods widely used that is numerical methods for calculating such problems. While these methods were based on mathematical reasoning; Also, they largely consist of straight forward computations, which can be followed without need of great mathematical insight. Therefore, numerical approach is very good for solving many problems and that is why we focus on both the Standard Collocation and Perturbed Collocation Methods, which are both numerical methods used in solving differential equations.

The relevant application of Boundary value Problem can be found in real life situation ranging from Science to Engineering fields where problems they model include: spring problems, electrical circuit problem, buoyancy problems to mention a few. To these problems, arriving at a close-form solution are not always feasible for the mere fact that quite a good number of these real life problems do not have analytical solution and even in the availability of these solutions, it is well known that these are not amenable to direct numerical interpretation and hence limited in their usefulness in practical applications ([15],[19]). Also, there are some of these differential equations for which the solution in terms of formula are so complicated that one often prefers to apply numerical methods ([5],[9],[18]). Owing to these facts, there is always the need to develop new numerical methods of solution and to improve on the existing ones.

The collocation methods has found extensive application in recent years presented in a series of papers, for example, in [2-9] for the case of numerical solution of Ordinary Differential Equations (ODEs) and in [4,9,10] for the case of numerical solution of Partial Differential Equations (PDEs).

This paper is organised as follows: section 2 represents Collocation methods of selecting the points in Boundary value problem, in section 3 and 4 we have implementation of Standard Collocation Methods and Perturbed Collocation Methods respectively, in

section 5, there is error estimate, in section 6, we have illustrative examples are given and table of result were presented while conclusion drawn is in section 7.

2. COLLOCATION METHODS

The order of an Ordinary Differential Equation (ODE) is the highest derivative in the equation, and a Boundary Value Problem (BVP) is one that is specified at certain boundary points, with conditions attached to the boundary point.

Consider the fourth order Boundary value problem (BVP) of the form:

$$y^{iv} = f(x, y, y', y'', y'''), \quad a \leq x \leq b \tag{1}$$

together with the boundary conditions

$$y(a) = 0 \tag{2}$$

$$y^i(a) = 0 \tag{3}$$

$$y(b) = 1 \tag{4}$$

$$y'(b) = 1 \tag{5}$$

where a and b are the boundary points, and 0 and 1 are the boundary conditions for the points a and b.

Collocation method as one of the broad class methods of Weighted Residual (MWR) evolved as a variable techniques for the solution of a broad class of problem. The technique as adapted in this paper involves constructing approximating solution of the form:

$$y_N(x) = \sum_{i=0}^N a_i x^i \tag{6}$$

where N is the degree of the approximant and $i = 0(1)N$.

which forms a solution to the given equation (1), now equation 6 can be expanded depending on the value of N used to have,

$$y_N(x) = a_0 + a_1x + a_2x^2 + \dots + a_Nx^N \tag{7}$$

which is then differentiated to the order of the original equation(1), and substituted into equation(1). Two methods of selecting these points are considered in the following sub-sections.

a. Collocating at equally-spaced point(Boundary points non-inclusive)

The technique here demands that instead of collocating at points on zeros of x, the collocation points are determined by the use of:

$$x_k = a + \frac{(b-a)k}{N} \quad ; k = 1,2,3, \dots N-1 \tag{8}$$

Where a and b are respectively the lower and upper bound of the interval, N is the chosen degree of the solution.

It is to be noted that equation(8) yields points that are located within the interval of consideration without the inclusion of boundary points a and b.

b. Collocating at equally-spaced point (Boundary Points inclusive)

We hereby choose collocation points such that x, is spread across the given interval with the boundary point included. These points are determined by the use of:

$$x_k = a + \frac{(b-a)k}{N-2} \quad ; k = 1,2,3,\dots N-2 \tag{9}$$

Where all parameters are as defined above

3. STANDARD COLLOCATION METHODS

In this method we shall assume an approximate solution of the form in equation (6), where N is the degree of the approximant and $a_i(i \geq 0)$ are to be determined.

Thus, equation (6) is then substituted into equations (1)-(5) to have

$$y_N^{iv}(x) = f(x, y_N(x), y_N'(x), y_N''(x), y_N'''(x)) \tag{10}$$

together with the boundary conditions

$$y_N(a) = \alpha \tag{11}$$

$$y_N'(a) = \alpha' \tag{12}$$

$$y_N(b) = \beta \tag{13}$$

$$y_N'(b) = \beta' \tag{14}$$

Hence, equation (10) is then collocated at point $x = x_k$, to have

$$y_N^{iv}(x_k) = f(x_k, y_N(x_k), y_N'(x_k), y_N''(x_k), y_N'''(x_k)) \tag{15}$$

Where $x_k = a + \frac{(b-a)k}{N-2} \quad ; k = 1,2,3,\dots N-3 \tag{16}$

Thus, equation (15) gives rise to (N-3) algebraic system of equations, with (N + i) unknown constants.

Four extra equations are obtained using equations (11)-(14). Altogether, we obtain (N + 1) algebraic linear equation with (N + 1) unknown constants. These (N + 1) algebraic equation are then solved using Gaussian elimination to obtain the unknown constant $a_i(i \geq 0)$ which are then substituted back into our approximate solution given by equation(6)

4. PERTURBED COLLOCATION METHODS

In this method we shall assume an approximate solution of the form in equation (6), where N is the degree of the approximant and $a_i(i \geq 0)$ are to be determined.

Thus, equation (6) is then substituted into equations (1)-(5) to have

$$y_N^{iv}(x) = f(x, y_N(x), y_N'(x), y_N''(x), y_N'''(x)) + H_N(x) \tag{17}$$

Where $H_N(x)$ is defined by

$$H_N(x) = \tau_1 T_N(x) + \tau_2 T_{N-1}(x) + \tau_3 T_{N-2}(x) + \tau_4 T_{N-3}(x)$$

and τ_1, τ_2, τ_3 and τ_4 are free Tau parameters, $T_N(x)$ is the Chebyshev polynomials defined by

$$T_N(x) = \text{Cos}(N\text{Cos}^{-1}x); \quad -1 \leq x \leq 1 \tag{18}$$

Thus, equation(17) is then collocated at points $x = x_k$, to have

$$y_N^{iv}(x_k) = f(x_k, y_N(x_k), y_N'(x_k), y_N''(x_k), y_N'''(x_k)) + H_N(x_k) \tag{19}$$

Where $x_k = a + \frac{(b-a)k}{N+2} ; k = 1,2,3, \dots N+1$ 20

Thus, equation (20) give rise to (N+1) algebraic system of equations, with (N + 5) unknown constants.

Four extra equations are obtained using equations (11)-(14). Altogether, we obtain (N +5) algebraic linear equation with (N +5) unknown constants. These (N + 5) algebraic equation are then solved using Gaussian elimination to obtain the unknown constant $a_i(i \geq 0)$ which are then substituted back into our approximate solution given by equation(6).

5. ERROR ESTIMATE

In this section, an error estimator for the approximate solution of (6) is obtained. We defined $e_N(x) = y(x) - y_N(x)$ as the error function of the approximate solution $y_N(x)$ to $y(x)$, where, $y(x)$ is the exact solution and $y_N(x)$ is the approximate solution computed for various values of N.

6. NUMERICAL EXAMPLES

Given below are numerical examples to illustrate the simplicity and the applicability of the discussed method.

Example 1: Consider the fourth order boundary value problem

$$y^{iv}(x) - 3601y'''(x) + 3600y(x) = 1 + 1800x^2 \tag{21}$$

with boundary conditions

$$y(0) = 1 \tag{22}$$

$$y'(1) = 1 \tag{23}$$

$$y(1) = 1.5 + \text{Sinh}(1) \tag{24}$$

$$y'(1) = 1 + \text{Cosh}(1) \tag{25}$$

with the exact solution $y(x) = 1 + 0.5x^2 + \text{Sinh}(x)$.

TABLE OF VALUES (RESULTS)

Table 1 of example 1

X	Exact	Standard method of case N = 6	Perturbed method of case N = 6	Error of Standard Method	Error of Perturbed Method
0	1.0	1.0	1.0	0	0
0.1	1.10516675	1.105158218	1.105171239	8.532E-4	4.489E-6
0.2	1.221336003	1.221309009	1.221341159	2.6994E-5	5.156E-6
0.3	1.34920293	1.349472069	1.349511098	4.8224E-5	9.195E-6
0.4	1.4907522326	1.490683204	1.490711716	6.9122E-5	4.061E-5
0.5	1.646095306	1.64605783	1.646011146	8.9522E-5	8.416E-5

0.6	1.816653582	1.816542761	1.816523029	1.10821E-5	1.306E-4
0.7	2.003583702	2.003449265	2.003414421	1.34437E-4	1.6928E-4
0.8	2.208105982	2.207945751	2.207913576	1.60231E-4	1.9241E-4
0.9	2.431516726	2.431331719	2.431317603	1.8501E-4	1.9912E-4
1.0	2.675201194	2.675000001	2.675000001	2.01193E-4	2.01193E-4

The above table observed that the order of errors of Standard Collocation Method and Perturbed Collocation Methods are almost the same, but that of Perturbed Method having a slightly greater degree of accuracy. The order of the power of the error starts at -6 and ends at -4 in table 1 as we move higher in the interval 0-1.

EXAMPLE 2: Consider the fourth order BVP

$$y^{iv}(x) + y'''(x) = 0, \quad 0 \leq x \leq \frac{\pi}{2} \tag{26}$$

together with the boundary conditions

$$y(1) = 0 \tag{27} \qquad y\left(\frac{\pi}{2}\right) = 0$$

28

$$y'''(0) - 5y'(0) = 0 \tag{29}$$

and

$$y'''\left(\frac{\pi}{2}\right) - 50y\left(\frac{\pi}{2}\right) = -0.25 \tag{30}$$

with the exact solution of the problem given by

$$y(x) = (444 - 100x)^{-1}(1 - x - \text{Cos}(x) - 1.2\text{Sin}(x)).$$

Table 2 of Example 2

X	Exact	Standard method of case N=6	Perturbed method of case N=6	Error of Standard Method	Error of Perturbed Method
0	0	0	0	0	0
$\frac{\pi}{12}$	-6.3968212E-4	6.3826931E-4	6.39916281E-4	1.27795144E-3	1.2795984E-3
$\frac{\pi}{6}$	-1.3648323E-3	1.6208785E-3	1.62450998E-3	2.98571085E-3	2.98934229E-3
$\frac{\pi}{4}$	-2.1938178E-3	2.74324438E-3	2.74876526E-3	4.93706208E-3	4.94258304E-3
$\frac{\pi}{3}$	-3.1506750E-3	3.79129773E-3	3.79812558E-3	6.94197269E-3	6.94880049E-3
$\frac{5\pi}{12}$	-4.2674796E-3	4.55603213E-3	4.58304239E-3	8.82351169E-3	8.83052196E-3
$\frac{\pi}{2}$	-5.5880143E-3	4.84776841E-3	4.864883201E-3	1.043572267E-2	1.045289746E-2

The above table observed that the order of errors of Standard Collocation Method and Perturbed Collocation Method are almost the same, but that of Perturbed Method having a slightly greater degree of accuracy. The order of the power of the error starts at power -3 and ends at -2 in table 2 as we move in the interval $0 - \frac{\pi}{2}$.

7. CONCLUSION

From table 1 and 2, it was observed that the Standard Collocation and Perturbed Collocation Method were both accurate methods (i.e Numerically) of solving higher order boundary value problems with the perturbed Collocation having slightly greater degree of accuracy than Standard Collocation Method, but Perturbed Collocation Method involving more tedious work when compared to the Standard Collocation Method.

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QUALITY OF CAPITAL EXPENDITURE PROGRAM ON REGIONAL WORKING UNIT

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Abstract: *This study discussed the quality of capital expenditure program of the Regional Working Unit (RWU) in Wonogiri District in 2010 until 2011. Data analysis method used quantitative and qualitative analysis with Value For Money (VFM) and Business Model Canvas (BMC) measurement approach. VFM analysis of this study showed that the efficient capital expenditure program was 81% and very efficient at 19%. Capital expenditure program that run effectively of 88% and run quite effectively of 12%. Based on the BMC approach, RWU's capital expenditure program in Wonogiri Regency had met the criteria set out in nine blocks of BMC. Inhibiting factors founded in this study were lack of human resources, database that had not been accurate, and no performance audit.*

Keyword: *VFM, BMC, capital expenditure, Public Sector Accounting*

INTRODUCTION

Waste of funds, leakage of public funds, and inefficiency programs occur in local financial management. The performance budgeting system requires planning to implement the budget in an orderly, regulatory, economical, efficient, effective, transparent and accountable manner as outlined in programs and activities. Due to these problems, the implementation of Government Regulation no. 105 of 2000 as the standard for the evaluation of local government financial performance towards the achievement of targets and realization of the program and policy both in the components of income, expenditure components, and financing components to be a weak position. Assessment of the success of Regional Government Budget (RGB) as an accountability assesment of local financial management is more emphasized on the achievement of targets so less attention to how the budgeting process undertaken from the planning stage to the assessment stage, and whether the achievement of budget realization has been held economically, efficiently and effectively (Fatimatuzzahra, 2009).

Government Regulation No. 58 of 2005 provides rules on the assessment of work performance with benchmarks, performance indicators, and targets to be achieved. The final results of performance assessment are performance outcomes that are formulated in terms of economic, efficiency, and effectiveness (Asak, Yasa, & Astika, 2016). Economics and efficiency are closely related to the implementation of programs and activities, while the effectiveness associated with the implementation of pre-defined programs.

Weaknesses in the current assessment or performance measurement because it is only based on the targets and realization to know inputs, outputs, and outcomes, it is necessary to consider other ways as a comparison material to measure the performance of local government, especially on the financial aspect. (Fryer, Antony, & Ogdan, 2009). One way that can be considered for performance assessment, from the budget planning stage to the budget execution stage is the concept of budget effectiveness. Effectiveness is related to the relationship between expected results and actual results achieved. Effectiveness is the relationship between output and purpose (Mahmudi, 2011). The greater the contribution of output to the achievement of objectives, the more effective the organization, program or activity (Williamson & Zeng, 2009). The economy has a focus on input and efficiency that is related to the output of the program or process, then effectiveness has a focus on the outcomes achieved. An organization, program or activity is considered effective if the results output can meet the expected goals, or can be said spending wisely (Grimsey & Lewis, 2005). The effectiveness of a program and its activities means that the use of the budget must fit the targets and goals set for the wider public interest (Park, 2010).

This research evaluated the quality of Capital Expenditure Program of Public Works Department, Department of Agriculture, Food Crops and Horticulture and Wonogiri Regency Health Office by using VFM approach. This purpose of this study was to determine the economics, efficiency, and effectiveness of capital expenditure on the Department of Public Works, Department of Agriculture, Food Crops and Horticulture and Wonogiri Regency Health Office and problems faced in efforts to achieve good performance.

Capital expenditures in Local Government represent budget expenditures for the acquisition of fixed assets and other assets that provide benefits over one accounting period. Therefore, to know whether a spending can be included as a capital expenditure or not, it is necessary to know the definition of fixed assets or other assets and fixed assets capitalization criteria.

Performance can be interpreted as an achievement of something planned. Performance is considered good if able to achieve and finish what has been predetermined. Performance assessment uses assessment measures based on indicators as follows: a). Input is a performance benchmark based on the amount of funding used to implement the program or activity; b).

Output is a performance benchmark by-product (goods or services) generated from the program or activity in accordance with the input used; c). Outcome is a performance benchmark based on the level of success achieved based on the level of output program or activities that have been implemented (Williamson & Zeng, 2009). Measurement of performance and development of performance indicators that have been implemented will be continued in activities that can be referred to as performance evaluation. Implementation of performance evaluation shall be guided by agreed and determined measures and indicators (Micheli & Mari, 2014). Performance evaluation is also a feedback process for past performance that is useful for improving productivity in the future (Paarlberg & Lavigna, 2010). The quality of decision making is influenced by efficient financial management. Efficiency in financial management improves the quality of decisions taken and can improve the financial performance of local governments.

Khomsiyah, (2015) in the research described regional capital expenditure, effectiveness, and management efficiency and regional financial independence in East Java Province in 2013 and analyzed the influence of regional capital expenditure, effectiveness, and efficiency of management and local financial independence on the economic growth of the East Java Province in 2013. The results showed that capital expenditures had no significant effect on economic growth. The effectiveness of regional financial management had a significant effect on economic growth. The efficiency of regional financial management had a significant effect on economic growth. Regional independence had a significant effect on economic growth. So in the study concluded that the effectiveness and efficiency of management, local financial independence had a significant influence on economic growth. While capital expenditures had no significant effect on the economic growth of a region.

The research of Hafidh (2015) Research Hafidh (2015) aimed to determine the effect of regional financial ratios on public capital expenditures for economic growth. This research was quantitative descriptive. The study used RGB and PDRB data of City and Regency of DIY in the period of 2006-2011. The results of this study indicated that all regions still had a very low level of regional independence (KD). The level of regional efficiency (EFD) described the value of the category which was less good. The regional effectiveness variables showed a fairly effective ratio because all regions were able to exceed the predetermined revenue target. The study also found that the three regional financial ratios showed positive and significant results, but R² was only 0.38. Based on figures obtained earlier, the regional financial performance proportioned from locally-generated revenue (LGR) had no effect on public capital expenditure. Capital expenditures affected PDRB positively and significantly. Thus, the regional performance model expressed in the region's financial ratios was only able to explain the change in the GRDP variable by 35%.

RESEARCH METHODS

Main Model

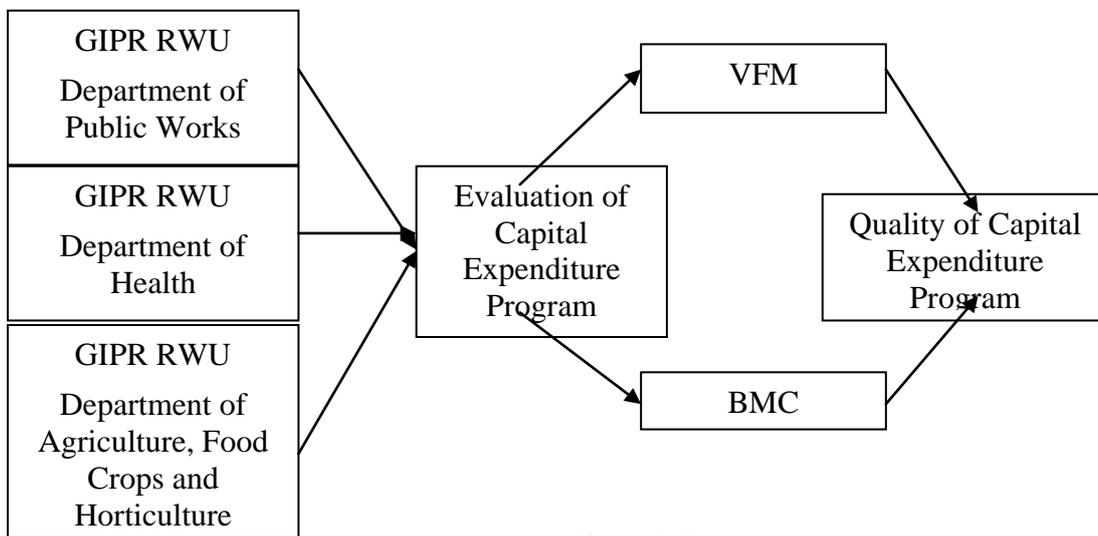


Figure 1. Research model

The type of data in this study used primary and secondary data. Primary data in the form of data taken directly, while the secondary data in the form of data was in the form of documents (Hox & Boeije, 2005).

Data Analysis Method

Value For Money (VFM)

Data analysis in this research using Quantitative and qualitative approach by using VFM performance. Measurement of VFM as follows: (Mahmudi, 2011)

a. **Economy**

Data analysis in this research using quantitative and qualitative approach by using VFM performance. Measurement of VFM is as follows: (Mahmudi, 2011)

$$\text{Economic} = \text{Input} / \text{Input Price (Rp)}$$

b. Efficiency

Efficiency is the relationship between input and output in which goods and services purchased by the organization are used to achieve a certain output (Dian Merini, 2013). Mathematically the measurement of the efficiency ratio is as follows: (Mahmudi, 2011)

$$\text{Efficiency} = \text{Output} / \text{Input}$$

C. Effectiveness

The effectiveness ratio is the relationship between the output and the defined goal (Mardiasmo, 2002). Effectiveness is measured by how far the level of output, the organization's policies and procedures achieve its stated objectives. For the formula to measure the effectiveness ratio: (Mahmudi, 2011)

$$\text{Effectiveness} = \text{Outcome} / \text{Output}$$

Table 1. Performance Measurement Percentage

Performance Value	Information
Value of Economic Performance:	
> 100 %	Economic
85 % to 100 %	Fairly Economic
65 % to 84 %	Less Economic
< 65 %	Not Economic
Value of Efficiency Performance:	
< 90 %	Very Efficient
90 % to 99 %	Efficient
100 %	Fairly Efficient
> 100 %	Not Efficient
Value Performance Effectiveness:	
≥ 100 %	Effective
85 % to 100 %	Fairly Effective
65 % to 84 %	Less Effective
≤ 65 %	Not Effective

Source : (Mahmudi, 2011)

Business Model Canvas (BMC)

BMC is a business model concept developed by Alexander Osterwalder and Yves Pigneur. BMC is a strategy tool used to describe a business model and project a rationale on how organizations create, deliver, and capture value (Hanshaw & Osterwalder, 2016). BMC was previously called Business Model Generation (Osterwalder & Pigneur, 2010). BMC transforms complex business concepts to simplify through a canvas sheet of planning with nine interlocking key blocks that aim to map out strategies for building business that is competitive and successful in the future (Frick & Ali, 2013). The advantages of using BMC is to thoroughly know the strengths and shortcomings of the organization, the needs and profit analysis is performed quickly, it can map the organization to know the weakness since the early and understand the strength of the organization from the right point of view, and able to systematically describe an organization for the retrieval decisions toward more strategic management (Joyce & Paquin, 2016). The scheme of BMC in public organizations is illustrated as follows:

Main Service Provider	Key Programs	Value Propositions	Public Relationship	Public Segments
8	7	2	4	1
	Key Resources		Channels	
	6		3	
Cost Structure		Program Impact to Community		
9		5		

Source: (Hanshaw & Osterwalder, 2016)

Figure 2. BMC dalam Organisasi Publik

Based on the above table can illustrate the correlation between blocks. Each block has an association with another block based on the sequence of numbers in the image above. Explanation on the assessment of each block indicator is described as follows: (Hanshaw & Osterwalder, 2016)

1. Public Segments

- For whom is the service provided?
- Who are the people most in need?
- What are the needs of our society?

2. Value Propositions

- What impact can the community provide?
- What problems are we solving?
- What services can be provided for the community?
- What is the needs of the community that can be fulfilled?

3. Channel

- Through what channels does the community segment want to achieve?
- How do we achieve it?
- How are our channels integrated?
- Which is the best?
- Which is the most cost-effective?
- How to integrate them with user routines?

4. Public Relationship

- What kind of relationship is expected of the community that needs to be built and maintained?
- Which community has established a relationship?
- How is society integrated with the given service model?
- How much does it cost?

5. Program Impact to Community

- Fourth digital keys by key performance indicator standards:
- Cost per transaction,
- User satisfaction,
- Level of refinement,
- Digital takeover.

6. Key Resources

- What main activities are needed in the value proposition?
- How is the distribution of services to the public?
- How is the relationship with the community?
- What are the key performance indicators of service?

7. Key Programs

- What main activities are needed in the value proposition?
- How is the distribution of services to the public?
- How is the relationship with the community?
- What are the key performance indicators of service?

8. Main Service Provider

- Who are the key partners?
- Who are the key service providers?
- What are the main resources that can be obtained from partners?
- What are the main activities undertaken by partners?

9. Cost Structure

- What is the most important cost in the service?
- What are the most expensive key resources?
- Which main activities are the most expensive?

RESULTS AND DISCUSSION

Quantitative Analysis

Table 2. Performance of Capital Expenditure Program of Public Work Department of Wonogiri Regency With VFM

RWU	Program	Value	Percentage	Category
	Year 2010			
Department of Public Work	Office administration service program	Economic	101.57%	Very economic
		Efficiency	98.45%	Efficient
		Effectiveness	100%	Effective
	Improvement of facilities and infrastructure of apparatus program	Economy	107.37%	Very economic
		Efficient	93.14%	efficient
		Effective	100%	Effective
	Road and bridge development program	Economy	103.78%	Very economic
		Efficient	96.36%	Efficient
		Effective	90%	Fairly Effective
	Turap/talud/bronjong development program	Economy	102.32%	Very economic
		Efficient	97.73%	Efficient
		Effective	100%	effective
Rural infrastructure	Economy	101.70%	Very economic	

	development program	Efficient	93.97%	Efficient
		Effective	93.33%	Fairly Effective
	Year 2011			
	Office administration service program	Economy	102.36%	Very economic
		Efficient	97.69%	Efficient
		Effective	100%	Effective
	Improvement of facilities and infrastructure of apparatus program	Economy	100.75%	Very economic
		Efficient	99.26%	Efficient
		Effective	100%	Effective
	Road and bridge development program	Economy	103.88%	Very economic
		Efficient	96.26%	Efficient
		Effective	95%	Fairly effective
	Rural infrastructure development program	Economy	100%	Very economic
		Efficient	100%	Very efficient
		Effective	100%	Effective

Source : processed data, 2017

Table 3. Performance of Capital Expenditure Program of Agriculture Department of Wonogiri Regency With VFM

RWU	Program	Value	Percentage	Category
Department of Agriculture	Year 2010			
	Specific Allocation Fund (SAF) Program in agriculture	Economy	103.71%	Very economic
		Efficient	96.42%	Efficient
		Effective	100%	Effective
	BPLM Distribution Facility Program	Economy	101.69%	Very economic
		Efficient	98.34%	efficient
		Effective	100%	Effective
	Year 2011			
	Office administration service program	Economy	113.95%	Very economic
		Efficient	87.75%	Very Efficient
		Effective	100%	Effective
	Improvement of facilities and infrastructure of apparatus program	Economy	100.84%	Very economic
		Efficient	99.17%	Efficient
		Effective	100%	Effective

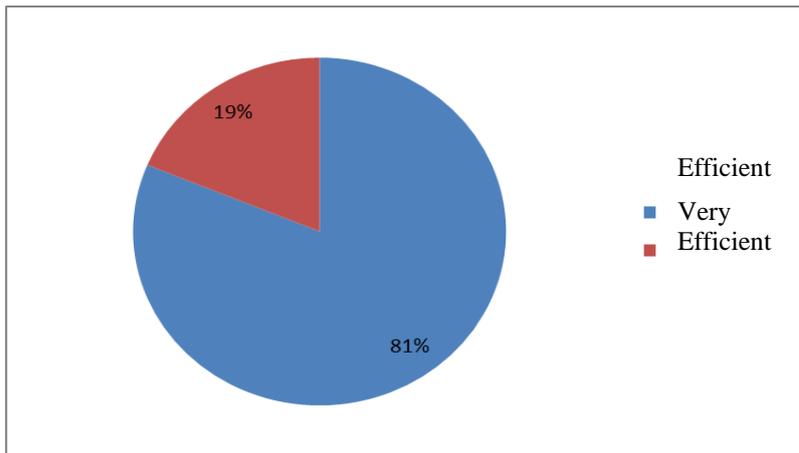
Source : Processed data, 2017

Table 4. Performance of Capital Expenditure Program of Public Health Department of Wonogiri Regency With VFM

RWU	Program	Value	Percentage	Category
Department of Public Health	Office administration service program	Economy	114,85%	Very economic
		Efficient	87,07%	Very Efficient
		Effective	100%	effective
	Improvement of facilities and infrastructure of health service	Economy	101,94 %	Very economic
		Efficient	93,14%	efficient
		Effective	100%	effective
	Office administration service program	Economy	102,78%	Very economic
		Efficient	97,29%	Efficient
		Effective	100%	effective
	Improvement of facilities and infrastructure of apparatus program	Economy	105,23%	Very Economic
		Efficient	95,03%	Efficient
		Effective	100%	effective

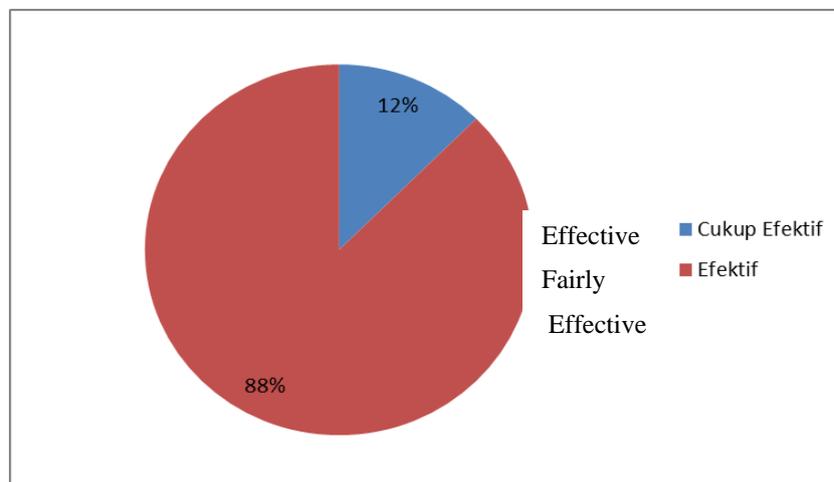
Source : Processed data, 2017

Based on VFM approach outline that the quality of capital expenditure program of RWU in Wonogiri regency can be seen in Figure 3 and Figure 4.



Source: processed data, 2017

Figure 3. Percentage of Capital Expenditure Program Efficiency



Source: processed data, 2017

Figure 4. Percentage of Capital Expenditure Program Effectiveness

Figure 3. shows the percentage of efficiency and effectiveness level of capital expenditure on RWU. Description of the percentage in the diagram shows that the capital expenditure program of RWU in Wonogiri Regency runs with efficient category of 81% and highly efficient category by 19%. Related to the effectiveness of capital expenditure program implementation of RWU in Wonogiri of 12% in the fairly effective category and 88% in the effective category.

Qualitative Analysis

Performance Accountability of RWU Capital Expenditure Budget in Wonogiri Regency

BMC is used to evaluate the quality of capital expenditure programs. Based on indicators on the 9 blocks in BMC, the quality of RWU's capital expenditure program in Wonogiri Regency can be briefly grouped into 9 BMC blocks described as following figure.

Table 5. BMC Analysis

Main Service Provider	Key Programs	Value Propositions	Public Relationship	Public Segments
- Contractor - Consultant	- Infrastructure development - Development of SAF - Health services	- Improvement of infrastructure - Food independence - Adequate health facilities.	- Government Instance - Performance Report (GIPR) - Budget Transparency - Musrenbang	Community of Wonogiri Regency
	Key Resources		Channels	

	- Human Resources (employee) - Financial Resources (RGB) - Physical Resources (Tools)		- Activities - Projects - Technical guidance - Socialization - Community service	
Cost Structure		Program Impact to Community		
- Cost of procurement of goods and services - Operational costs		- Implementation of vision and mission - Implementation of community service		

Source: processed data, 2017

Analysis of GIPR RWU in Wonogiri Regency with BMC approach is described as follows:

1. **Public Segment**

The community segment blocks focus on identifying targeted community groups as targeted capital expenditure programs which aimed to serve the community. The community of Wonogiri Regency is from the lower, middle to upper class and consist of various age groups. Wonogiri Regency Government hopes that the capital expenditure program that has been implemented can give a positive impact on the entire community of Wonogiri Regency.

2. **Value Propositions**

Value proposition is used to identify the needs of the Wonogiri Regency community, to know the capability of the Wonogiri regency government in the implementation of the program, then how can the local government improves the performance and provide services that affect the life of the community.

The values that can be found in the value proposition block are as follows:

- a. Improvement of infrastructure
- b. Food independence
- c. Adequate health facilities.

3. **Channel**

Channel is a medium to reach the community. In an effort to reach the community, the government of Wonogiri Regency has the following media:

- a. Activities
- b. Projects
- c. Technical guidance
- d. Socialization
- e. Community service

The above media can make capital expenditure program which implemented by Wonogiri regency in accordance with what impact expected by society.

4. **Public Relation**

In this research, public relations block focuses on the pattern of government relations with the community. The form of government relations with the community varies. The form of relationship with the community as follows:

- a. Deliberation of Planning and Development (Musrenbang)
- b. LAKIP
- c. Budget Transparency

The relationship with the community is not only limited to the delivery of public aspirations to the government, but also the delivery of government accountability to the community which is the principle of openness in the implementation of local government. The relationship between the community and the government takes place when there is conformity between the goals set by the implemented programs.

5. **Program Impact to Community**

The quality of the capital expenditure program in this block is determined by the program's ability to project future events. Capital expenditure program is expected to accommodate the needs of the community in Wonogiri regency in the future.

The form of the quality of capital expenditure program in Wonogiri Regency can be seen from the performance indicators that have been dressed with the vision and mission of the Regional Government and the implementation of services for the community.

6. **Key Resources**

The analysis undertaken in this block can be determined through the ability to predict the human resources, financial resources and physical resources required, in addition, the ability of the Wonogiri Regency Government to utilize various resources in the appropriate time and amounts is also assessed as strength in this element.

The human resource in this block is competent employees. Financial resource is the funding of programs derived from RGB and physical resource is the availability of equipment and other physical resources that support the implementation of programs and activities.

7. **Key Programs**

The main programs studied in this study are outlined in the capital expenditure program. Program planning in accordance with predetermined objectives is needed so that the capital expenditure program can be felt by the

community. The Wonogiri Regency Government's capital expenditure program has been referring to infrastructure development, SAF development, and health services.

8. Main Service Provider

This block is focused on Wonogiri Regency Government partners and their role in providing the needed resources. Wonogiri Regency Government in running the capital expenditure program, in cooperation with service provider partners through a process of procurement of goods and services that are transparently informed to the public. The main service provider partners of the Government of Wonogiri Regency are contractor and consultant which funded by the RGB that in accordance with the budget ceiling and the agreed Estimate Price which has been agreed.

9. Cost Structure

The last block is the Cost Structure. This block focuses on the costs that emerge from the execution of activities. In the capital expenditure program in the Government of Wonogiri Regency that appears in the spending program is the cost of procurement of goods and services and operational costs.

Based on the analysis of nine blocks BMC can be described that RWU in Wonogiri Regency is able to meet the criteria which set out in BMC.

Problems in Achieving the Quality of Capital Expenditure Program of Wonogiri Regency RWU

The obstacles found in RWU in Wonogiri Regency are outlined below.

1. Available Human Resources have not been able to accommodate the needs in serving the community.
2. RGB is not fully able to finance the proposed program.
3. The absence of local regulations on the implementation of minimum service standards.
4. Unclear information systems to support program activities
5. Performance audit has not been implemented as a material evaluation of local government performance and the achievements obtained.

CONCLUSION

The conclusions of this research are:

1. Based on the VFM Approach, the capital expenditure program in RWU in Wonogiri Regency in 2010 and 2011 outlined in accordance with the targeted previously.
2. The quality of RWU's capital expenditure program in Wonogiri Regency in 2010. and 2011 was in accordance with what is planned based on BMC evaluation.
3. There are some obstacles in the implementation of capital expenditure program, the obstacles are:
 - a. Lack of human resources support that support the implementation of activities.
 - b. Unavailability of accurate and valid data base
 - c. The absence of a clear information system and a good performance audit to produce maximum program quality

The limitations of this study are :

1. This research only took the object of research at Department of Public Works, Department of Agriculture, Food Crops and Horticulture , Department of Health in Wonogiri.
2. This research only analyzed how the quality of capital expenditure program in Department of Public Works, Department of Agriculture, Food Crops and Horticulture and Department of Health in Wonogiri Regency based on VFM and BMC approach

Based on the limitations of the above, the suggestions given by researchers are as follows:

1. Future research is expected to do the research with broader research objects and use more developed methods.
2. Future research is expected to analyze not only the quality of capital expenditure programs but on the expenditure of Local Government in depth and comprehensive.

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A Systematic Human Counting at Guest House using Sensing Device Technique

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ABSTRACT- The application of vision detector using sensing device techniques is important in systematic counting of people both indoors and outdoors. This technique is broadly used in auditorium, lecture theatre and public market.

In this paper, the technique uses a camera attached to an Android-based mobile phone which is then applied to capture images that are then transferred to a storage system via USB for image processing and counting. Also, a model for counting people indoors and outdoors is developed. Also, accurate human counting is observed.

Index Terms: Human counting, Sensing device, detection, Model

I INTRODUCTION

The application of vision detector in human counting is an automatic counting of people. Likewise, sensing technique is an important method of counting people both indoors and outdoors. The displayed system has ability to detect and track many people using a disparity map, skin detector and face detector [1]. Crowd gatherings in mass as can be found in places like stadium or concerts has high tendency of creating a potential risks to audience[2]. It is important that administrator should be able to provide the data of people who are in a building or enclosed outdoor space. The information collected from the counting of people is important for surveillance and security, monitoring of high traffic areas, staff planning and safety, market effectiveness, crowd management, energy optimization and, fire management which users can explore. In this paper Computer vision and MATLAB/SIMULINK tool box are used for face detection and counting using android phone camera. The data will enable us to have statistical information on the people flow at different periods of time.

II LITERATURE REVIEW

High density traffic flow of people is time consuming [3]. People counting systems can be classified into two

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categories; non-obstructive and obstructive. Non-obstructive systems like thermal sensors or infrared beams though they do not create obstacle on doorways, however they still have counting problem [4]. Also, examples obstructive people counting system are turnstiles and mat-type foot switches [5]. Turnstiles are costly, flexibly low with obstruction on the passing way which causes problem of undercounting [6], [7]. In this paper, our counting system is based on computer vision with Simulink tool box. Computer vision is an inter- related field which uses computer for videos or digital image processing [8]. From engineering perspective, it automates tasks that can be done by the human visual system . The security in Smart Cities can be improved through computer vision in the Internet of Things (IoT) scenarios [9]. They worked on computer vision module to analyse isolated picture and returns to the IoT platform to get their result. They tested module using different models for heads and shoulders. The accuracy for True Positives is 34.38% for 54 pictures. With model for detecting upper bodies, module obtained a 35.19% of accuracy. In foreground segmentation the feedback update-by-detection scheme balance stationary people segmentation and removing background noise but the head-shoulder model has a poor performance on detecting people with strange clothes and hats and there was clustering of points [10]. Automatically computer vision extracts, analyses and understands applicable information from a sequence of images or a single image. In view of this, section-2 discusses architecture of the human counting system, section-3 discusses findings and interpretations and section-4 provides experimental result and conclusion.

III METHODOLOGY

The systematic human counting proposed is based on the technique of human face detection which uses computer vision tool box and Simulink tool box. The images from android phone version 5.1 camera are processed on computer (RAM 4.00GB capacity; Processor; Intel (R) Celeron CPU 2.16 GHz) via USB connection for analysis. One important aspect to have a proper image for processing is lighting system. If there is poor illumination from lighting system, there will be will insufficient information from images for any machine vision application. After getting the image from camera, background of the image is estimated for segmentation. After performing segmentation of the images, the information is passed through a decision making algorithm for tracking and counting of the people. Automatically, a tracker is initialized for every foreground blob identified either as an individual or a group.

Finally, the developed model is implemented on MATLAB/SIMULINK.

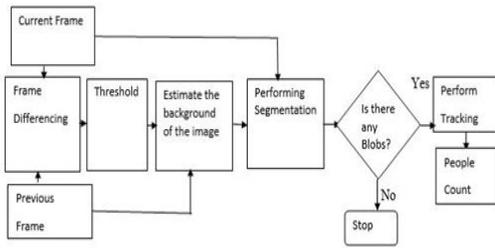


Figure1: Counting System Algorithm for Image Processing

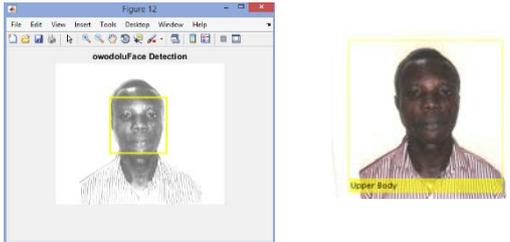


Figure 2: Face Detection with Viola Jones Cascade Detector for Single Image (Tested)

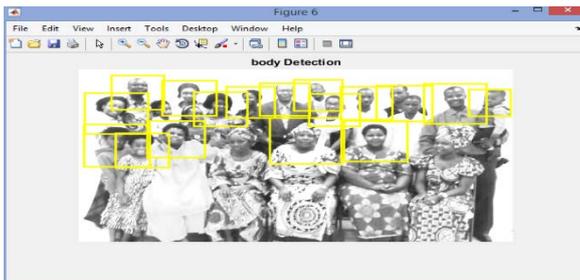


Figure 3: Detection of 18 People out of 22 with Upper-body using Viola Jones Cascade Detector

IV RESULTS AND DISCUSSION

The Guest House has a sitting capacity is 500 persons with different facilities for game and audio-visual display. The population is high on Saturdays due to ceremonies. The video and images were recorded on Saturday between 11 a.m-11.30am. The time of video clip was 4mins and it captured indoor and outdoor. The video or image was recorded in various locations at the Guest house. These are represented as Sample A, Sample B, Sample C, Sample D, Sample E, Sample F, Sample G and Sample H. The resolutions (pixel) are recorded. Sample A is the major location of the entertainment with the highest population of 22 people while Sample H has the lowest population of 4 people.

Table 4.1: The Visitor Attendance and Counting Accuracy

ACTUAL COUNTING VALUE	RESOLUTION (PIXEL) IDENTITY	PROCESSED VALUE	DIFFERENCE BETWEEN ACTUAL AND PROCESSED (ERROR)	COUNTING ACCURACY (%)
22	293X521	18	4	81.8
18	279X435	17	1	94.4
14	267X367	9	5	64.3
19	288X398	18	1	94.7
15	273X320	13	2	86.7
7	173X263	5	2	71.4
5	194X428	5	0	100.0
4	196X316	3	1	75.0

The actual counting is by manual method. Likewise, the difference between the actual counting number of people and processed value gives the error as shown in the table above. In order to increase the accuracy, the background of the image is properly estimated to remove effect of occlusion.

Sample A, has the actual counting value of 22 people while the processed value from camera was 18 and error is 4. Percentage of counting accuracy calculated is 81.8%. Sample B, has the actual counting value of 18 people while the processed value from camera 17 and error is 1. Percentage of counting accuracy calculated is 94.4% respectively. Likewise, Sample C, has the actual counting value of 14 people while the processed value from camera 9 and error is 5. Percentage of counting accuracy calculated is 64.3% respectively. Sample D, has the actual counting value of 19 people while the processed value from camera 18 and error is 1. Percentage of counting accuracy calculated is 94.7% respectively. Sample E, has the actual counting value of 15 people while the processed value from camera 13 and error is 2. Percentage of counting accuracy calculated is 86.7% respectively. Sample F, has the actual counting value of 7 people while the processed value from camera 5 people and error is 2. Percentage of counting accuracy calculated is 71.4% respectively. Sample G, has the actual counting value of 5 people while the processed value from camera 5 people and error is 0. Percentage of counting accuracy calculated is 100.0% respectively. Sample H, has the actual counting value of 4 people while the processed value from camera is 3 people and error is 1. Percentage of accuracy calculated is 75.0% respectively.

$$\% \text{ Counting Accuracy} = \frac{\text{Processed Value}}{\text{Actual Counting Number}} \times 100$$

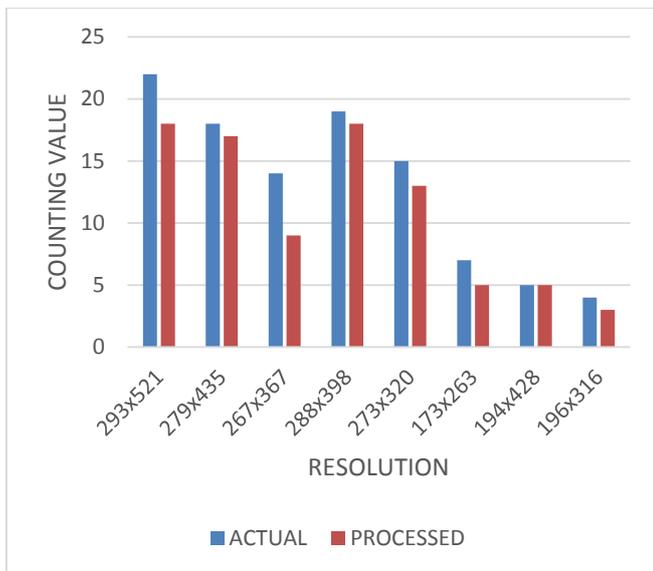


Figure 4: The Counting Value Variation and Image Resolution

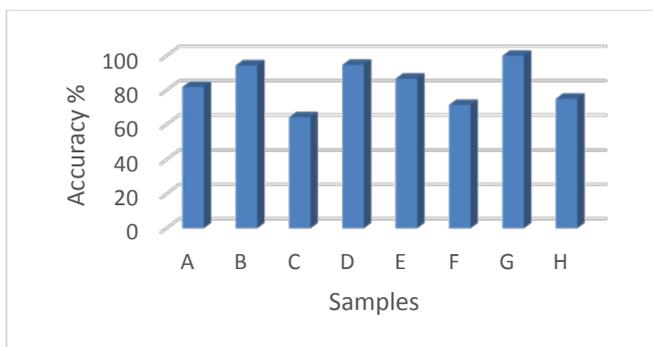


Figure 5: Percentage of Counting Accuracy of the Images
 The effect of occlusion affects the accuracy of the images. This is well controlled during background estimation

V CONCLUSION

The systematic human counting at Guest House using sensing device technique with computer vision and Simulink tool boxes experiment shows the result of Sample G with 5 people has the pixel of best quality with the accuracy of 100.0% under good illumination system. Likewise, people were more coordinated. Occlusion is one factor that causes error in other samples so a well illuminated environment is required. The paper reveals the systematic human counting technique in a guest house or place. MATLAB is the programming tool or interface on computer that is adaptable for counting implementation in image processing. This method is an alternative to old or manual counting system and it can be used in various places. Also it can be used for further research.

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Comparative Study for Cognitive development between Grade 4 Students who are Learning According to Story Method and who are Learning According to a Lecturing Method

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Abstract- This paper studies the effect of telling a story while teaching the lesson “Photosynthesis” for students in grade 4 at Safir High School. The study shows how stories increase cognitive development, and that the positive words give you what you expect. Two groups of grade 4 (sections A and B) were taught in two different ways and examined after being learned. The resulting cases ensure the effect of the story while explaining the lesson. The students who had the story strategy 59% took above average (4.5) while the other group 19 % took above average.

Index Terms- Cognitive Development: it is related to remembering, thinking and problem solving., Lecturing Method: pedagogy in teaching, were the students are the center of the class., Story Method: teaching students by telling stories.

I. INTRODUCTION

Doctors realized that any bad word has a very strong power and it may lead the listener to illness, psychological and neurological diseases, gloominess, and disturbances that may lead to death.

Brown (2013) says: “Words. So powerful. They can crush a heart, or heal it. They can shame a soul, or liberate it. They can shatter dreams, or energize them. They can obstruct connection, or invite it. They can create defenses, or melt them. We have to use words wisely”.

In this research, we will show the power of the word on human being specifically, the effect of applying the “story” strategy to longer the information in the memory.

The vast majority of people put expectations for what will happen when they are speaking with someone. Let us propose that a teacher in the rest is going to ask a student to eat his sandwich, where the student seems obviously that he has a sandwich and he didn’t eat it.

The expectations would be: The student will eat his sandwich. What if

- He doesn’t like what his mother prepared for him
- He remembered a video he watched about a poor boy and don’t have money to eat.
- He saw his friend not having food.

- He already knew that he took a low grade on a subject in an exam.
- He feels shy eating in front of people.
- He isn’t hungry.
- He wants to get in shape.
- He doesn’t love you.
- He is fasting.
- He is challenging with his friend who can endure for a specific time without eating.

But what if the teacher asked him by saying: “ Here you are, little amazing student. Do you know that eating breakfast every morning make us powerful?”

Sociology and the neuroscience divide

Neuroscience is based on evolutionary thinking which, to them, is just another arbitrary narrative. Much of brain science, however, confirms the importance of narrative to the coherence of self and its tendency to create events as meaningful (LeDoux et al. 2003). We can hardly discard narratives because they tell a story. The knowledge one could learn about the brain without evolutionary thinking is so limited that it would be of little use to anyone. Evolution informs our thinking of the brain.

Some generalizations about the emotional brain:

Carter (1999) brain cells that are not used die. “Use it or lose it” is as true in childhood as it is in older age; the brain has immense flexibility.

Neuroscience and unconscious emotion

1. More than 95% of what the brain does is below consciousness and shapes conscious thought. (Lakoff and Johnson 1999)
2. Emotions are objective and public; they occur in the face, posture, voice, and specific behaviors. (Damasio, 2003)
3. Emotions engage heart rates, blood pressure, skin conductance, and endocrine response. Damasio(2003)
4. Unconscious system causes the feelings (like fear) before we even know that we are in danger. (LeDoux, 1996)
5. Evolution came up with emotions first and feelings later (Damasio 2003).

II. HYPOTHESIS

- Telling stories increase students' memories.
- Positive words give you what you expect and enhance cognitive development.

III. METHODS

Two groups of grade 4 students in Safir High School are applied for two different ways in teaching.

Group A made up of 21 students and group B made up of 22 students.

Group A:

In 18-1-2018 at 11:30 a.m, the teacher explained a lesson using ppt presentation about "Photosynthesis and contribution of trees in decreasing pollution in atmosphere" using pictures and lecturing method (Appendix 1).

Group B:

In 18-1-2018 at 11:30 a.m, the teacher explained a lesson using ppt presentation about "Photosynthesis and contribution of trees in decreasing pollution in atmosphere" using pictures and the story strategy (Appendix 1).

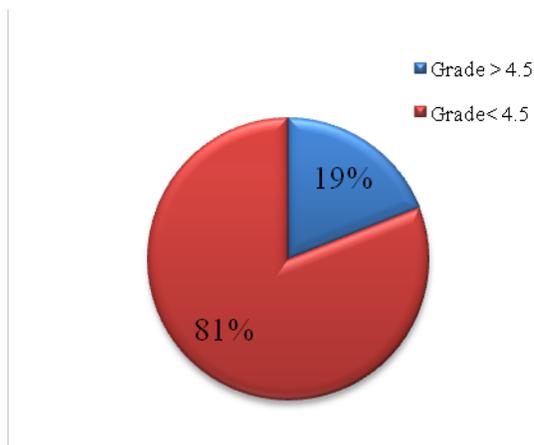
Measurements

In 18-1-2018 at 1:00 p.m, students were asked different questions about the lesson (Appendix 2).

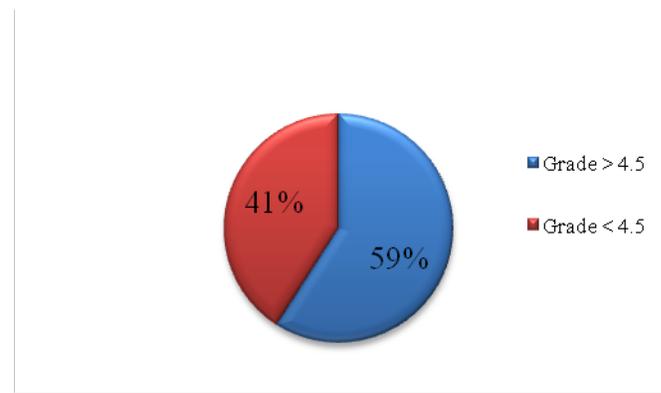
Results

19 % of students of group A have taken above average in the quiz; their grades were greater than 4.5 over 9 (> 4.5) while 59% of students of group B have taken above average; their grades were greater than 4.5 over 9 (> 4.5).

Group A:



Group B:



IV. CONCLUSION

Words do matter. This world deserves to become a place where words can both lift us from the precipice and send us on an adventure. Words are more than simply tools for us to change our emotional state or express how we feel. The way that people refer to themselves and others is highly diagnostic of their mental state.

Certain words reflect the behavioral characteristics of the person who spoke or wrote them.

Words are the vehicle for change and inspiration; they allow the brightest minds on Earth to free themselves of the chains in their minds. Words turn dreams and visions into reality, they give life to all that remains hidden and kept away.

Words have given us a chance.

APPENDIX 1

Case 1: Story

- One day a mother and her son went to the garden, while the mother was watering the plants, the son asked her: I have never seen a green plant working, who cooks for her?
- S: Who cooks for you?
- M: You mom
- M: If I want to make a cake for you, what do I need?
- S: Milk, flour, and eggs.
- M: Great. And so the green plants, they cook for themselves. They need carbon dioxide, sunlight, and water.
- S: Complete mama!
- M: When the plants take these, they give oxygen and glucose (sugar), and the sugar feeds the plants.
- S: Okay mama, but why this process is called photosynthesis?
- M: Son, photosynthesis is "photo" which means light and "synthesis" which means mixing. And it's a process where the plants make their own food.

Case 2: Lecturing

- Photosynthesis is a process where the plants make their own food.
- The plants take carbon dioxide, water, and light in order to make photosynthesis.
- The plants mix them in order to give oxygen gas and glucose (sugar).
- The sugar feeds the plant.

APPENDIX 2

Circle the correct answer in each of the following

	1	2	3	4	5
'photosynthesis' What does 'photo' mean?	picture	Light	mixing	post	water
'photosynthesis' What does 'synthesis' mean?	giving	Taking	adding	deleting	mixing
What is the meaning of photosynthesis?	Process where plants make their own food	Process where food make their own plants	Process where mothers cook their cakes	Process where light takes air	Process where oxygen is absorbed
What does the plant need to make its own food?	-water -sunlight -oxygen	-water -carbon dioxide	-water -sunlight -carbon dioxide	-water -oxygen	-sunlight -soil -oxygen
What do the roots absorb?	oxygen	Carbon dioxide	Sunlight	water	Carbon dioxide and water
CO ₂ is taken by...	leaves	stem	Roots	fruits	soil
What does the plant produce?	Carbon dioxide and glucose	Oxygen and glucose	Water and glucose	Only glucose	Only oxygen
Trees give oxygen so oxygen will...	stay constant	increase	Decrease	Not be found	disappear
Trees give oxygen so carbon dioxide will...	Stay constant	Increase	decrease	Not be found	disappear

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